MINISTRY OF ENVIRONMENT, WATERS AND FORESTS
NATIONAL ENVIRONMENTAL PROTECTION AGENCY

REPORT OF INDICATORS
YEAR 2020

Bucharest - 2021

EXECUTIVE SUMMARY

The indicators report for the year 2020 is a selection of the indicators found in the Report on the state of the environment in Romania for the year 2020 (published on the ANPM website:http://www-old.anpm.ro/upload/217086_RSM%202020.pdf), elaborated with data of public interest provided by the institutions found in the report or taken from the websites of European or international bodies relevant in the field of protection Environment.The report provides assessments of the environmental situation, scenarios of its evolution, information about the actions to be taken and what needs to be done or can be done to improve it, in the light of the 37 Core Set Indicators (CSI) established by the European Environment Agency (EEA) taken over and supplemented with 34 other specific indicators, by O.M.M.A.P. no.618/30.03.2015, for the most correct characterization of the 12 thematic areas of the report. Thus, the current report aims to describe, as close as possible to the European model, the way in which the environmental policies are carried out and evolve, the trends in this field and the forecast of the impact at the level of Romania.

Thank you all!
The elaboration team, Bucharest 2021

Translated by, Elena Emilia Neacșu-
Authorization no: 25580
Translation date: 08/09/2022

CONTENTS

SELECTIVE LIST OF ABBREVIATIONS AND ACRONYMS

AGA	Annual Growth Analysis
WBA	Water Basin Administration
DSWBA	Dobrogea-Seaside Water Basin Administration
WA	Waterway Administration
EEA	European Environment Agency
EFA	Environmental Fund Administration
GARTR	General Association of Refrigeration Technicians in Romania
CASHF	County Association of Sport Hunters and Fishermen
MA LIOP	Managing Authority for the Large Infrastructure Operational Program
MA OPAC	Managing Authority of the Operational Program Administrative Capacity
NARW	National Administration of “Romanian Waters"
NACREA	National Agency for Cadastre and Real Estate Advertising
NALI	National Agency for Land Improvement
NMA	National Meteorological Administration
NAFA	National Agency for Fisheries and Aquaculture
NACP	National Authority for Consumer Protection
NEPA	National Environmental Protection Agency
NRACPUS	National Regulatory Authority for Community Public Utilities Services
NAHCP	National Agency for Hazardous Chemicals and Preparations
NSVFSA	National Sanitary Veterinary and Food Safety Authority
APSFR	Areas with Potential Significant Flood Risk
EPA	Environmental Protection Agency
AOT40	Accumulated Ozone exposure over a Threshold of 40 ppb (= 80 µg / m^3)
RWA	Romanian Water Association
SYR	Statistical Yearbook of Romania
G	(Ecological condition) good
HB	River basin
BAT	The best techniques available
CDGLU	Creation of the Database of Ground-Land Units
EBRD	European Bank for Reconstruction and Development
Bio	Biological elements
RDBAT	Reference documents on best available techniques
BCC	Balance of credit capitalization

WB	Water body
AWB	Artificial water body
CD	Chemicals Directive
CANE	Classification of Activities in the National Economy
CAFE	Clean Air For Europe
SMWB	Strongly modified water body
CBC	Cross Border Cooperation
BOC	Biochemical oxygen content at 5 days
CGAP	Code of Good Agricultural Practice
COC-Cr	Chemical oxygen content - the method with potassium dichromate
CDC	Center for Disease Control
CDM	The Clean Development Mechanism
DBSC	Danube-Black Sea Canal
CE	Council of Europe
EEC	European Economic Community
ESC	Economic and Social Cohesion
ETP	Electro-thermal power plant
CFC	Chlorofluorocarbons
TCC	Continental temperate climate
WCTC	Warm continental temperate climate
CITSWFF	Convention on International Trade in Species of Wild Fauna and Flora
CIS WFD	Common Implementation Strategy for the Water Framework Directive
CLP	Classification, Labeling and Packaging
MAC	Maximum Permissible Concentration
CMIP	Climate Model Intercomparison Project
CMD	Carcinogens and Mutagens Directive
MTSR	Mutagenic and Toxic Substances for Reproduction
NCCNA	National Commission for the Control of Nuclear Activities
NCOED	National Center for Oceanographic and Environmental Data
NCRMCE	National Center for Risk Monitoring in the Community Environment
NCAPPP	National Commission for Approval of Plant Protection Products
NCBP	National Commission for Biocidal Products
NCAC	National Coastal Area Committee
CCSTC	Competence center for space technologies in Constanța
VOC	Volatile Organic Compounds
NMVOC	Nonmethane Volatile Organic Compounds
PAMNC	Poarta Albă-Midia Năvodari canal
CPR	Common Provisions Regulation

CPFEU	Catch per fishing effort unit
CPD/PID	Sustainable consumption and production action plan and sustainable industrial policy
CBS	Commission for Biosafety
CSD 1996	Wastewater treatment
CAD	Chemical Agents Directive
DSWD	Dobrogea Litoral Waters Directorate
CDARD	County Directorate for Agriculture and Rural Development
WFD	Water Framework Directive (Directive 2000/60 / EC)
DG IMIES	Directorate-General for the Internal Market, Industry, Entrepreneurship and SMEs
CMD	Carcinogens and Mutagens Directive
MSFD	Marine Strategy Framework Directive
ID	Insufficient data
DDT	1,1,1-Trichloro-2,2-bis (4-chlorophenyl) ethane
CAD-MARD	County agricultural directorates - Ministry of Agriculture and Rural Development
WEEE	Waste Electrical and Electronic Equipment
CCTC	Cool continental temperate climate
DMC	Domestic Material Consumption
DIM	Direct material inputs
DIPCET	Directorate for Industrial Policies, Competitiveness and Energy Transport
PH	Public Health
DPSIR	Driver-Pressure-State-Impact-Response - Anthropic Activity-Pressure-State-Impact-Response
EEE	Electrical and electronic equipment
ECA	European Chemicals Agency
EEA	European Environment Agency
EFSA	European Food Safety Authority
PPE	Personal Protective Equipment
EMAS	Eco-Management and Audit Scheme - Community Environmental Management and Audit System
ES	European standard
ENSO	El Niño-Southern Oscillation
EQS	Environmental Quality Standard
E-PETR	European Pollutant Emission and Transfer Register
ESS SDI	Population connected to wastewater treatment systems
EA-SHW	European Agency for Safety and Health at Work
EU TEPI WP-5	Purified water - Collected water
EUSC	European Union Statistics Commission
Eurostat ETE	Population connected to urban wastewater treatment plants

EUNIS	European Nature Information System
VG	(ecological condition) very good
FB/Fb	Phytobenthos
CF	Cohesion Fund
GPCE	General physico-chemical elements
EAFRD	European Agricultural Fund for Rural Development
ERDF	European Regional Development Fund
PP	Phytoplankton
RF	Rural fund
UF	Urban fund
SF	Suburban fund
CGAEC	Code for Good Agricultural and Environmental Conditions
GEF	Global Environment Facility
GFCM	General Fisheries Commission of the Mediterranean
MRI	Market research institute
NEG	National Environmental Guard
GHG	Greenhouse Gas
GES	Greenhouse gases
GIS	Geographic Information System
H	The mountain climate
GD	Government decision
PAH	Polyaromatic hydrocarbons
HCB	hexachlorobenzene
HCFC	Hydrochlorofluorocarbons
HCH	Hexachlorocyclohexane
HFC	Hydrofluorocarbons
I	Industrial
ICP	International Co-operative Program
RIPA	Research Institute for Pedology and Agrochemistry
ICPDR	International Commission for the Protection of the Danube River
IFI	International Financial Institution
NIRD	National Institute for Research and Development
NIS	National Institute of Statistics
IED	The Industrial Emissions Directive
IET	International Emissions Trading
LCI	Large Combustion Installations
SME	Small and medium enterprises
IMP	Integrated Maritime Policy
DDNRDI	Danube Delta National Research and Development Institute
KT	Kilo ton
GA-NMRDI	Grigore Antipa National Marine Research and Development Institute
NRDIMGG-GEOECOMAR	National Research-Development Institute for Marine Geology and Geoecology - GEOECOMAR Bucharest

NRDIEPB	National Research and Development Institute for Environmental Protection Bucharest
NIGHGE	National Inventory of Greenhouse Gas Emissions
NIHWM	National Institute of Hydrology and Water Management
NIS	National Institute of Statistics
IUCN	International Union for Conservation of Nature
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
IPPU	Industrial Processes and Product Use
SIPA	Structural Instrument for Pre-Accession
IOS	International Organization for Standardization
SIVTR	State Institute for Variety Testing and Registration
THI	Temperature-humidity index
IUCNR	International Union for Conservation of Nature and its Resources
JI	Joint implementation
LC	Threatened with extinction
LCP	Large Combustion Plant
DEL	Derived Emission Limits
E.I	Equivalent inhabitants
NRLER	National Reference Laboratory for Environmental Radioactivity
LRTAP	Air pollutant emissions data viewer (LRTAP Convention)
LULUCF	Land use, land use change and forests
M	(Ecological status) moderate
MARD	Ministry of Agriculture and Rural Development
ICZM	Integrated Coastal Zone Management
ME	Ministry of the Environment
AA	Annual average (arithmetic)
MARSPLAN-BS	Cross-border maritime spatial planning in the Black Sea - Romania and Bulgaria
MBP	The Man and the Biosphere Program
MWF	Ministry of Waters and Forests
MRDPA	Ministry of Regional Development and Public Administration
MEF	Ministry of European Funds
MLW	Marine Litter Watch App
MONERIS	Modeling Nutrient Emissions in River Systems
MH	Ministry of Health
MSFD	Marine Strategy Framework Directive
TSS	Total suspended solids
MZB	Macrozoobenthos (benthic macronevertebrates)
N	NUTRIENTS
NAO	North Atlantic oscillation
NAP	National Allocation Plans

NR	Not rated
TN	Total nitrogen
WPLV	Wastewater pollutant limit values
NAUI	National Association of Underwater Instructors
NWRM	Natural Water Retention Measures
CB	Control body
OECD CEI	Population connected to wastewater treatment plants
OECD KEI	Degrees of connection to wastewater treatment plants
COPAS	County Office of Pedological and Agrochemical Studies
OM	Order of the Minister
GEO	Government Emergency Ordinance
DO	Dissolved oxygen
ODS	Substances that destroy the ozone layer
NGO	Non-governmental organization
UNO	United Nations
OPAS	Office of Pedological and Agrochemical Studies
OUAI	Water users' organizations for irrigation
F	Fish
P	Poor ecological condition
LEAP	Local Environmental Action Plan
AT	Alert threshold
RBDP	River Basin Development Plan
PADI	Professional Association of Diving Instructors
PCB	Polychlorinated biphenyls
GEP	Good ecological potential
MEP	Moderate ecological potential
MaxEP	Maximum ecological potential
PET	Polyethylene terephthalate
PFC	Perflourocarbons
IT	Information threshold
GDP	Gross domestic product
RBMP	River basin management plan
NAPEP	National Action Plan for Environmental Protection
NDP	National Development Plan
NRDP	National Rural Development Program
NWMP	National Waste Management Plan
NPRMIIR	National Program for Rehabilitation of the Main Irrigation Infrastructure in Romania
NPM	The National Plan of management
NRP	National Reform Program
TAOP	Technical Assistance Operational Program
ACOP	Administrative Capacity Operational Program
LIOP	Large Infrastructure Operational Program
POPs	Persistent Organic Pollutants
SOP	Sectoral Operational Programme

PFPPM	Plans for Flood Prevention, Protection and Mitigation
RWMP	Regional Waste Management Plan
SP	Specific pollutants
MSP	Maritime Spatial Planning
GMHP	Genetically modified higher plants
TP	Total phosphorus
STP	Short-term pollution
Q	Flow m3 / s
DDBR	Danube Delta Biosphere Reserve
RBLM	Risk-Based Land Management
EQR	Ecological quality ratio
CREAS	Chemical Registration, Evaluation and Authorization System
AR	Arranged Regime
NR	Natural regime
EPER	European Pollutant Emission Register
NAQMN	National Air Quality Monitoring Network
NNERS	National Network for Environmental Radioactivity Surveillance
CSR	Country Specific Recommendations
P	(Ecological status) poor
RAU	Register of Aquaculture Units
NSSD	National Strategy for Sustainable Development
SAC	Special Areas of Conservation
ICMS	International Chemicals Management Strategy
EPARD	European Program for Agriculture and Rural Development
SCI	Sites of Community Importance
SDNP	Sustainable Development Network Program
SDG	Sustainable Development Goals
ES	Ecological status
CMAIDS	Control of major accidents involving dangerous substances
SF6	Sulfur hexafluoride
CIL	Cold Intermediate Layer
NWSER	National warning / alarm system for environmental radioactivity
NSELAGHG	National System for Estimating the Level of Anthropic Greenhouse Gas Emissions
NSIAQAM	National System for Integrated Air Quality Assessment and Management
NWMS	National Waste Management Strategy
NPC	National Petroleum Company
NSFA	National strategy for fisheries and aquaculture
ASAP	Areas of Special Avifauna Protection

RS	Romanian standard
LLC	Limited liability company
OSH	Occupational Safety and Health
QHTL	Quasi-homogeneous top layer
ERSS	Environmental Radioactivity Surveillance Strategy
PTS	Permanent Technical Secretariat
SWOT	Strengths Weaknesses Opportunities Threats
T	Transport
EU	European Union
GEF	Global Environmental Finance
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UV	Ultraviolet rays
V	Total volume m3
LV	Limit value
VU	Vulnerable
LVE	Limit Values Emission
ELV	End-of-life vehicles
WQ	Water Quality / Model for water quality forecasting
WEI	Water Exploitation Index
WFEA	World Forum for Ecological Acoustics
WWFN	World Wide Fund for Nature
EWIS	European Water Information System
WTC	Wastewater treatment cover
LSA	Large supply area
AVN	Areas vulnerable to nitrates

LIST OF SPECIFIC INDICATORS FOR ROMANIA

***Source*: Guide for the elaboration of the Annual Report on the State of the Environment according to the requirements of the European Environmental Status Report (SOER) – O.M.M.A.P. no. 618/30.03.2015**

***Note*: Indicators not contained in the report could not be processed due to lack of data**

Core Set Indicators (CSI):

AIR POLLUTION

- RO 01 CSI Indicator 01 – Emissions of acidifying substances
- RO 02 CSI Indicator 02 – Ozone precursor emissions
- RO 03 CSI Indicator 03 – Primary particle emissions and secondary particle precursors
- RO 04 CSI Indicator 04 – Exceeding air quality limit values in urban areas
- RO 05 CSI Indicator 05 – Exposure of ecosystems to acidification, eutrophication and ozone

BIODIVERSITY

- RO 07 CSI Indicator 07 – Species of European interest
- RO 08 CSI Indicator08 – Designated protected areas
- RO 09 CSI Indicator09 – Species diversity

CLIMATE CHANGE

- RO 06 CSI Indicator 06 – Production and consumption of substances leading to the destruction of the ozone layer
- RO 10 CSI Indicator 10 – Greenhouse gas emissions trend
- RO 11 CSI Indicator 11 – Greenhouse gas emission projections
- RO 12 CSI Indicator 12 – Global european and national level temperature
- RO 13 CSI Indicator 13 – Atmospheric concentrations of greenhouse gases

LAND AND SOIL

- RO 14 CSI Indicator 14– Land occupancy
- RO 15 CSI Indicator 15 – Progress in the management of contaminated sites

WASTE

- RO 16 CSI Indicator 16 – Municipal waste generation
- RO 17 CSI Indicator 17 – Generation and recycling of packaging waste

WATER

- RO 18 CSI Indicator 18 – Use of freshwater resources
- RO 19 CSI Indicator 19 – Oxygen-consuming substances in rivers
- RO 20 CSI Indicator 20 – Nutrients in water
- RO 21 CSI Indicator 21 – Nutrients in transitional, coastal and marine waters
- RO 22 CSI Indicator 22 – The quality of bathing water
- RO 23 CSI Indicator 23 – Chlorophyll A of the transitional, coastal and marine waters
- RO 24 CSI Indicator 24 – Urban wastewater treatment

AGRICULTURE

- RO 25 CSI Indicator 25 – Gross balance of nutrients
- RO 26 CSI Indicator 26 – Area intended for organic farming

ENERGY

- RO 27 CSI Indicator 27 – Final energy consumption by sector type
- RO 28 CSI Indicator 28 – Primary energy intensity
- RO 29 CSI Indicator 29 – Primary energy consumption by fuel type -
- RO 30 CSI Indicator 30 –Primary energy consumption produced from renewable energy sources
- RO 31 CSI Indicator 31 – Electricity consumption produced from renewable energy sources

FISHING

- RO 32 CSI Indicator 32 – State of marine fish stocks
- RO 33 CSI Indicator 33 – Aquaculture production
- RO 34 CSI Indicator 34 – Fishing fleet capacity

TRANSPORT

- RO 35 CSI Indicator 35 – Passenger transport demand
- RO 36 CSI Indicator 36 – Demand for the freight transport
- RO 37 CSI Indicator 37 – The use of alternative and cleaner fuels

SPECIFIC INDICATORS:

AIR POLLUTION

- RO 38 APE Indicator 05 – Heavy metal emissions
- RO 39 APE Indicator 06 – Emissions of persistent organic pollutants

BIODIVERSITY

- RO 40 SEBI Indicator 05 – Habitats of European interest in Romania
- RO 41 SEBI Indicator 07 – Nationally designated protected natural areas
- RO 42 SEBI Indicator 08 – Protected areas of community interest designated under the Habitats and Birds Directive
- RO 43 SEBI Indicator 10 – Invasive alien species
- RO 44 SEBI Indicator 13 – Fragmentation of natural and semi-natural areas
- RO 45 SEBI Indicator 17 – Forest: forest fund, timber growth and harvesting
- RO 46 SEBI Indicator 18 – Forest: dead wood (dry)

CLIMATE CHANGE

- RO 47 CLIM Indicator02 – Average rainfall
- RO 48 CLIM Indicator 04 – Extreme rainfall
- RO 49 CLIM Indicator 08 – The degree of snow layer
- RO 50 CLIM Indicator 12 – Sea level rise at global, European and national level
- RO 51 CLIM Indicator 13 – Increase in sea water temperature
- RO 52 CLIM Indicator 16 – Watercourse flow rates
- RO 53 CLIM Indicator 17 – Floods
- RO 54 CLIM Indicator 18 – Hydrological drought
- RO 55 CLIM Indicato r27 – Soil Organic Carbon
- RO 56 CLIM Indicator 30 – Growing season of agricultural crops
- RO 57 CLIM Indicator 32 – Productivity of agricultural crops due to lack of water resources
- RO 58 CLIM Indicator 34 – Areas occupied by forests
- RO 59 CLIM Indicator 35 – Risk of forest fires
- RO 60 CLIM Indicator 36 – Extreme temperatures and health

- RO 61 CLIM Indicator46 – Flooding and health
- RO 62 CLIM Indicator47 – Number of degrees-days for heating

WASTE

- RO 63 WasteIndicator 003 – Waste electrical and electronic equipment

WATER

- RO 64 WHS Indicator 01 – Pesticides in groundwater
- RO 65 WHS Indicator 02 – Dangerous substances in watercourses
- RO 66 WHS Indicator 03 – Dangerous substances in lakes
- RO 67 WEC Indicator 04 – Watercourse classification schemes

TRANSPORT

- RO 68 TERM Indicator 08 –Land occupancy through transport infrastructure
- RO 69 TERM Indicator 11 – End-of-life vehicles

SUSTAINABLE CONSUMPTION AND PRODUCTION

- RO 70 SCP Indicator 033 – Number of EMAS and ISO 14001 certified organisations
- RO 71 SCP Indicator - Number of products and services labelled with the European Eco-label

Chapter I
AMBIENT AIR QUALITY AND POLLUTION

AMBIENT AIR QUALITY STATUS

The surrounding air quality can be highlighted by choosing some indicators to characterize this environmental factor. The confidence level of these indicators depends on the quality of the data used, which can be:

- data available from air quality monitoring networks;
- results of studies, inventories, forecasts;
- givenand available results reported or obtained through studies at European level;
- scenarios, strategies, programs, objectives, targets at national and European level that monitor air quality and pollution.

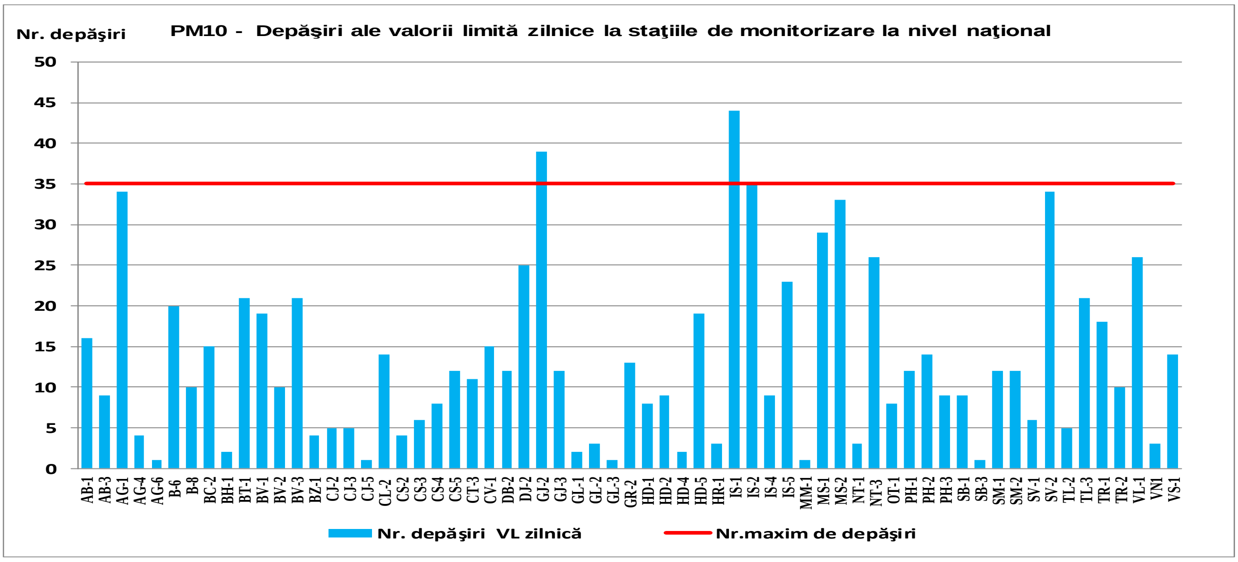
Exceeding the limit values and target values regarding ambient air quality in urban areas

RO 04
Indicator code Romania: RO 04 EEA indicator code: CSI 04
TITLE: **EXCEEDING THE AIR QUALITY LIMIT VALUES IN URBAN AREAS**
DEFINITION: The percentage of the urban population potentially exposed to concentrations of pollutants in the surrounding air that exceed the limit values for the protection of human health.

The quality of life is strictly correlated and dependent on the quality of the air. The rate of economic, demographic and institutional development requires the taking of well-thought-out and documented measures to control dangerous air pollution phenomena, to direct the socio-economic-financial development mechanisms for the benefit of man and humanity.

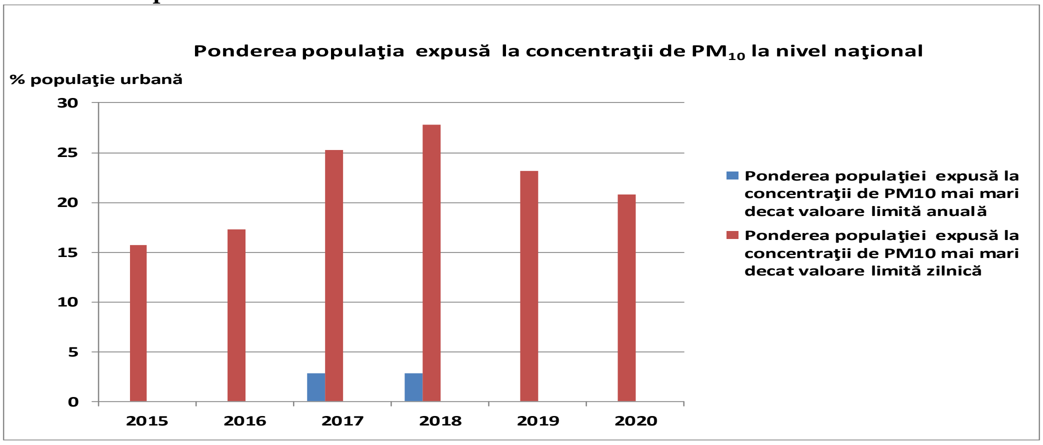
The body burden of the population exposed to certain pollutants, known to have storage qualities in certain organs, represents another important aspect of the influence of environmental pollution on health, which can be analyzed through the percentage of the urban population potentially exposed to concentrations of pollutants in the ambient air and which exceed the limit value for the protection of human health.

Figure I.1 Number of exceedances of the daily limit value for PM10 particles in suspention at monitoring stations at national level in 2020



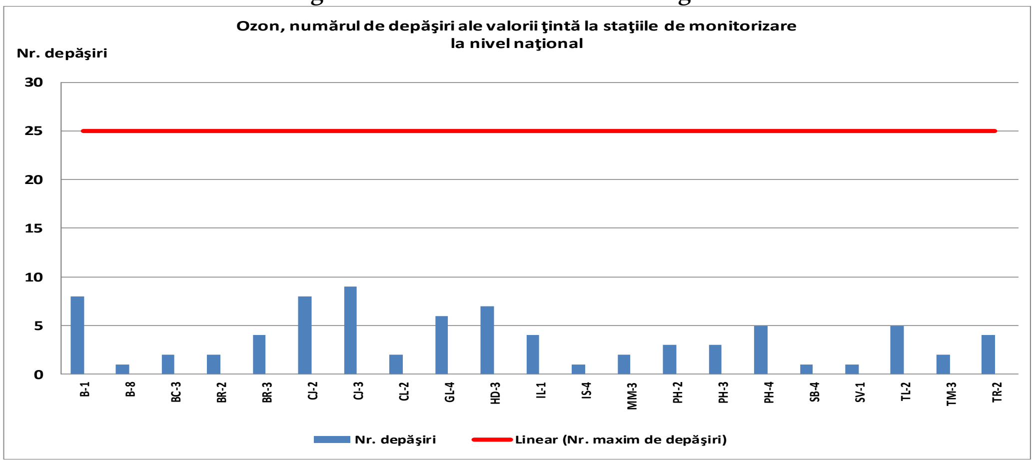
Source: NEPA

Figure I.2 Share of the population at national level that is potentially exposed to PM10 concentrations that exceed the limit value established for human protection



Source:NEPA

Figure I.3 Number of exceedances of the target value for ozone at monitoring stations at national level in 2020



Source: NEPA

The knowledge of these effects of environmental pollution on health led to the need to establish environmental protection measures, which also take into account the data regarding the number of exceedances of the limit value/target value recorded at national level.

Effects of ambient air pollution on health

The ever-increasing requirements for electricity, thermal energy, products from the chemical, metallurgical, cement industries, road and air transport, are causes for which atmospheric pollution is becoming more acute due to the increase in the air concentration of some atmospheric pollutants (SO_2, NO_x, O_3, fine particle emissions, etc.) or the penetration into the atmosphere of some harmful compounds (radioactive elements, synthetic organic substances, etc.). Air pollution has unpleasant, often serious consequences for humans and the environment, in various forms: it prevents the development of vegetation, reduces the value and agricultural production, reduces visibility, leads to the emission of smoke into the environment, harmful vapors, etc., but also on buildings, infrastructure and technical, electrical and electronic material increasingly miniaturized, more compact, with more complex functions and therefore extremely sensitive to air pollution, emphasizing its attrition and degradation.

Effects of ambient air pollution on ecosystems

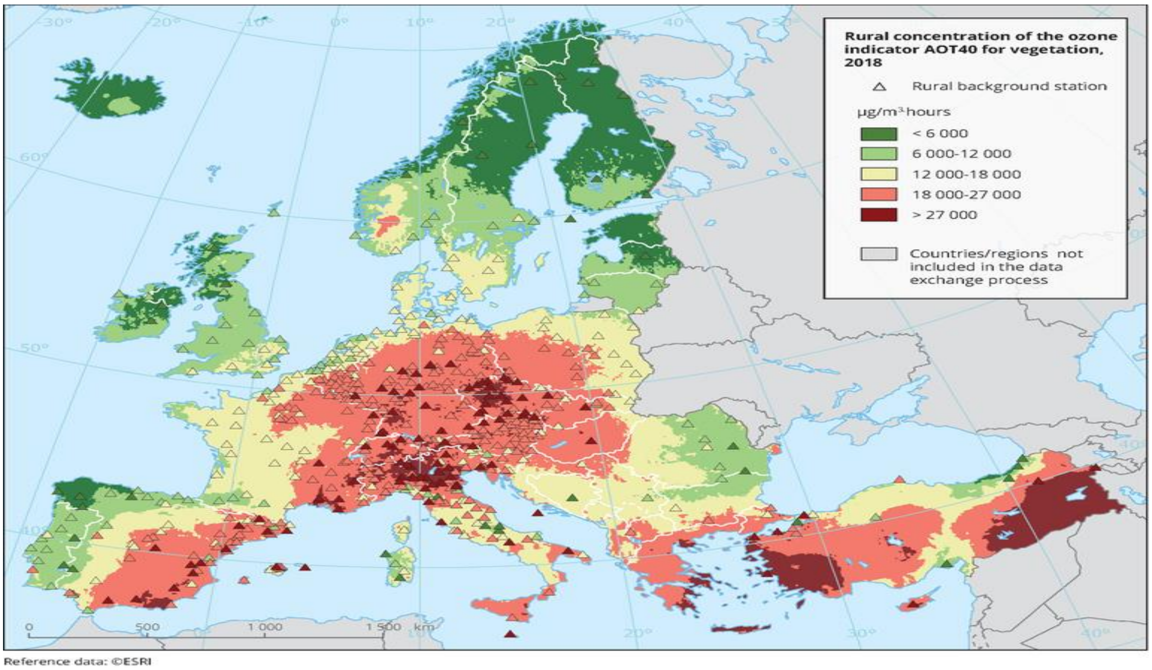
Ambient air pollution affects ecosystems negatively influencing the development of fauna and flora, which are sometimes much more sensitive than the human body to the action of various pollutants. The effects of atmospheric pollutants are diverse, depending on their nature:

- acid gases (carbon monoxide, sulfur dioxide, nitrogen oxides) in combination with water from precipitation produce acid rain that affects vegetation;
- nitrogen and sulfur compounds contribute to the formation of smog, which prevents normal photosynthesis and animal respiration;
- halogen derivatives cause burns in plants and the disease called fluorosis in animals (deformation of bones and loss of teeth);
- the particles reduce atmospheric transparency affecting photosynthesis and animals causing respiratory diseases similar to those of humans.

RO 05
Indicator code Romania: RO 05 EEA indicator code: CSI 05
TITLE: **EXPOSURE OF ECOSYSTEMS TO ACIDIFICATION, EUTROPHISATION AND OZONE**
DEFINITION: The indicator shows the ecosystems or cultivated areas that are subject to depositions or atmospheric concentrations of pollutants that exceed the so-called "critical thresholds" or concentration for a certain ecosystem or cultivated area. At the same time, this indicator shows the state of change in acidification, eutrophication and ozone levels for the environment. The risk for each location is estimated by reference to the "critical level", which represents a quantitative estimate of the exposure to pollutants below which no harmful and significant long-term effects occur, given current knowledge.

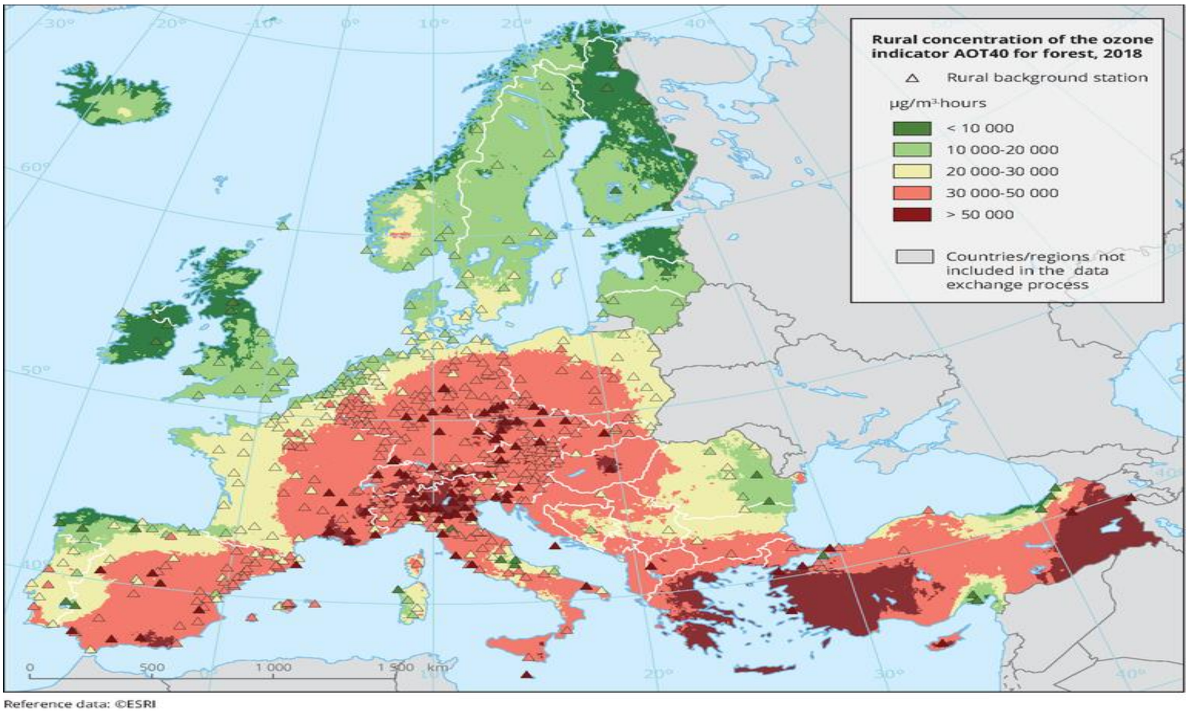
Figure I.4 Exposure of vegetation and forestareas to AOT40 ozone concentrations in some European countries

Vegetation



Source: [https://www.eea.europa.eu/data-and-maps/figures/rural-concentration-map-of-the-ozone-indicator-aot40-for-crops-year-14/120149-map11- 1-rural-concentration.eps/image_large/](https://www.eea.europa.eu/data-and-maps/figures/rural-concentration-map-of-the-ozone-indicator-aot40-for-crops-year-14/120149-map11-1-rural-concentration.eps/image_large/)

Forests



Source: https://www.eea.europa.eu/data-and-maps/figures/rural-concentration-of-the-ozone-6/120150-map11-2-rural-concentration.eps/image_large

Effects of ambient air pollution on soil and vegetation

Pollutants emitted into the atmosphere are subject to dilution and sedimentation processes, conditioned by their properties and the conditions of the atmospheric environment in which they enter. Suspensions have a lower stability in the atmosphere than gases and a lower diffusion capacity, inversely proportional to their mass and size, thus having a lower capacity to dilute in the air compared to gases, instead they sediment more easily. The main effects of ambient air pollution on soil and vegetation are eutrophication (generated by nitrogen compounds from the atmosphere through sedimentation and deposition through precipitation) and acidification (generated by acid rain, which has as its source acidic gases: CO_2, SO_2, NO_x).

EMISSIONS OF ATMOSPHERIC POLLUTANTS AND THE MAIN SOURCES OF EMISSIONS

The level of emissions of polluting substances released into the atmosphere can be significantly reduced by implementing environmental policies and strategies such as:

- greater use of renewable energy sources (wind, solar, hydro, geothermal, biomass);
- replacement of classic fuels with alternative fuels (biodiesel, ethanol);
- the use of installations and equipment with high energy efficiency (low consumption, high yields);
- carrying out a program of afforestation and creation of green spaces (absorption of CO_2, retention of fine dust, release of oxygen into the atmosphere).

The estimation of emissions for each type of air pollutant is based on indicators, assumptions, and activity data, as well as on the removal efficiency of reduction measures and the degree/dimension in which these measures are applied.

Three groups of measures have been identified to reduce air pollutant emissions, namely:

- *Autonomous measures*which represent changes resulting from human activities (e.g. lifestyle changes), stimulated by control and command approaches (e.g. legal traffic restrictions) or by economic incentives (e.g. pollution taxes, emissions trading systems , etc.).
- *Structural measures*which supply the same level of

(energy) services to the consumer, but with less polluting activities. This group includes fuel substitution (eg switching from coal to natural gas) and energy efficiency/energy conservation improvements.

*Technical measures*developed to capture emissions at source before they enter the atmosphere, emission reductions achieved through these options do not change the structure of energy systems or agricultural activities.

Energy

Final energy consumption by sector type

RO 27
Indicator code Romania: RO 27 EEA indicator code: CSI 27
TITLE: **FINAL ENERGY CONSUMPTION BY SECTOR TYPE**
DEFINITION: The indicator shows the ecosystems or cultivated areas that are subject to depositions or atmospheric concentrations of pollutants that exceed the so-called "critical thresholds" or concentration for a certain ecosystem or cultivated area. At the same time, this indicator shows the state of change in acidification, eutrophication and ozone levels for the environment. The risk for each location is estimated by reference to the "critical level", which represents a quantitative estimate of the exposure to pollutants below which no harmful and significant long-term effects occur, given current knowledge.

The assessment of the degree of energy dependence at the sector level is carried out by adding up the amounts of energy used by branches of activity according to the energy balance.The quantities used for the production of other fuels, the consumptions of the energy sector and the losses of transport and distribution are not included.

Table I.1 Energy resources, in structure and by main types

	2018	2019	distinctions	
	thousand	thousand	(±)thousand	%
ENERGY RESOURCES - TOTAL	**43238**	**44116**	**+878**	**2.03**
- Primary energy production (including recovered energy)	**24979**	24535	**-444**	-1.78
• **from primary energy resources:**				
- coal (excluding coke)	4868	4790	-78	-1.60
- crude oil²)	12485	12971	+486	3.89
- usable natural gas³)	11087	11546	+459	4.14
- imported coke	454	501	+47	10.35
- imported petroleum products	3290	3263	-27	-0.82
- hydroelectric, wind, solar photovoltaic and nuclear heat	5044	4960	-84	-1.67

1)Conventional fuel with a calorific value of 10,000 kcal/kg; 2) including gasoline and ethane from extraction scaffolds; 3)exclusive gasoline and ethane from extraction scaffolds
(*cf. INSE, Energy Balance 2019, https://insse.ro/cms/ro/tags/balanta-energetica-si-structura-utilajului-energetic*)

Resources and consumption of primary energy by fueltype

RO29

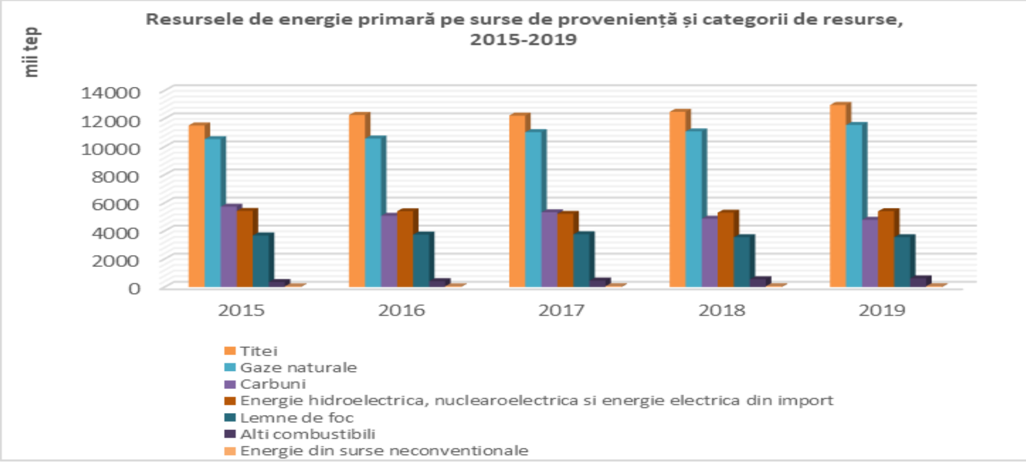
Indicator code Romania: RO 29
EEA indicator code: CSI 29

TITLE: **PRIMARY ENERGY CONSUMPTION BY FUEL TYPE**

DEFINITION: The amount of energy required to meet gross domestic energy consumption from solid fuels, crude oil, natural gas, firewood, nuclear and renewable sources and a smaller component of "other" sources (industrial waste and net electricity imports) of a country.

In 2019 **primary energy resources**were 42,701 thousand tons of oil equivalent, increasing by 1,054 thousand toe (+2.5%) compared to the previous year. Figure I.5 shows the evolution of primary energy resources from the following types of fuels: coal, natural gas, crude oil, firewood (including biomass), other fuels, energy, energy from non-conventional sources. The majority share of primary energy production from crude oil and natural gas is observed.

Figure I.5 Primary energy resources by sources of origin and resource categories, 2015-2019 (thousands toe)



Source:http://www.insse.ro(TEMPO_IND107A_14_8_2018)

Primary energy productionin 2019, 24,535 thousand toe, decreased by 444 thousand toe compared to 2018, due to the decrease in production of coal, crude oil and mainly usable natural gas (-288 thousand toe), but continued to maintain its significant share in total energy resources, representing 55.6% of them.
Electricity production from renewable resources (hydro, wind and solar photovoltaic) recorded a decrease of 6.2% (-140 thousand toe) compared to the previous year.
Total gross domestic consumption of primary energywas 33,016 thousand toe in 2019, down 1.5% compared to 2018 (-494 thousand toe).
Source: National Institute of Statistics

Emissions of acidifying substances

RO 01

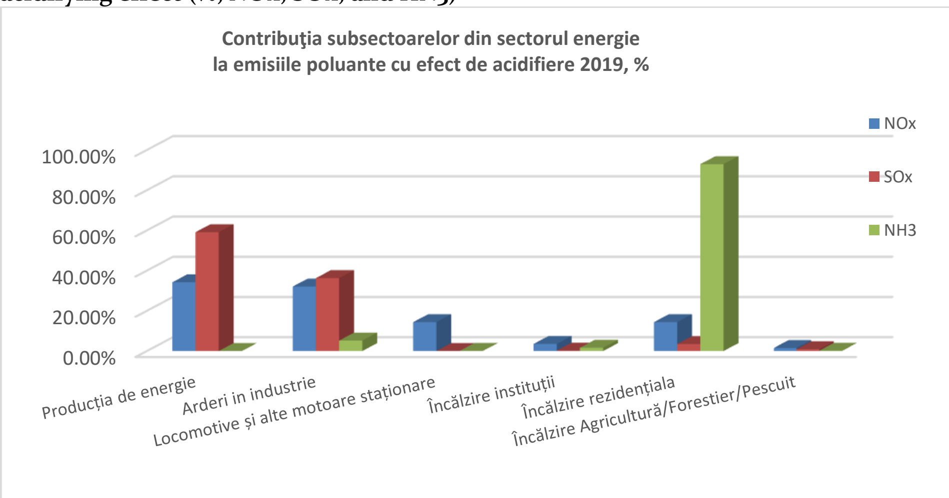
Indicator code Romania: RO 01
EEA indicator code: CSI 01

TITLE: **EMISSIONS OF ACIDIFYING SUBSTANCES**

DEFINITION:The indicator follows the trends of anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH_3) and sulfur oxides (SOx, SO_2), with each of them taking into account its acidifying potential. The indicator also provides information on changes in emissions from the main source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

*Acidification is the process of changing the natural chemical character of a component of the environment that is due to the presence in the atmosphere of halogenated chemical compounds that cause a series of chemical reactions in the atmosphere, leading to changes in the pH of the air, precipitation and even the soil, with the formation of the corresponding acids.*Gases with an acidifying effect on the atmosphere are: sulfur dioxide, nitrogen dioxide and ammonia. These pollutants come mainly from human activities: the burning of fossil fuels (coal, oil, natural gas), metallurgy, agriculture, road traffic. The main source of ammonia is represented by agriculture, namely manure management and enteric fermentation from animal husbandry and the use of nitrogen fertilizers.

Figure I.6 The contributions of the activity subsectors in the energy sector, in 2019, to the emissions of polluting substances with an acidifying effect (%, NOx, SOx, and HN3)



Source: Romania's Informative Inventory Report 2021

From the analysis of the data on the contribution of subsectors in the energy sector to the acidifying pollutant emissions in this sector, for the reporting period, a share of 91.2% of ammonia resulting from residential heating activity and high values of so2 and NOx shares in energy production and combustion activity in industry is observed for the reporting period (Figure I.18). Compared to the national total, the share of emissions from the energy sector is 43.2% for NOx, 89.2% for SO2 and 5.3% for NH3.

Emissions of ozone precursors

RO 02
Indicator code Romania: RO 02 EEA indicator code: CSI 02
TITLE: **EMISSIONS OF OZONE PRECURSORS**
DEFINITION:The indicator tracks trends in anthropogenic emissions of ozone precursor pollutants: nitrogen oxides (NOx), carbon monoxide (CO), methane (CH_4) and non-methane volatile organic compounds (VOCs) from the sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Particular attention should be paid to the control of pollution sources emitting volatile organic compounds (VOCs) mainly from the organic chemical synthesis industry because, together with particles in suspention, the main components of smog and nitrogen oxides, in the presence of light, contributes to the formation of tropospheric ozone. Troposphere ozone is a highly oxidizing, highly reactive gas with a drowning odor that causes respiratory problems, concentrates in the stratosphere and provides protection against UV radiation harmful to life.

The ozone present at ground level behaves as a component of the "photochemical smog". It is formed by means of a reaction involving in particular volatile organic compounds and nitrogen oxides.

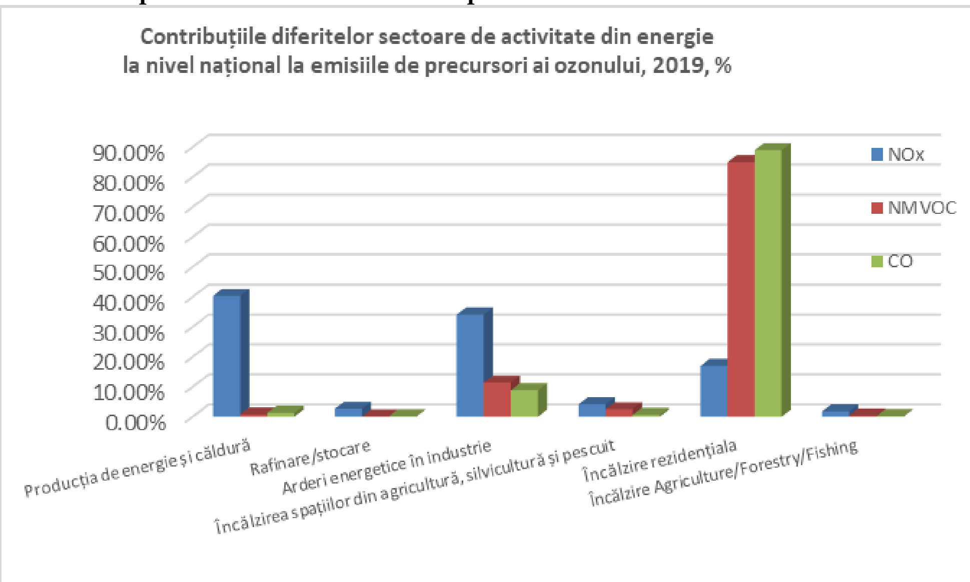
Ozone is responsible for damage to vegetation by atrophying some tree species in urban areas. In the spring-summer period, when the daylight interval is long, photochemical reactions in the atmosphere are accelerated, which results in increased ozone concentrations, especially during very hot days (with temperatures above 30°C). In addition, increased tropospheric ozone concentrations can impact crops and buildings.

Volatile organic compounds are one of the main precursors of ozone, which is a natural constituent of the atmosphere. In the context of the existence of other pollutants such as nitrogen oxides, sulfur oxides, ozone becomes a generator of smog and a series of negative effects on the climate system, as well as on the productivity of ecosystems and human health. As such, the areas most affected by tropospheric ozone pollution are the urban ones, the precursor pollutants being generated mainly by industrial activities and road traffic.

VOC pollution is widespread in many industrial facilities in the chemical and metallurgical industries, but also in fossil fuel burners or waste incinerators.

Nitrogen oxides are formed in the combustion process when fuels are burned at high temperatures, but most often they are the result of road traffic, industrial activities, electricity production. Nitrogen oxides are responsible for the formation of smog, acid rain, water quality deterioration, the greenhouse effect, and reduced visibility in urban areas.

Figure I.7 The contributions of the sub-sectors of activity in the energy sector, in 2019, to the emissions of polluting substances released into the atmosphere and considered ozone precursors



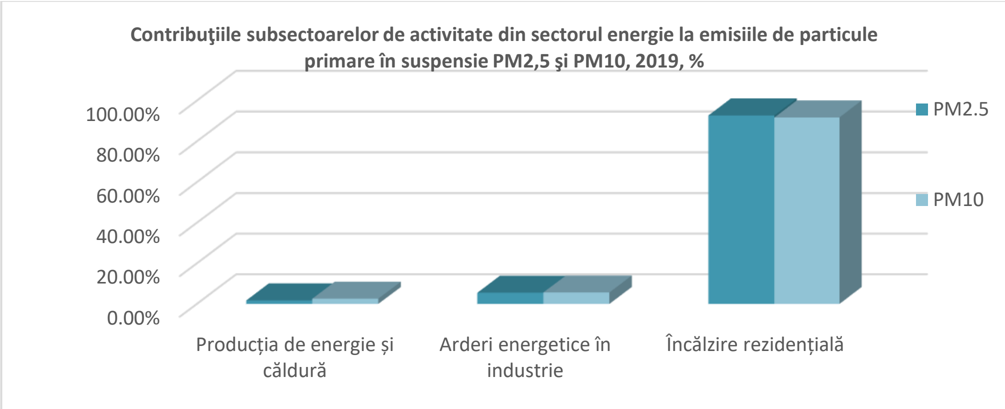
Source: Romania's Informative Inventory Report 2021

Emissions of primary particles in suspension

RO 03
Indicator code Romania: RO 03 EEA indicator code: CSI 03
TITLE: **EMISSIONS OF PRIMARY PARTICLES AND SECONDARY PARTICLE PRECURSORS**
DEFINITION:This indicator shows the trends in emissions of primary particles with a diameter smaller than 2.5 µm ($PM_{2.5}$) and respectively 10 µm (PM_{10}) and secondary particle precursors (nitrogen oxides (NO_x), ammonia (NH_3) and carbon dioxide sulfur (SO_2), from anthropogenic sources, by source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste other sources.

The contribution of the sub-sectors of activity in the energy sector to the anthropogenic emissions of primary particles with a diameter smaller than 2.5 µm ($PM_{2.5}$) and 10 µm (PM_{10}) is graphically represented, in relation to the total emissions from the energy sector.

Figure I.8 The contributions of the sub-sectors of activity in the energy sector, in 2019, to the emissions of primary particles in suspension PM2.5 and PM10



Source: Romania's Informative Inventory Report 2021

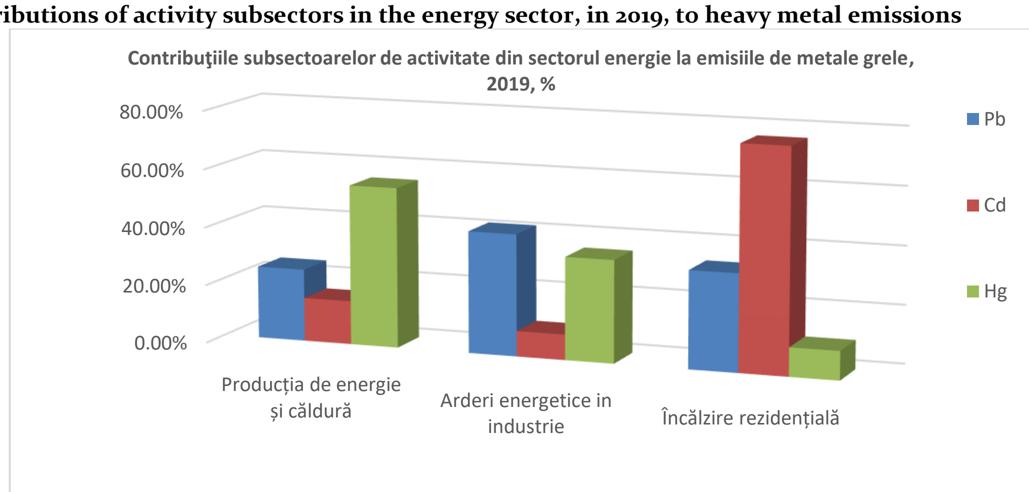
Heavy metal emissions

RO 38
Indicator code Romania: RO 38 EEA indicator code: APE 05
TITLE:**HEAVY METALSEMISSIONS**
DEFINITION:Trends in anthropogenic emissions of heavy metals by activity sector: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

Heavy metals (mercury, lead, cadmium, etc.) are compounds that cannot be degraded naturally, having a long retention time in the environment, and in the long term they are dangerous because they can accumulate in the food chain. Heavy metals can come from stationary and mobile sources: fuel and waste combustion processes, technological processes in heavy non-ferrous metallurgy and road traffic. Heavy metals can cause muscular, nervous, digestive disorders, general states of apathy. They can affect the process of plant development, preventing the normal development of photosynthesis, respiration or transpiration.

From statistical data, heavy metal emissions show a decrease compared to those recorded in recent years. The largest share of mercury emissions, in a percentage of over 60%, comes from combustion in the production of energy and heat. To these are added sectors such as: production processes, waste treatment and storage and, to a very small extent, other activities, respectively: non-industrial combustion plants and road transport.

Figure I.9 Contributions of activity subsectors in the energy sector, in 2019, to heavy metal emissions

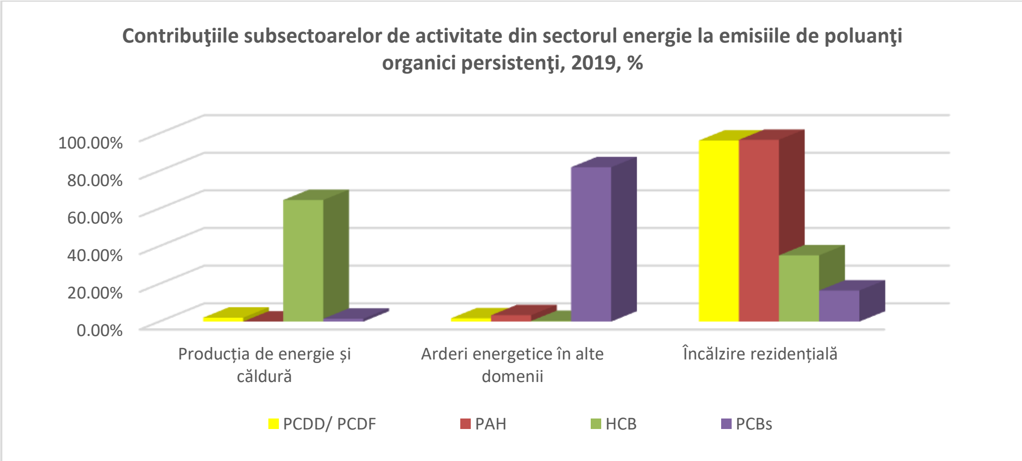


Source: Romania's Informative Inventory Report 2021

Emissions of persistent organic pollutants

RO 39
Indicator code Romania: RO 39 EEA indicator code: APE 06
TITLE: **EMISSIONS OF PERSISTENT ORGANIC POLLUTANTS**
DEFINITION:Trends in anthropogenic emissions of persistent organic pollutants, of polycyclic aromatic hydrocarbons (PAH), by activity sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

Figure I.10 The contributions of the activity subsectors in the energy sector, in 2019, to the emissions of persistent organic pollutants



Source: Romania's Informative Inventory Report 2021

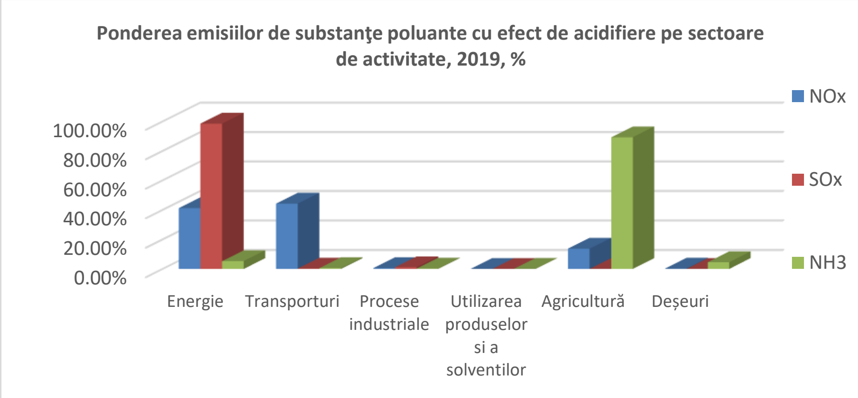
From the analysis of the data presented regarding the contribution of the subsectors to the emissions of persistent organic pollutants from the energy sector, it can be seen that the major share is residential heating, with values over 90% in the case of PCDD/PCDF dibenzofuransand PAH aromatic hydrocarbons.

Industry

Emissions of acidifying substances

RO 01
Indicator code Romania: RO 01 EEA indicator code: CSI 01
TITLE: **EMISSIONS OF ACIDIFYING SUBSTANCES**
DEFINITION:The indicator follows the trends of anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH_3) and sulfur oxides (SOx, SO_2), with each of them taking into account its acidifying potential. The indicator also provides information on changes in emissions from the main source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Figure I.11 Share of emissions of polluting substances with an acidifying effectat national level by activity sector in 2019



Source: Romania's Informative Inventory Report 2021

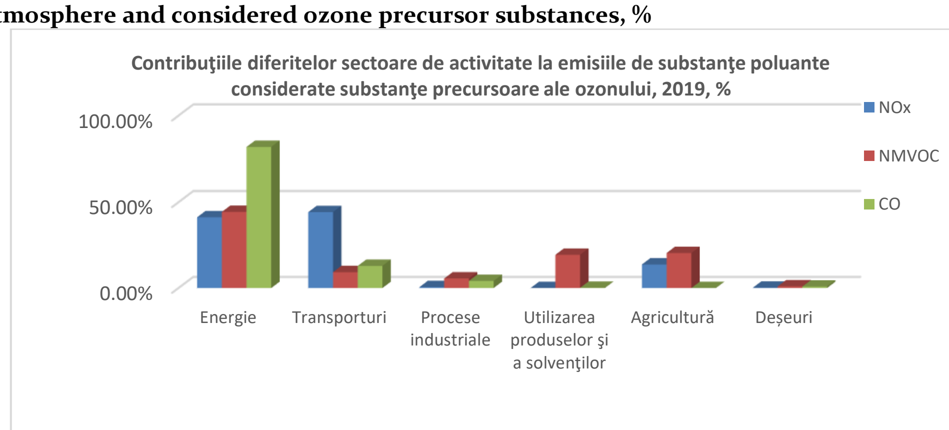
Ozone precursors emissions

RO 02
Indicator code Romania: RO 02 EEA indicator code: CSI 02
TITLE: **OZONE PRECURSORS EMISSIONS**
DEFINITION:The indicator tracks trends in anthropogenic emissions of ozone precursor pollutants: nitrogen oxides (NOx), carbon monoxide (CO), methane (CH4) and non-methane volatile organic compounds (VOCs) from the sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Ozone is the allotropic form of oxygen. In the atmosphere, it can be formed naturally as a result of electrical discharges and under the action of sunlight, and artificially as a result of the reactions of some harmful substances, originating from terrestrial pollution sources.
Ozone formed in the lower troposphere is the main pollutant in industrialized cities. Tropospheric ozone is formed from nitrogen oxides (especially nitrogen dioxide), volatile organic compounds (VOCs), carbon monoxide in the presence of sunlight, as the energy source of chemical reactions.

Toxic smog is produced by the chemical interaction between pollutant emissions and solar radiation. The most common product of this reaction is ozone. During peak hours, in urban areas, the atmospheric concentration of nitrogen oxides and hydrocarbons increases rapidly due to heavy traffic. At the same time, the amount of nitrogen dioxide in the atmosphere decreases due to the fact that sunlight leads to its decomposition into nitrogen oxide and oxygen atoms. Oxygen atoms combined with molecular oxygen form ozone. Hydrocarbons oxidize and react with nitrogen oxide to produce nitrogen dioxide.

Figure I.12 The contributions of the activity sectors at national level, in 2019 to the emissions of polluting substances released into the atmosphere and considered ozone precursor substances, %

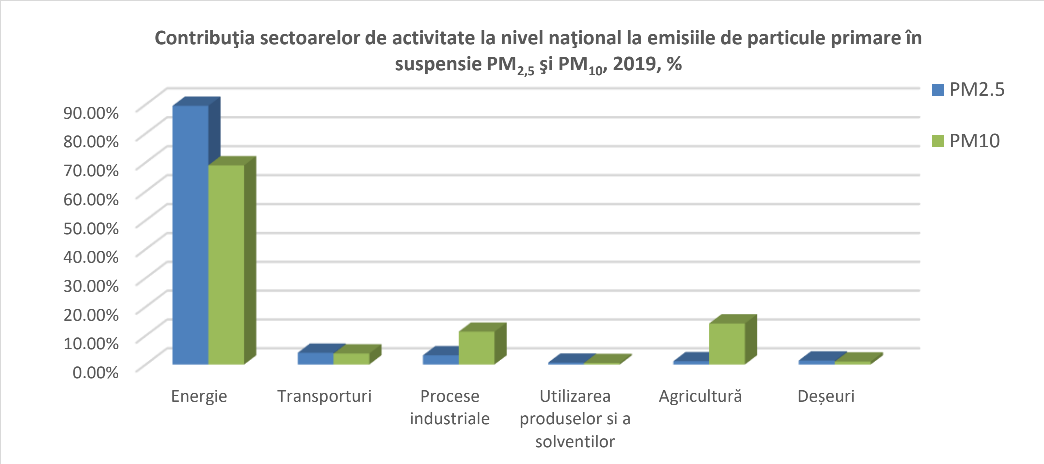


Source: Romania's Informative Inventory Report 2021

Emissions of primary particles and secondary particle precursors

RO 03
Indicator code Romania: RO 03 EEA indicator code: CSI 03
TITLE: **EMISSIONS OF PRIMARY PARTICLES AND SECONDARY PARTICLE PRECURSORS**
DEFINITION:This indicator shows the trends in emissions of primary particles with a diameter smaller than 2.5 µm (PM2.5) and respectively 10 µm (PM10) and secondary particle precursors (nitrogen oxides (NOx), ammonia (NH3) and carbon dioxide sulfur (SO2), from anthropogenic sources, by source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste other sources.

Figure I.13 The contribution of the activity sectors at national level in 2019, to the emissions of primary particles in suspension PM2.5 and PM10



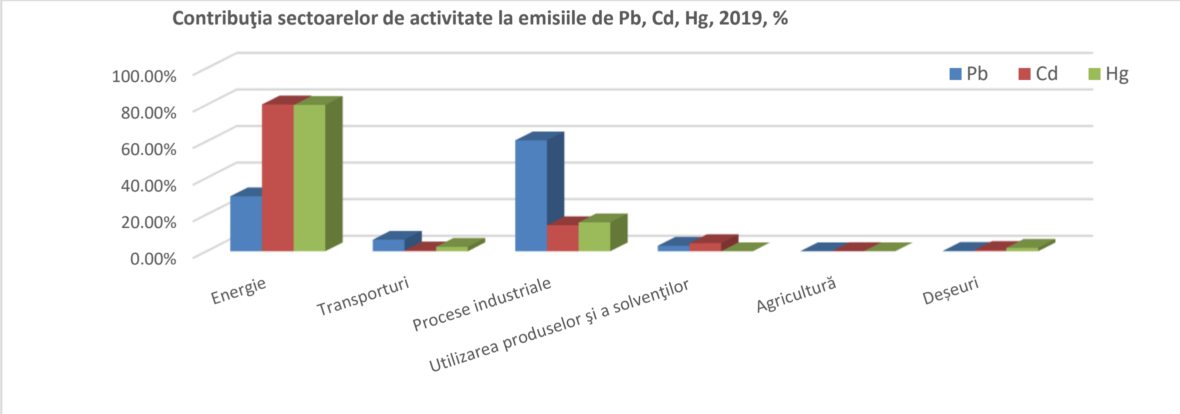
Source: Romania's Informative Inventory Report 2021

By comparing the values presented for different sectors of activity at national level, it is found that the share of the energy sector is the highest in emissions of primary particles in suspension (89.6% PM2.5, respectively 69% PM10), the majority in this sector being the emissions of dusts generated in the residential heating activity.The agriculture and industrial processes sectors stand out with much lower weights for PM10 emissions (14.2% and 11.4%, respectively).

Heavy metals emissions

RO 38
Indicator code Romania: RO 38 EEA indicator code: APE 05
TITLE: **HEAVY METALS EMISSIONS**
DEFINITION:Trends in anthropogenic emissions of heavy metals by activity sector: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

Figure I.14 The contribution of the activity sectors at national level to the emissions of heavy metals Pb, Cd, Hg, 2019

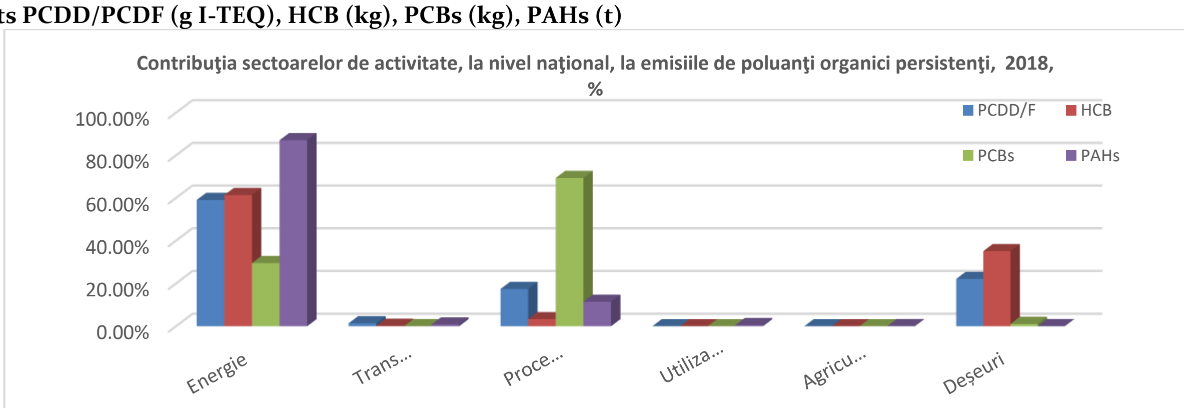


Source: Romania's Informative Inventory Report 2021

Emissions of persistent organic pollutants

RO 39
Indicator code Romania: RO 39 EEA indicator code: APE 06
TITLE: EMISSIONS OF PERSISTENT ORGANIC POLLUTANTS
DEFINITION:Trends in anthropogenic emissions of persistent organic pollutants, of polycyclic aromatic hydrocarbons (PAH), by activity sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

Figure I.15 The contribution of the activity sectors at national level in 2019, to the emissions of persistent organic pollutants PCDD/PCDF (g I-TEQ), HCB (kg), PCBs (kg), PAHs (t)



Source: Romania's Informative Inventory Report 2021

Industrial emissions

Industry

Industrial activities play an important role in the economic well-being of a country, also contributing to sustainable development. However, industrial activities can also have a significant impact on the environment. The industrial strategy for sustainable development aims to stimulate competitiveness, aiming at stable, lasting economic growth and environmental protection.

Air emissions generated by the largest industrial installations represent a considerable part of the total emissions of atmospheric pollutants. Likewise, these industrial activities have an important impact on the environmental factors of water and soil, to which is also added the waste generation. The possibility of controlling the activity of industrial installations so that emissions, resulting waste and energy consumption are as low as possible, was the object of the reform of the legislation at the level of the European Union, finally leading to the appearance in 2010 of the Directive 2010/75/EU on industrial emissions (IED Directive). Directive 2010/75/EU on industrial emissions (prevention and integrated control of pollution) (reform) aims at the prevention and integrated control of pollution resulting from industrial activities, by establishing the conditions for the prevention, and if it is not possible, for reducing emissions into air, water and soil, as well as preventing the generation of waste, in order to achieve a high level of environmental protection considered as a whole. It is also important to use energy efficiently, to prevent accidents and incidents and to limit their consequences as much as possible.

In order to prevent, reduce, eliminate pollution from industrial activities, in accordance with the polluter pays principle, the precautionary principle in environmental decision-making and the principle of pollution prevention, principles that overlap best with the concept of sustainable development, it was established by the IED Directive a general framework for the control of industrial activities, ensuring an efficient management of natural resources, giving priority to taking measures directly at the source and taking into account when necessary the economic situation, local environmental conditions or geographical location and technical characteristics of the installation.

In addition, the IED Directive promotes public access to information, public participation and access to justice in relation to the procedure for issuing the integrated environmental permit.

*Romania, as a Member State of the European Union, has implemented at national level the Register of Pollutants Emitted and Transferred in accordance with the provisions of Regulation (EC) no. 166/2006 of the European Parliament and of the Council regarding the establishment of the European Register of Pollutants Emitted and Transferred and amending Council Directives 91/689/EEC and 96/61/EC (EPRTR Regulation). The EPRTR Regulation establishes a register of emissions and transfers of pollutants at Community level (referred to as "European PRTR/EPRTR") in the form of a publicly accessible electronic database and establishes its operating rules, in order to implement the UNECE Protocol on pollutant emission and transfer registers and to facilitate public participation in environmental decision-making, as well as to contribute to the prevention and reduction of environmental pollution.*Directive 2010/75/EU on Industrial Emissions (IED) replaces the following seven directives, thus incorporating in a single clear and coherent legislative instrument a set of common rules for the authorization and control of industrial installations based on an integrated approach and application of the best available techniques:

- Directive 2008/1/EC on integrated pollution prevention and control (IPPC);
- Directive 2001/80/EC on the limitation of atmospheric emissions of certain pollutants from large combustion plants (LCP);
- Directive 2000/76/EC on waste incineration;
- Directive 1999/13/EC regarding the reduction of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations;
- Directive 78/176/EC on waste from the titanium dioxide industry;
- Directive 82/883/CE regarding the methods of supervision and control of areas where there are emissions from the titanium dioxide industry;
- Directive 92/112/CE on the procedures for the harmonization of programs to reduce, in order to eliminate, pollution caused by waste from the titanium dioxide industry.

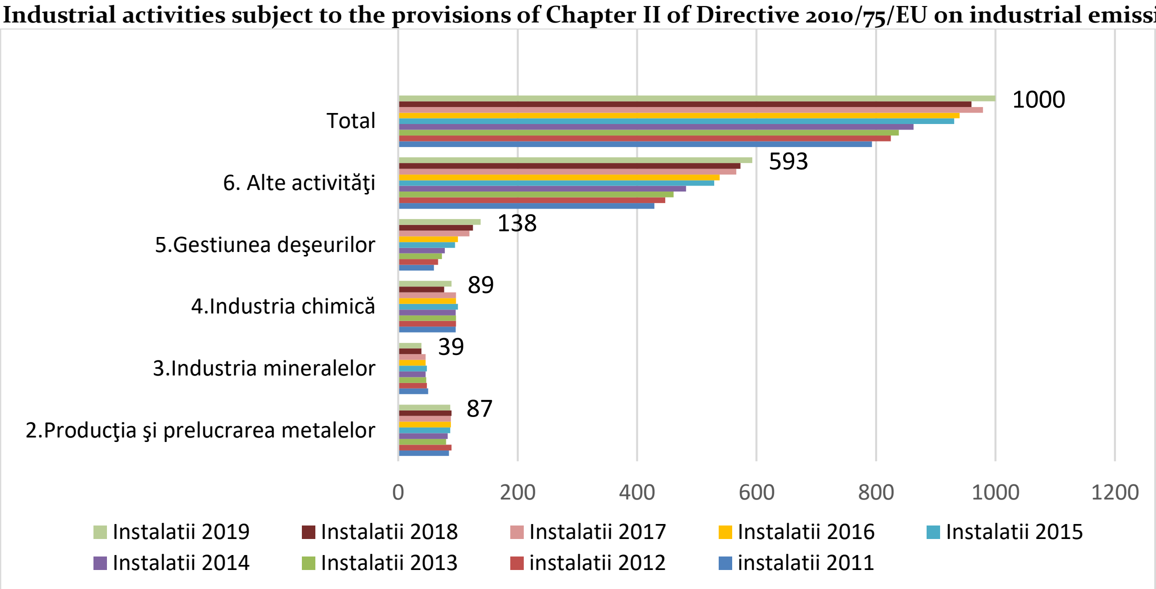
Romania transposed the provisions of the IED Directive through Law no. 278/2013 on industrial emissions, with subsequent amendments and additions, which entered into force on 01.12.2013. **Chapter II of the new directive contains provisions applicable to the activities provided for in Annex 1** and which reach, as the case may be, the capacity thresholds established in that annex. Regarding the activities listed in Annex 1, the provisions of Directive 2010/75/EU on industrial emissions are based on several principles, namely:

- integrated approach that takes into account the environmental performance of the entire installation, including air, water and soil emissions, waste generation, use of raw materials, energy efficiency, noise, accident prevention, as well as restoring the site to a satisfactory state in the moment of closure, in order to ensure a high level of environmental protection considered as a whole;
- the application of the Best Available Techniques (BAT) in the operation of industrial installations, as well as the establishment of authorization conditions and emission limit values (ELV) for pollutants in compliance with the BAT Conclusions (documents adopted by the European Commission through Implementation Decisions, which contain information on the level of emissions associated with the Best Available Techniques);
- flexibility in establishing authorization conditions by the competent authorities for environmental protection;

- verifying the compliance of industrial installations by implementing a system of environmental inspections and inspection plans including site verification at least once every 1 or 3 years;
- public participation in the decision-making process of issuing integrated environmental authorizations and informing them about the environmental performance of industrial installations.

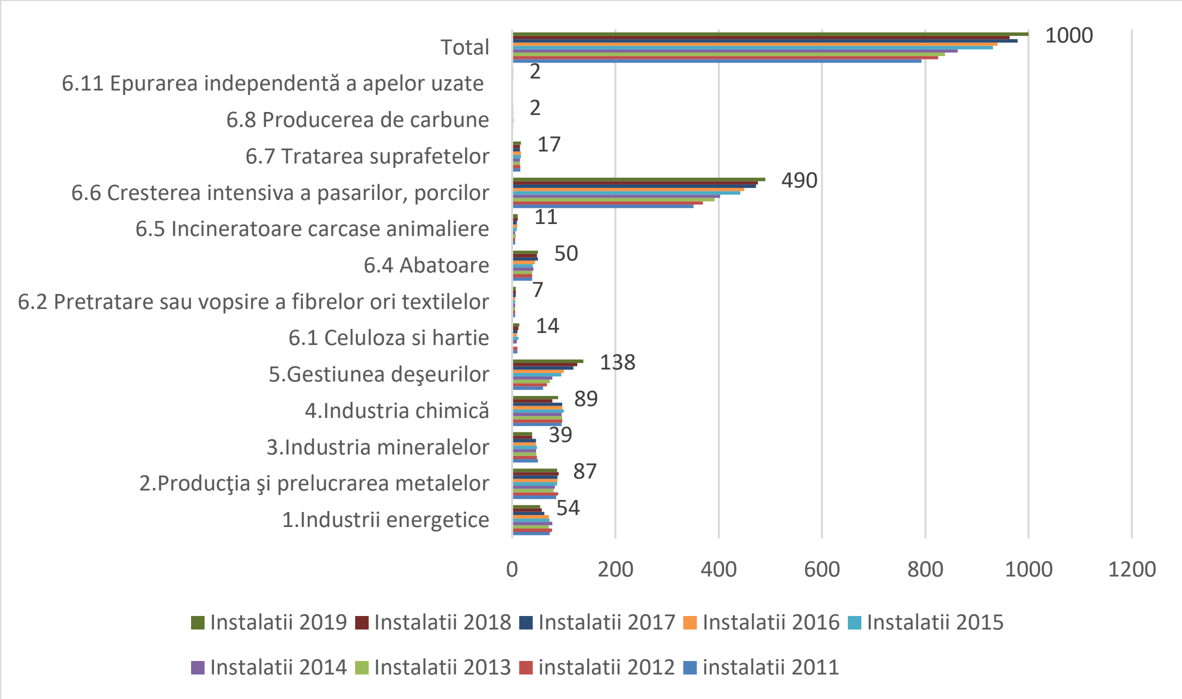
The most important categories of industrial activities provided by Annex 1 of Directive 2010/75/EU represented in Romania are the following: Thermal energy industry, Cement industry, Oil and natural gas refining industry, Chemical and petrochemical industry, Metallurgical industry. The main environmental factor possibly affected is the air due to the emissions resulting from the preparation of the raw material, the final processing of the products, the transport and storage of the raw material and auxiliary products.Also, the non-ferrous **metallurgy** industry has a possible significant impact on the environment through emissions of pollutants into the atmosphere (combustion gases and dust), through the discharge of technological waste water, waste storage, etc. The construction materials industry is represented by important units for the production of cement, lime, refractory bricks, etc., activities that cause the generation of large amounts of dust, as well as gas emissions (especially CO_2, SO_2, etc.). The chemical industry is represented by the installations for the production of basic organic and inorganic chemical substances, chemical fertilizers, phytosanitary products, basic pharmaceutical products and explosives. These activities are associated with the generation of emissions from the storage of chemicals used as raw materials and products, with potentially significant impact on air, soil and groundwater. The food industry holds an important place in the economy of many regions, being represented by facilities for the production of food, beverages and milk from raw materials of animal and plant origin. This type of activity can have a significant impact on the environment through emissions of pollutants into the atmosphere, emissions of substances from refrigeration installations, through the discharge of technological wastewater with a high organic load, the production of solid waste specific to these types of activity. That is why the operators have paid increased attention to the elimination of these problems by building purification stations, the purchase of ecological incinerators for waste of animal origin, etc. The intensive breeding of animals is represented by poultry or pig farms, which generate large amounts of pollutants and manure, which can mainly affect the air (through ammonia emissions and other gases that generate olfactory discomfort), the soil and water (generally from the storage manure and spreading it on agricultural land as organic fertilizer). The machine building industry with a possible significant impact on the environment through the metal waste resulting from series production and the specific pollutants resulting from the treatment with organic solvents of metal surfaces, objects or products manufactured within this industry. Light industry is represented by pretreatment factories (operations such as washing, bleaching, mercerization) or fiber or textile dyeing, activities that generate waste and wastewate.

Figure I.16 Industrial activities subject to the provisions of Chapter II of Directive 2010/75/EU on industrial emissions



Source: NEPA

Figure I.17 The situation of authorized installations by industrial sector at national level



Source: NEPA

Chapter III of Directive 2010/75/EU on Industrial Emissions (IED)

Chapter III of Law no. 278/2013 on industrial emissions, with subsequent amendments and additions, contains special provisions applicable starting from January 1, 2016, for combustion installations whose total nominal thermal power is greater than or equal to 50 MW, regardless of the type of fuel used (solid, liquid or gas). According to the provisions of art. 30 para. (3) integrated environmental authorizations issued for installations that include combustion installations authorized before the date of entry into force of the law (01.12.2013) or whose operators submitted a complete request for authorization before this date, provided that such installations to be put into operation no later than January 7, 2014, include conditions to ensure that air emissions from these installations do not exceed the emission limit values provided in part 1 of annex no. 5 of the law.

Integrated environmental authorizations issued to installations that contain combustion installations that do not fall under the provisions of para. (3), respectively those put into operation after January 7, 2014, provide conditions to ensure that air emissions from these installations do not exceed the emission limit values provided in part 2 of annex no. 5 of the law. The emission limit values provided in part 2 of annex no. 5 are much more restrictive than those provided in part 1.

Until January 1, 2016, the provisions of Directive 2001/80/EC (LCP) were applied to combustion plants with a nominal thermal power of more than 50 MW, which referred to the limitation of air emissions of certain pollutants, mainly SO_2, NO_x and powders. Directive 2001/80/EC (LCP) regarding the limitation of atmospheric emissions of certain pollutants from large combustion plants was transposed into Romanian legislation by Government Decision no. 541/2003 regarding the establishment of measures to limit air emissions of certain pollutants from large combustion plants, which was repealed by Government Decision no. 440/2010. Starting with 1.01.2016, the latter was repealed by Law no. 278/2013 on industrial emissions, with subsequent amendments and additions. In accordance with Art. 10 of the law on the categories of activities mentioned in annex no. 1, the provisions of Chapter II are applicable to them and one of the categories is the one mentioned in point 1.1 - Combustion of fuels in installations with a total nominal thermal power equal to or greater than 50 MW.

At the national level, out of the total of 90 functional combustion plants - 32 combustion plants benefit until June 30, 2020, according to art. 32 of the law, derogating from compliance with the emission limit values provided for in art. 30 para. (3) and the desulfurization rates provided for in art. 31, with

the condition of implementing the measures provided for in the National Transition Plan (PNT) and respecting the emission limit values for sulfur dioxide, nitrogen oxides and dust applicable on 31.12.2015 as well as the contributions to the national emission ceilings established in the PNT. Also, 22 combustion plants benefit in the period 01.01.2016 - 31.12.2023, according to art. 33 of the Law, from the derogation from the compliance with the emission limit values provided for in Article 30 para. (3) and of the rates of desulphurization provided for in Article 31, having the right to operate within the limit of 17500 hours, and 8 combustion plants benefit during the period 01.01.2016 - 31.12.2022, according to Article 35, from the derogation from compliance with the emission limit values provided for in Article 30 para. (3) and (4) and of the rates of desulphurisation referred to in Article 31, provided that at least 50 % of the useful production of heat, as a moving average over a period of 5 years, is distributed in the form of steam or hot water to a public district heating network.

The main purpose of Chapter III - Special provisions for combustion plants in Directive 2010/75/EU on industrial emissions is to reduce pollutants resulting from large combustion plants, especially emissions of sulfur dioxide and nitrogen oxides that have an acidifying effect on the environment. The thermal energy sector contributes to air pollution with significant amounts of sulfur dioxide, carbon monoxide, carbon dioxide, nitrogen oxides and dust. Reducing the impact of energy systems on the environment is achieved by: rehabilitating and modernizing large combustion installations, changing the fuel used. The reduction of SOx emissions in the energy sector is achieved mainly by abandoning the use of fuels with a high sulfur content (coal or fuel oil) and the use of fuels with a low sulfur content (natural gas). Energy is essential for economic and social well-being, yet the production and consumption of energy exerts considerable pressures on the environment, such as contributing to climate change, damaging the environment and producing adverse effects on human health.

In 2019, 68 combustion plants were operating at the national level. The main fuels used in these installations are: natural gas, fuel oil, lignite and coal, but biomass, petroleum coke and refinery gas are also used in a small number of installations. The values of the annual emissions (tons/year) of specific pollutants from combustion installations, recorded in 2019, are as follows:

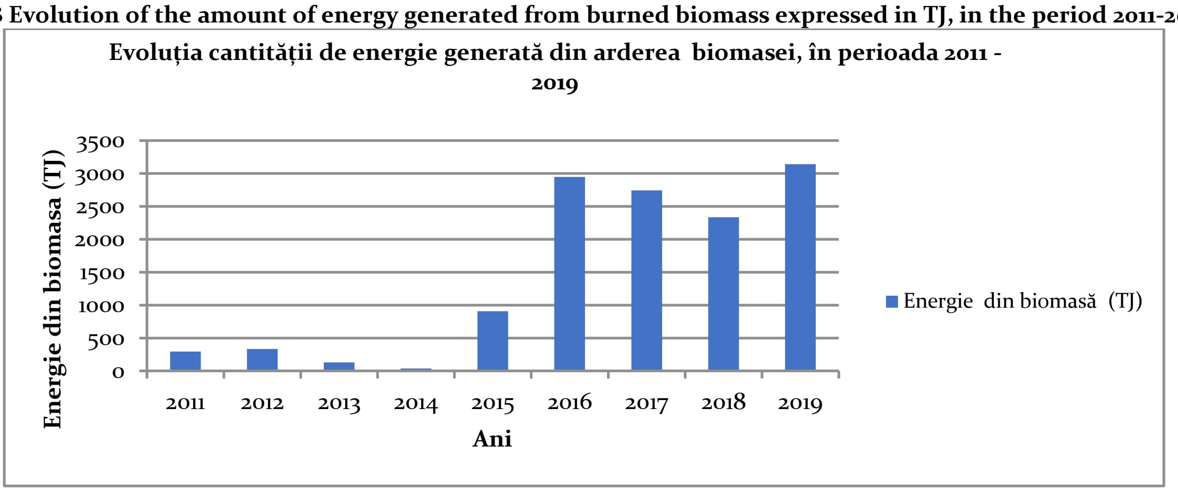
- 28519.36 t of sulfur dioxide;
- 24743.47 t nitrogen oxides;
- 2281.69 t of powders.

Table I.2 Evolution of the amount of energy generated from burned biomass expressed in TJ, in the period 2011 – 2019

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019
Energy from biomass (TJ)	294.94	330.91	128.00	38.91	907,396	2944,463	2744.66	2334,859	3142.38

Source: NEPA

Figure I.18 Evolution of the amount of energy generated from burned biomass expressed in TJ, in the period 2011-2019



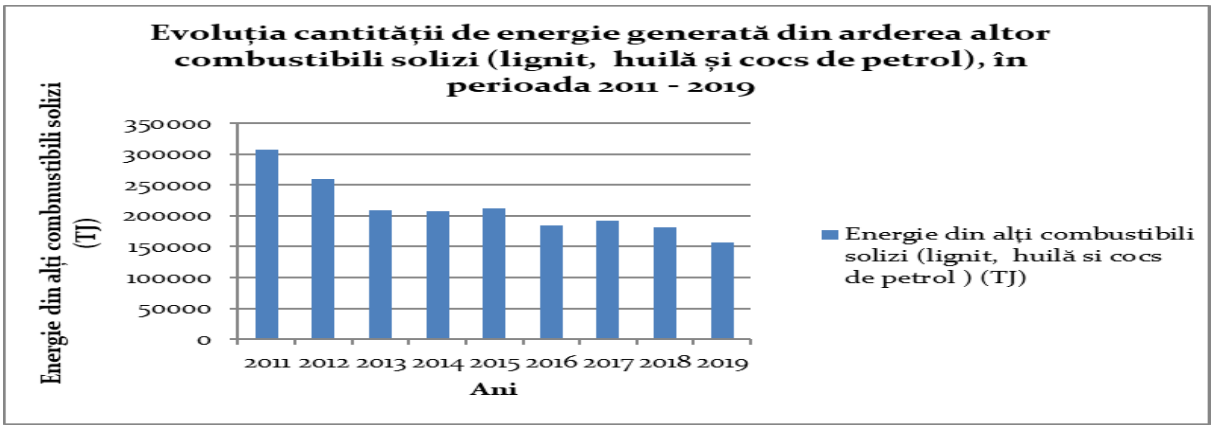
Source: NEPA

Table I.3 Evolution of the amount of energy generated from burning other solid fuels (lignite and coal), in the period 2011 – 2019

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019
Energy from other solid fuels (lignite and coal) (TJ)	306876.56	258902.12	208891.93	207672.78	211619.41	183880.38	192209.76	181596.29	156340.63

Source: NEPA

Figure I.19 Evolution of the amount of energy generated from burning other solid fuels (lignite and coal), in the period 2011 – 2019



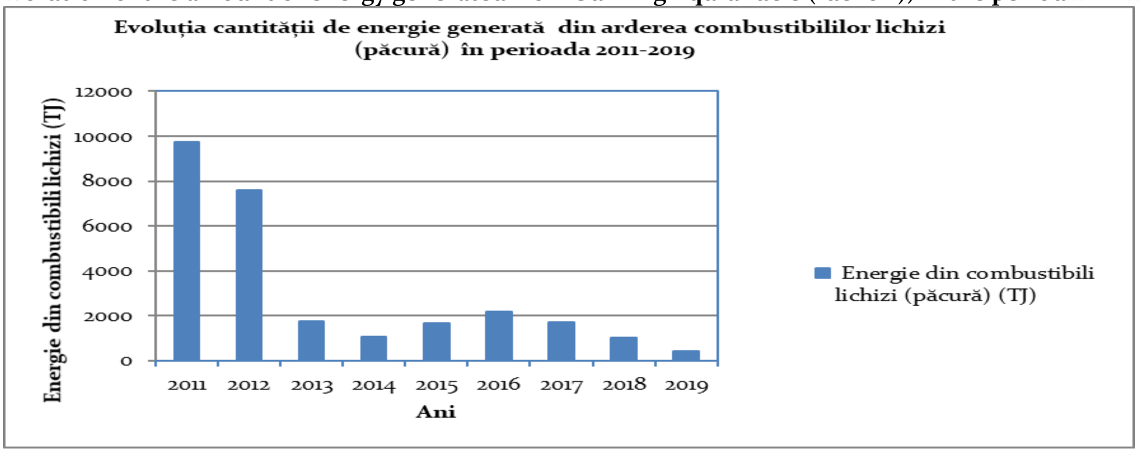
Source: NEPA

Table I.4 Evolution of the amount of energy generated from the burning of liquid fuels (fuel oil), in the period 2011–2019

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019
Energy from liquid fuels (fuel oil) (TJ)	9744.24	7605.84	1752.87	1077.57	1655,253	2187,866	1690.78	1005,134	413.20

Source: NEPA

Figure I.20 Evolution of the amount of energy generated from burning liquid fuels (fuel oil), in the period 2011–2019



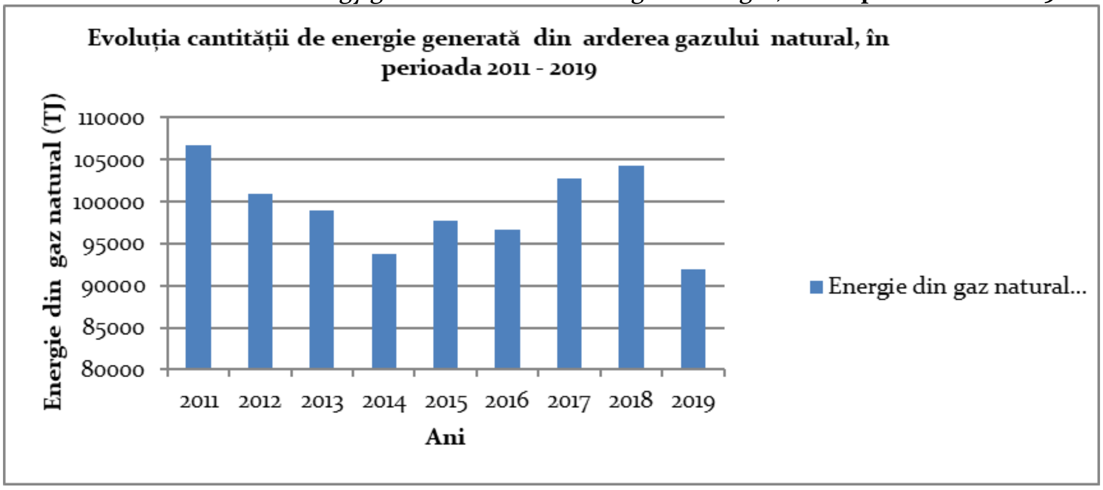
Source: NEPA

Table I.5 Evolution of the amount of energy generated from burning natural gas, in the period 2011 – 2019

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019
Natural gas energy (TJ)	106708.87	100984.9	98877.58	93823.39	97736.824	96652.262	102684	104210.492	91915.42

Source: NEPA

Figure I.21 Evolution of the amount of energy generated from burning natural gas, in the period 2011 – 2019



Source: NEPA

Table I.6 Evolution of the amount of energy generated from the combustion of other combustible gases (furnace gas and refinery gas), in the period 2011 – 2019

Years	2011	2012	2013	2014	2015	2016	2017	2018	2019
Energy other gases (TJ)	2873.65	2560.37	1868.90	1622,468	1389,004	1999,226	1290.66	1300,279	909,423

Source:NEPA

Chapter IV of the Industrial Emissions Directive (IED) 2010/75/EU presents Special Provisions on waste incineration plants and waste co-incineration plants

The incineration of hazardous and non-hazardous waste can produce emissions of substances that pollute the air, water and soil and have negative effects on human health. In order to limit these risks, Directive 2000/76/EC on waste incineration imposed strict operating conditions and technical requirements on waste incineration and co-incineration facilities, which were taken over in Chapter IV of Law no. 278/2013 on industrial emissions, as amended and supplemented – Special provisions on waste incineration facilities and waste incineration facilities.

This chapter deals with the technical progress made in the control of emissions from incineration/co-incineration activities in terms of reducing pollution, in particular those related to the establishment of limit values in the atmosphere for emissions of dioxins, mercury and dusts plus limits on discharges into water from waste gas purification plants. According to Law no. 278/2013 on industrial emissions, with subsequent amendments and additions, this chapter applies to the activities in Annex I (activities 5.2 and 5.3).

In 2019, 34 incineration plants and co-incineration plants wereinventoried.

In order to guarantee the complete combustion of waste, itisrequiredthat all installations maintain the gasesresultingfromincineration and co-incineration at a minimum temperature of 850°C for at least two seconds. If itishazardouswaste, with a content of halogenatedorganic substances, expressed in chlorine, greaterthan 1%, the temperature must bebrought to 1100°C for at least two seconds. The heatproduced by incineration or co-incineration must beutilized as much as possible.

Limit values of atmospheric emissions for incineration plants are indicated in annex no. VI part 3 of the respective law. These refer to heavy metals, dioxins and furans, carbon monoxide (CO), dusts, total organic carbon (TOC), hydrochloric acid (HCl), hydrofluoric acid (HF), sulfur dioxide (SO_2) and nitrogen oxides (NO and NO_2).

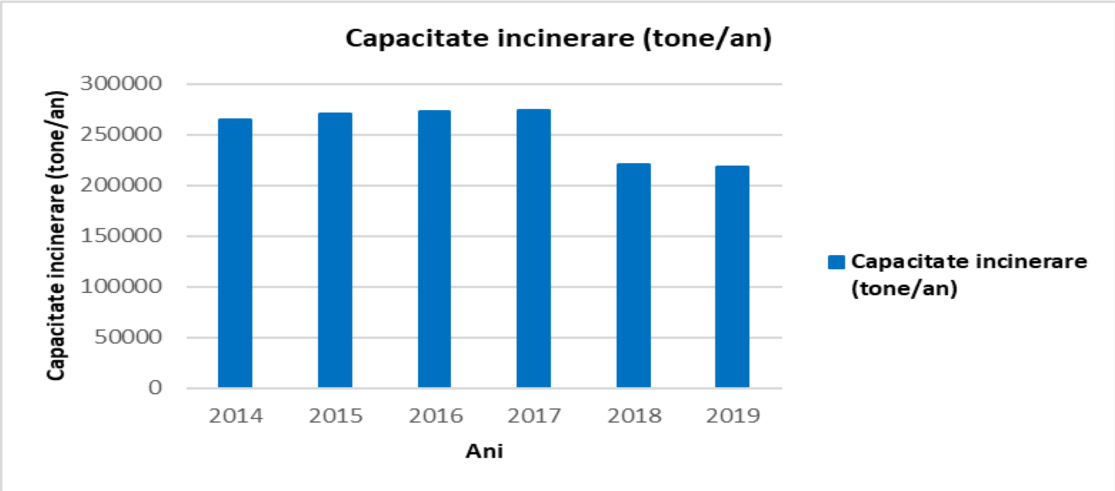
The determination of atmospheric emission limit values for co-incineration plants is provided in annex no. VI, part 4 of the respective law. Special provisions are also mentioned regarding cement kilns and combustion installations for waste co-incineration.

The authorizations for the incineration or co-incineration facilities must provide conditions for the discharge of waste water from waste gas treatment, in compliance with the emission limit values indicated in annex no. VI, part 5 of the respective law.

Residuesgenerated by incineration or co-incineration must beminimized and recycled as much as possible. Whentransporting dry residues, precautions must betaken to avoidtheir dispersion in the environment. Tests must becarried out to establish the physical and chemicalcharacteristics of the residues, as well as theirharmfulpotential.

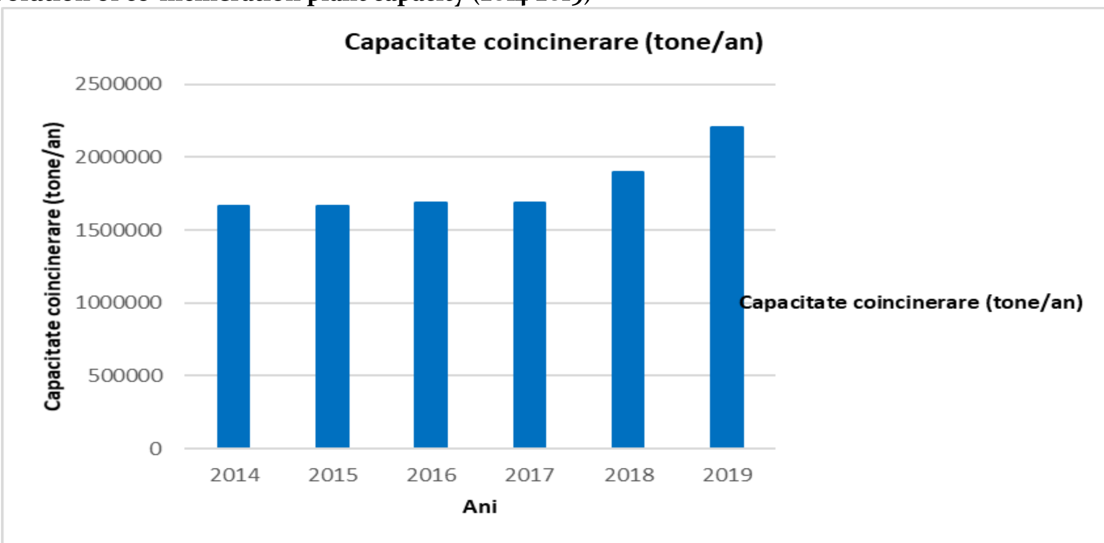
The evolution of the capacities of incineration and co-incineration facilities for the period 2014-2019 is presented in the graphs below.

Figure I.22 Evolution of the capacity of incineration facilities (2014 – 2019)



Source: NEPA

Figure I.23 Evolution of co-incineration plant capacity (2014-2019)



Source: NEPA

Chapter V of the IED is intended for specific provisions applicable to installations and activities that use organic solvents

With the appearance of Directive 2010/75/EU of the European Parliament on industrial emissions, Directive 1999/13/EC on the establishment of measures to reduce emissions of volatile organic compounds (VOC) due to the use of organic solvents in certain activities and installations has become an integral part of this one. *Chapter V is intended for the specific provisions applicable to installations and activities that use organic solvents, activities listed in Annex VII Part 1 and which reach, as the case may be, the consumption thresholds established in Part 2 of that annex. These provisions are aimed at preventing or reducing the effects, direct or indirect, due to emissions of volatile organic compounds (VOCs) in the environment, mainly from the air and potential risks to human health, through measures and procedures to be implemented, in certain industrial activities whose solvent consumption is at a higher level than the thresholds established for each type of activity.*

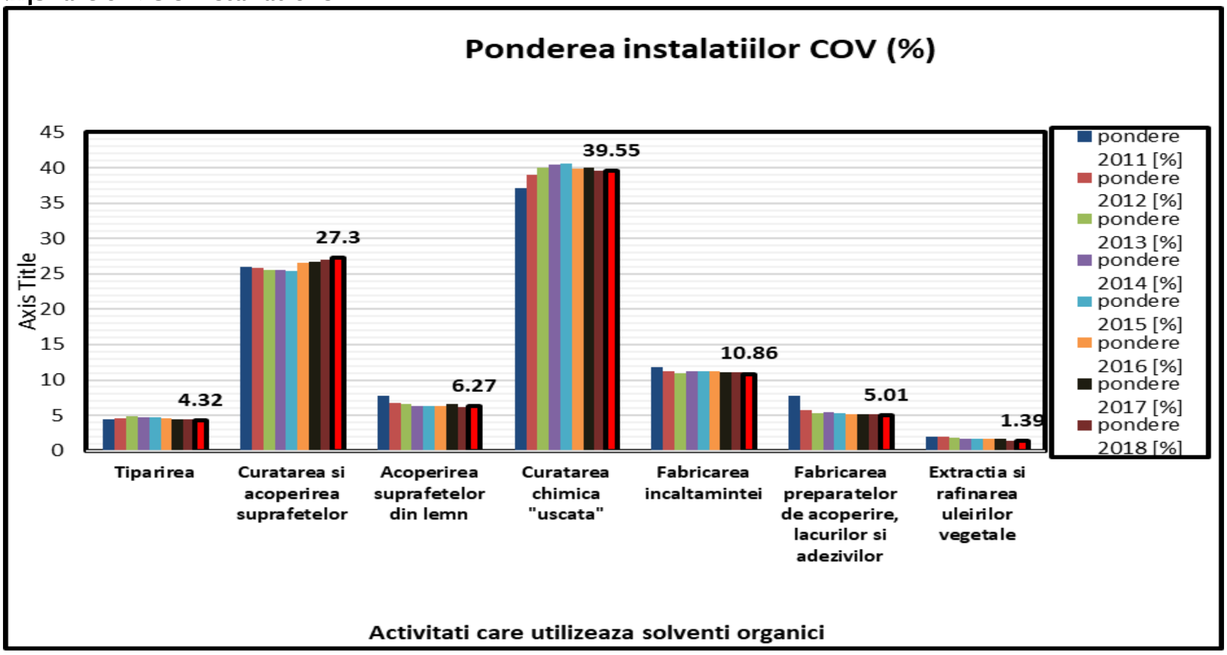
The economic agents that operate the installations covered by Chapter V have the obligation to apply the measures and techniques associated with the best available techniques to ensure compliance of the operating conditions with one of the following requirements:

- compliance with VOC emission limit values through the use of VOC emission capture and treatment equipment;
- application of a VOC reduction Scheme by reducing the consumption of solvents through appropriate techniques, or replacing VOC-based solvents with water-based solvents, or with substances with a lower VOC content, which offer the possibility of reducing emissions at the source, reduction equivalent to the one that would be achieved by applying the emission limit values.

The number of installations whose activities are subject to the provisions of Chapter V of the IED, inventoried in 2020 for 2019, was 718 (57 installations also fall under Chapter II - special provisions applicable to installations and activities listed in Annex I - IPPC), of which the following activities have an important weight:

- printing, with a share of 4.32%;
- cleaning and covering surfaces, with a weight of 27.3%;
- the covering of wooden surfaces, with a weight of 6.27%;
- "dry" chemical cleaning, with a weight of 39.55%;
- footwear manufacturing, with a share of 10.86%;
- manufacture of paints, varnishes, inks and adhesives, with a share of 5.01%;
- the extraction and refining of vegetable oils and animal fats, with a share of 1.39% of the total activities inventoried.

Figure I.24Share of VOC installations



Source: NEPA

European Register of Pollutants Released and Transferred (E-PRTR Register)

The European Register of Released and Transferred Pollutants (E-PRTR Register) succeeds the European Register of Pollutant Emissions (EPER Register). The register is designed in the form of an electronic database that can be accessed by the public at the following address[*https://industry.eea.europa.eu*](https://industry.eea.europa.eu)*. AtEuropean level, on January 18, 2006, was adopted the Regulation (EC) no. 166/2006 of the European Parliament and of the Council on the establishment of the European Register of Pollutants emitted and transferred and amending Council Directives 91/689/EEC and 96/61/CE of the Council ("E-PRTR Regulation"). In 2019, Regulation (EC) no. 166/2006 was amended by Regulation (EU)*<u>*2019/1010*</u>*to align and streamline the reporting requirements of EU environmental legislation. The amending regulation conferredto the* <u>*European*</u>

Commissionpowers to adopt and implement actswhich specifies the type, format and frequency of information to be reported under Regulation (EC) no. 166/2006. Thus, the Implementing Decision (EU)2019/1741of the Commission introduced specific changes to E-PRTR following Regulation (EU) no. 1010/2019.

The register contains specific data and information regarding pollutant emissions in air, water, soil, pollutant transfers from waste water, hazardous and non-hazardous waste, outside the locations of industrial complexes, from all member states of the European Union.Reporting is required if the capacity threshold and emission thresholds or off-site transfer thresholds of wastewater or waste pollutants are exceeded. ***Romania has implemented at national level the provisions of the EPRTR Regulation through Government Decision no. 140/2008 regarding the establishment of measures for the application of the provisions of Regulation (EC) of the European Parliament and of the Council no. 166/2006 regarding the establishment of the European Register of Emissions and Transfers of Pollutants and the amendment of Council directives 91/689/EEC and 96/61/CE, which establishes the institutional framework necessary for the direct application of the EPRTR Regulation***.

According to the requirements of the EPRTR Regulation, the NationalEnvironmental ProtectionAgency created the national website of the Registry of Pollutants Emitted and Transferred (PRTR), which allows public access both from the country and abroad to environmental information on industrial complexes in Romania, by accessing the address http://prtr.anpm.ro.The link, as requested by the European Commission, was sent at European level to be integrated into the European register in the "Links - National Registers" section.

Both the European EPRTR and the national PRTR Register contain information for the period (2007-2019), the data collections related to the latter year being reported by the member states to the European Commission until November 30, 2020. The EPRTR Regulation established new requirements, additional to those established by the EPER Decision, extending the reporting for the industrial sectors that are the subject of the IPPC Directive to a series of non-IPPC activities, thus totaling 66 activities grouped in 9 industrial sectors, including under the activity of underground mining, the activity of exploration/exploitation of oil and gas deposits.

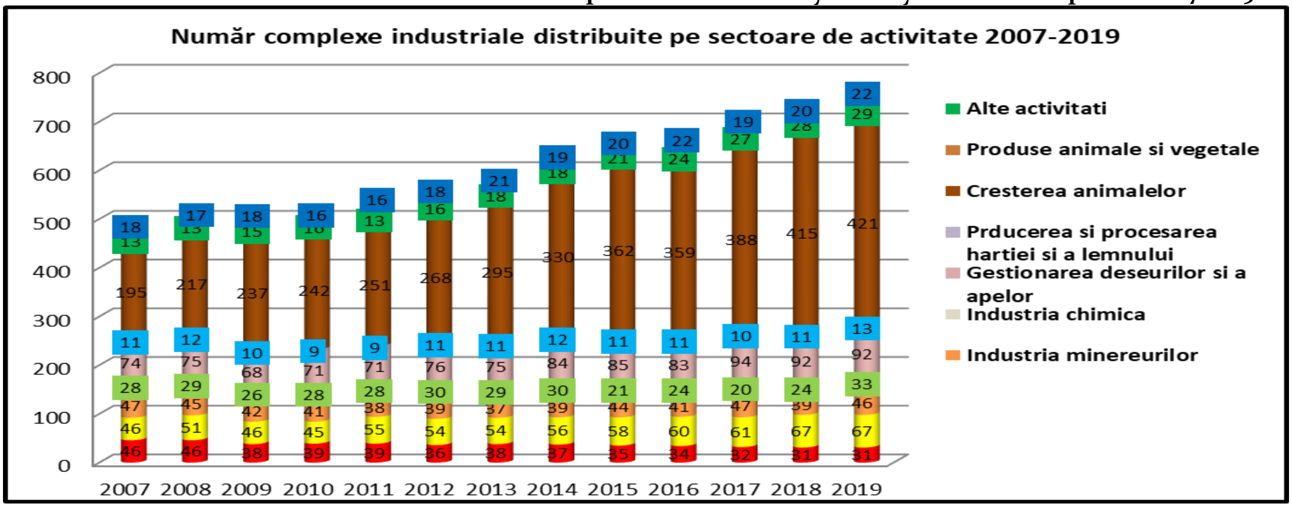
The collection related to the year 2019, at the national level, includes a number of 754 industrial complexes, respectively sites, which have exceeded the threshold values established by Annex II of the EPRTR Regulation, with 277 industrial complexes more than in 2007 (477), with 249 industrial complexes more than in 2008 (505), with 254 industrial complexes more than in 2009 (500), with 247 industrial complexes more than in 2010 (507), with 234 industrial complexes more than in 2011 (520), with 206 industrial complexes more than in 2012 (548), with 175 industrial complexes more than in 2013 (579), with 128 industrial complexes more than in 2014 (626), with 95 industrial complexes more than in 2016 (657), with 94 industrial complexes more than in 2016 (660),with 56 industrial complexes more than in 2017 (698) and with 27 industrial complexes more than in 2018 (727).

Figure I.25The evolution of the number of industrial complexes that reported in theEPRTR 2007-2019

Source: NEPA

Compared to 2018, in 2019 there is a 3.71% increase in the number of complexes registered in the PRTR National Register, and compared to 2007 an increase of 58.07%. In the 2019 collection, a number of 42 industrial complexes were registered for the first time in the PRTR National Register.

Figure I.26 Evolution of the number of EPRTR industrial complexes distributed by activity sector in the period 2007-2019



Source: NEPA

The share of the total number of installations reported in the energy sector, metal production and processing, mining industry, chemical industry, paper and wood production and processing, animal plant products sector, as well as other activities, remains more or less the same over the series of time, and the number of reported industrial complexes carrying out animal breeding activity was continuously increasing until 2015, after which, for 2016, a small decrease is recorded followed by a new increase in 2017, 2018 and 2019; thus the increase recorded in 2019 is higher by 1.44% compared to 2018.
Their distribution by development regions is as follows:

- Region 1 North - East 97 industrial complexes,
- Region 2 South - East 94 industrial complexes,
- Region 3 South – Muntenia 169 industrial complexes,
- Region 4 South West – Oltenia 48 industrial complexes,
- Region 5 West 111 industrial complexes,
- Region 6 North-West 90 industrial complexes,
- Region 7 Center 117 industrial complexes,
- Region 8 Bucharest – Ilfov 28 industrial complexes.

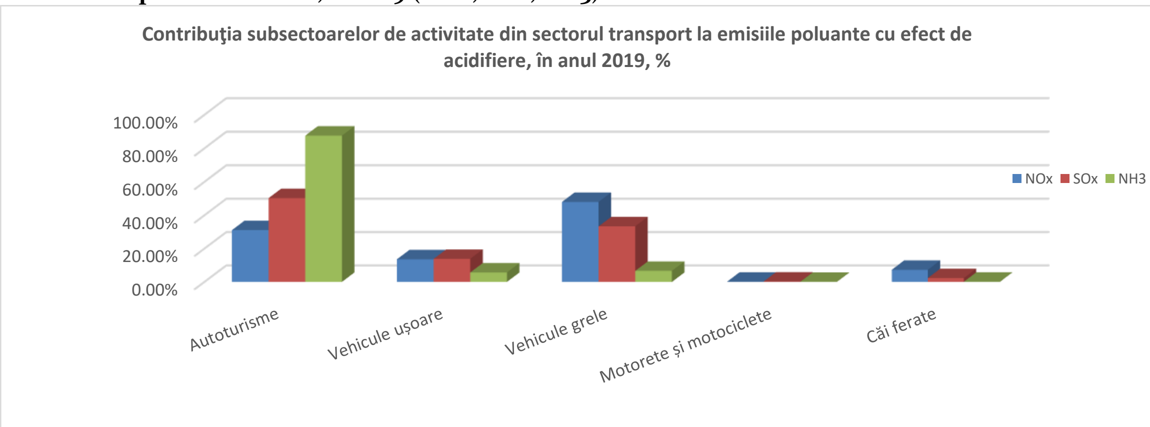
Although the energy sector continues to improve its environmental performance, it contributes to air pollution with significant amounts of sulfur dioxide, carbon monoxide, carbon dioxide, nitrogen oxides and dust. Analyzing at national level the evolution of these main pollutants emitted into the air, a general trend of their decrease is observed. It can be mentioned that the reduction of the impact of energy systems on the environment was achieved by rehabilitating and modernizing large combustion installations, by implementing desulfurization, deoxidation and dust removal installations. At the same time, the reduction of SOx emissions in the energy sector was also achieved by giving up the use of fuels with a high sulfur content (coal or fuel oil), but also by using fuels with a low sulfur content (natural gas).But we must admit that this decline in emissions also occurred due to the closure of some facilities as a result of the economic crisis. But ***overall, in 2019 compared to 2007, most emissions from the energy sector were reduced, as follows: SOx by approximately 93.63%, NOx by approximately 70.71%, PM10 by 91.84%, and CO2 by approximately 54, 72%***

Transport

Emissions of acidifying substances

RO 01
Indicator code Romania: RO 01 EEA indicator code: CSI 01
TITLE: **EMISSIONS OF ACIDIFYING SUBSTANCES**
DEFINITION:The indicator follows the trends of anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH_3) and sulfur oxides (SOx, SO_2), with each of them taking into account its acidifying potential. The indicator also provides information on changes in emissions from the main source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Figure I.27The contribution of the activity subsectors in the transport sector to the emissions of pollutants with acidification and eutrophication effect, in 2019 (NOx, SOx, NH_3)



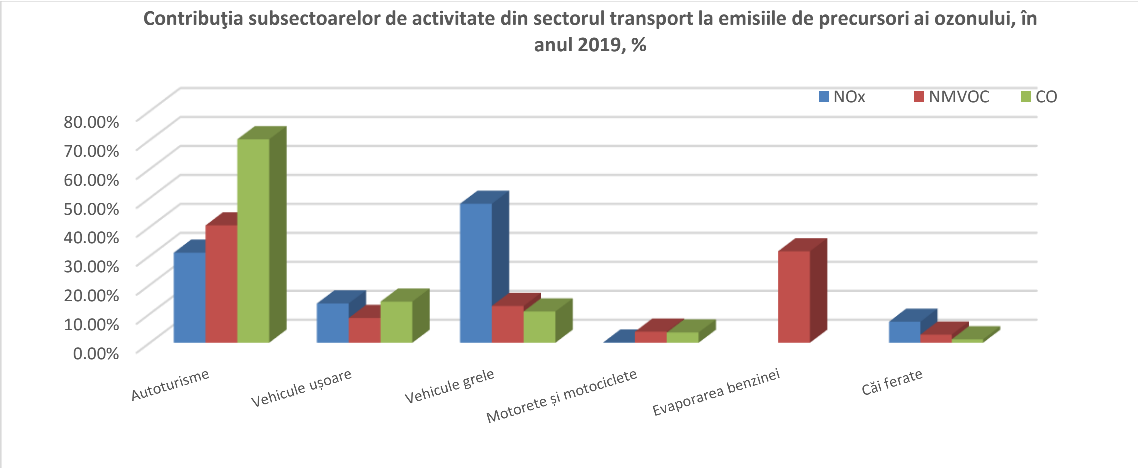
Source: Romania's Informative Inventory Report 2021

From the analysis of the data presented regarding the acidifying potential of anthropogenic emissions of nitrogen oxides (NOx), ammonia (NH_3) and sulfur oxides (SOx, SO_2), it is observed that of the total emissions from transport, road transport has the largest contribution to passenger cars category, followed by heavy vehicle, light vehicle and rail transport categories.

Emissions of ozone precursors

RO02
Indicator code Romania: RO 02 EEA indicator code: CSI 02
TITLE: **EMISSIONS OF OZONE PRECURSORS**
DEFINITION:The indicator tracks trends in anthropogenic emissions of ozone precursor pollutants: nitrogen oxides (NOx), carbon monoxide (CO), methane (CH_4) and non-methane volatile organic compounds (VOCs) from the sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Figure I.28 The contribution of the activity subsectors in the transport sector to the emissions of ozone precursors (NOx, NMVOC, CO), in 2019

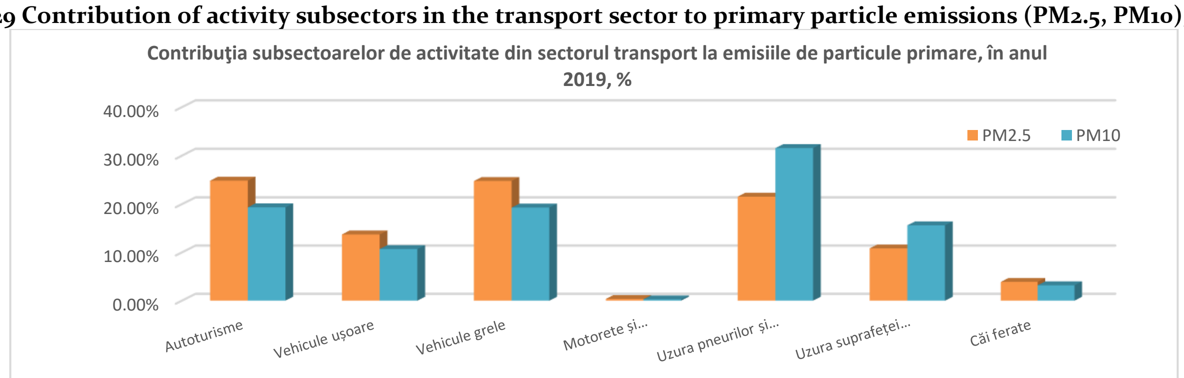


Source: Romania's Informative Inventory Report 2021

Emissions of primary particles and secondary particle precursors

RO 03
Indicator code Romania: RO 03 EEA indicator code: AEM 03
TITLE: **EMISSIONS OF PRIMARY PARTICLES AND SECONDARY PARTICLE PRECURSORS**
DEFINITION:This indicator shows the trends in emissions of primary particles with a diameter smaller than 2.5 µm (PM2.5) and respectively 10 µm (PM10) and secondary particle precursors (nitrogen oxides (NOx), ammonia (NH_3) and carbon dioxide sulfur (SO_2), from anthropogenic sources, by source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste, other sources.

Figure I.29 Contribution of activity subsectors in the transport sector to primary particle emissions (PM2.5, PM10), in 2019



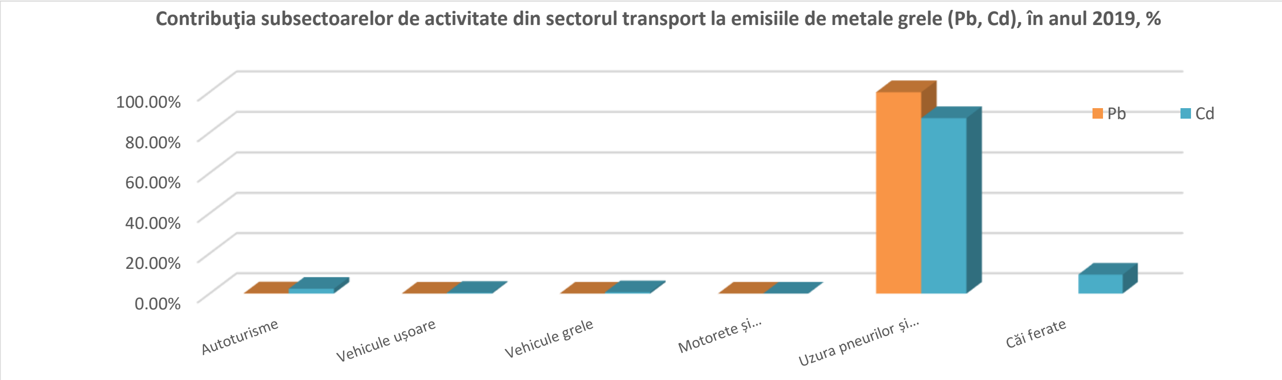
Source: Romania's Informative Inventory Report 2021

From the analysis of data from the transport sector, it is found that emissions of primary particles and precursors of secondary particles mainly come from road transport.

Heavy metals emissions

RO 38
Indicator code Romania: RO 38 EEA indicator code: APE 05
TITLE:**HEAVY METALS EMISSIONS**
DEFINITION:Trends in anthropogenic emissions of heavy metals by activity sector: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

Figure I.30 The contribution of the activity sub-sectors in the transport sector to the emissions of heavy metals (Pb, Cd), in 2019



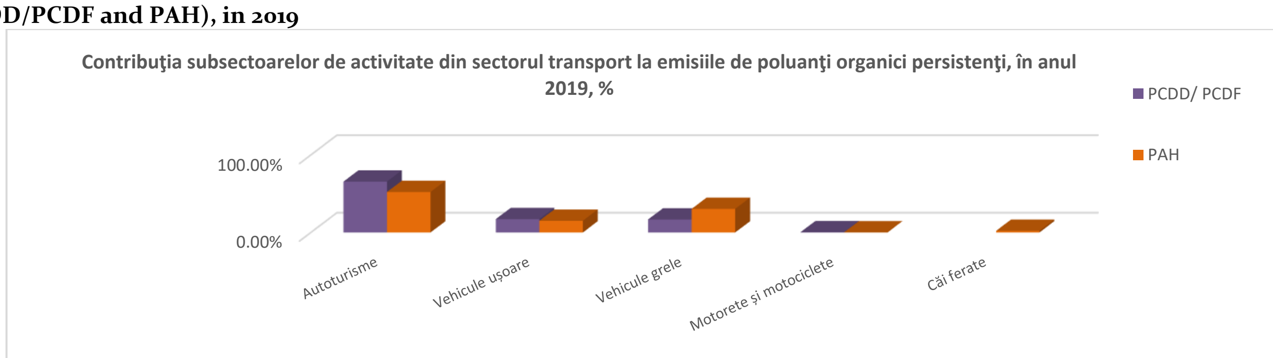
Source: Romania's Informative Inventory Report 2021

From the graph above, it can be seen that in the transport sector, the biggest contribution to heavy metal emissions is the wear and tear of road vehicle tires and brakes.

Emissions of persistent organic pollutants

RO 39
Indicator code Romania: RO 39 EEA indicator code: APE 06
TITLE: **EMISSIONS OF PERSISTENT ORGANIC POLLUTANTS**
DEFINITION:Trends in anthropogenic emissions of persistent organic pollutants, of polycyclic aromatic hydrocarbons (PAH), by activity sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

Figure I.31 Contribution of activity subsectors in the transport sector to emissions ofpersistent organic pollutants (PCDD/PCDF and PAH), in 2019



Source: Romania's Informative Inventory Report 2021

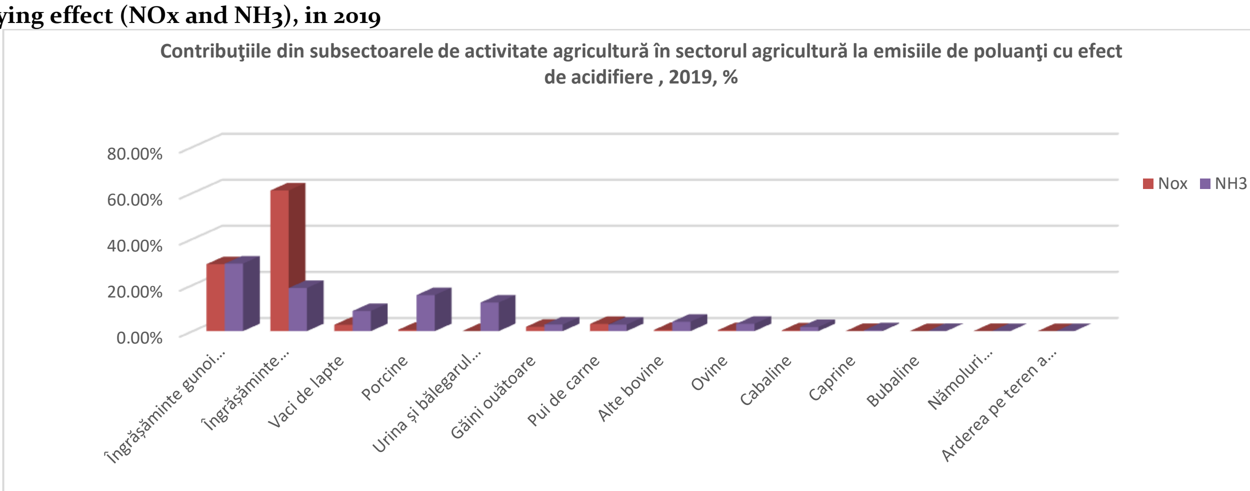
From the analysis of data from the transport sector, it is found that road transport has the largest share of persistent organic pollutant emissions in the category of cars, followed by the categories of heavy vehicles and light vehicles.

Agriculture

Emissions of acidifying substances

RO 01
Indicator code Romania: RO 01 EEA indicator code: CSI 01
TITLE: **EMISSIONS OF ACIDIFYING SUBSTANCES**
DEFINITION:The indicator follows the trends of anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH_3) and sulfur oxides (SOx, SO_2), with each of them taking into account its acidifying potential. The indicator also provides information on changes in emissions from the main source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Figure I.32 The contributions of the sub-sectors of activity in the agricultural sector to the emissions of pollutants with an acidifying effect (NOx and NH_3), in 2019



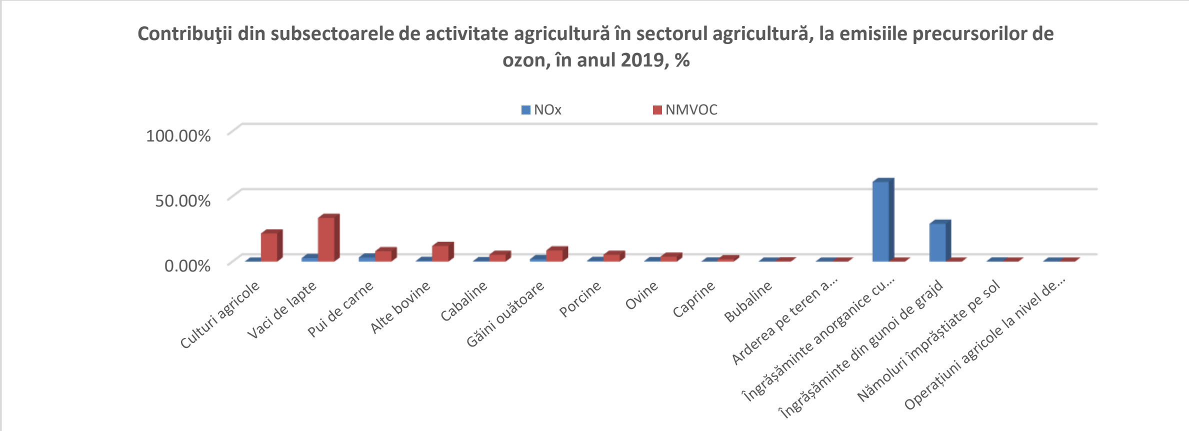
Source: Romania's Informative Inventory Report 2021

From the analysis of the data presented regarding the contribution of the activity of the sub-sectors in agriculture to the emissions of pollutants with an acidifying effect, it is found that the activities with impact are the application of synthetic and natural fertilizers in agricultural crops, followed by animal breeding (dairy cows, pigs, laying hens). The sub-sector of activity concerning the application of organic and inorganic nitrogen fertilizers (including urea) to the soil is the main contributor to NOx emissions from agriculture.

Emissions of ozone precursors

RO 02
Indicator code Romania: RO 02 EEA indicator code: CSI 02
TITLE: **EMISSIONS OF OZONE PRECURSORS**
DEFINITION:The indicator tracks trends in anthropogenic emissions of ozone precursor pollutants: nitrogen oxides (NOx), carbon monoxide (CO), methane (CH_4) and non-methane volatile organic compounds (VOCs) from the sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Figure I.33The contributions of the sub-sectors of activity in the agricultural sector to the emissions of ozone precursors (NMVOC and NOx), in 2019



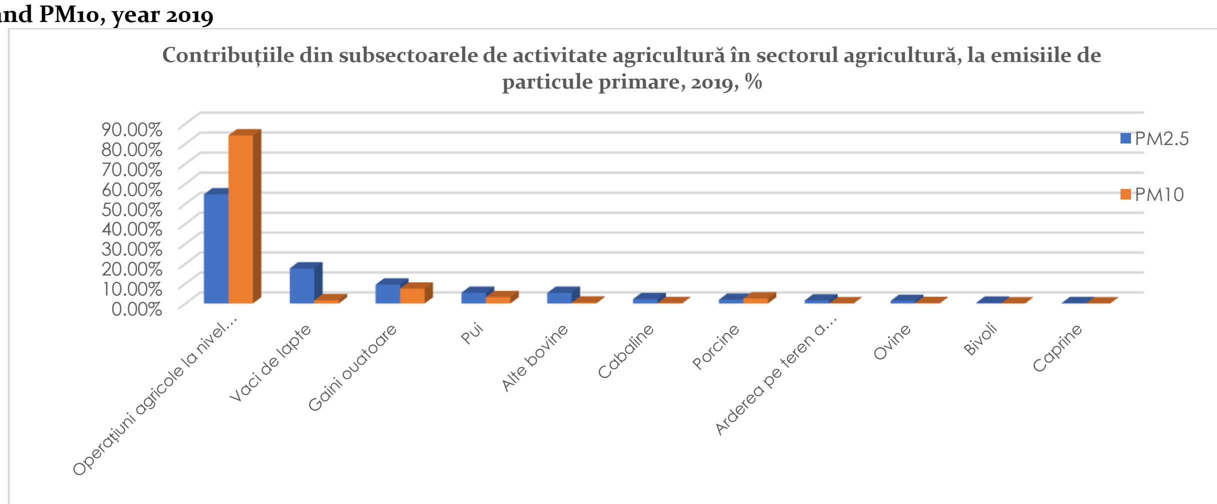
Source: Romania's Informative Inventory Report 2021

From the analysis of the data presented regarding the contribution of the activity of the agricultural sectors, to the emissions of ozone precursors at the national level, it is found that the activities related to raising animals (dairy cows, broilers, other cattle) along with agricultural land cultivation, have the highest weight for the NMVOC pollutant, and for NOx emissions, the main emitter is the activity subsector related to the application of inorganic nitrogen fertilizers (including urea).

Emissions of primary particles and secondary particle precursors

RO 03
Indicator code Romania: RO 53 EEA indicator code: CSI 03
TITLE: **EMISSIONS OF PRIMARY PARTICLES AND SECONDARY PARTICLE PRECURSORS**
DEFINITION:The indicator tracks trends in anthropogenic emissions of ozone precursor pollutants: nitrogen oxides (NOx), carbon monoxide (CO), methane (CH4) and non-methane volatile organic compounds (VOCs) from the sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Figure I.34 The contributions of the subsectors of activity in the agricultural sector to the emissions of primary particles PM2.5 and PM10, year 2019



Source: Romania's Informative Inventory Report 2021

From the analysis of the data regarding the contribution of the activity of the agricultural sectors, to the emissions of primary particles PM2.5 and PM10 in the agricultural sector, it is found that a significant weight is held by the activity related to agricultural operations in farms, transport and storage, followed by the activity of growing dairy cows.

Emissions of persistent organic pollutants

RO 39
Indicator code Romania: RO 39 EEA indicator code: APE 06
TITLE: **EMISSIONS OF PERSISTENT ORGANIC POLLUTANTS**
DEFINITION:Trends in anthropogenic emissions of persistent organic pollutants, of polycyclic aromatic hydrocarbons (PAH), by activity sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

In 2019, the agricultural activity sector had an insignificant contribution (0.06%) to the emissions of polycyclic aromatic hydrocarbons resulting from the activity of burning agricultural residues on the ground in 2019.

TRENDS AND FORECASTS REGARDING AMBIENT AIR POLLUTION

The values of emissions of polluting substances released into the atmosphere are directly proportional to:

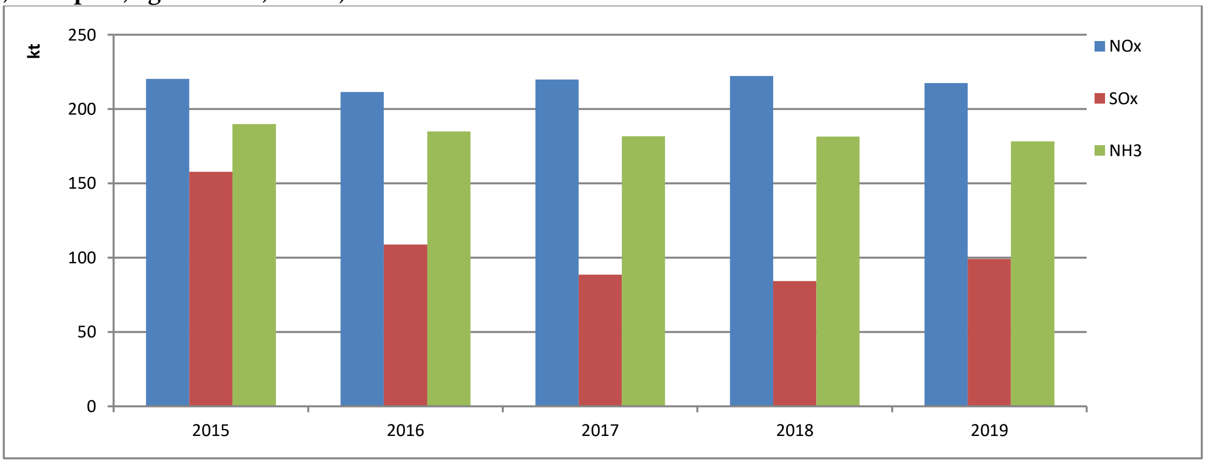
- the level of production achieved from various sectors of activity at the national level;
- the level of modernization of facilities (cleaner technologies, with minimal emissions of polluting substances);
- replacing old installations, which are not economically and financially justified to be refurbished, with new, non-polluting installations;
- the transposition of European legislation into Romanian legislation so as to achieve the targets regarding the limitation of pollutant emissions into the atmosphere, the maintenance and improvement of air quality indicators.

Air pollution is a complex problem because it is a widespread phenomenon, generated by many activities, such as increased industrial and energy production, burning of fossil fuels, increased traffic, warming, etc.

Emissions of acidifying substances

RO 01
Indicator code Romania: RO 01 EEA indicator code: CSI 01
TITLE: **EMISSIONS OF ACIDIFYING SUBSTANCES**
DEFINITION:The indicator follows the trends of anthropogenic emissions of acidifying substances: nitrogen oxides (NO_x), ammonia (NH_3) and sulfur oxides (SO_x, SO_2), with each of them taking into account its acidifying potential. The indicator also provides information on changes in emissions from the main source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Figure I.35Trend of air pollutant emissions with acidification and eutrophication effect at national level 2015-2019 (energy, industry, transport, agriculture, waste)



Source: LRTAP-RO 2021

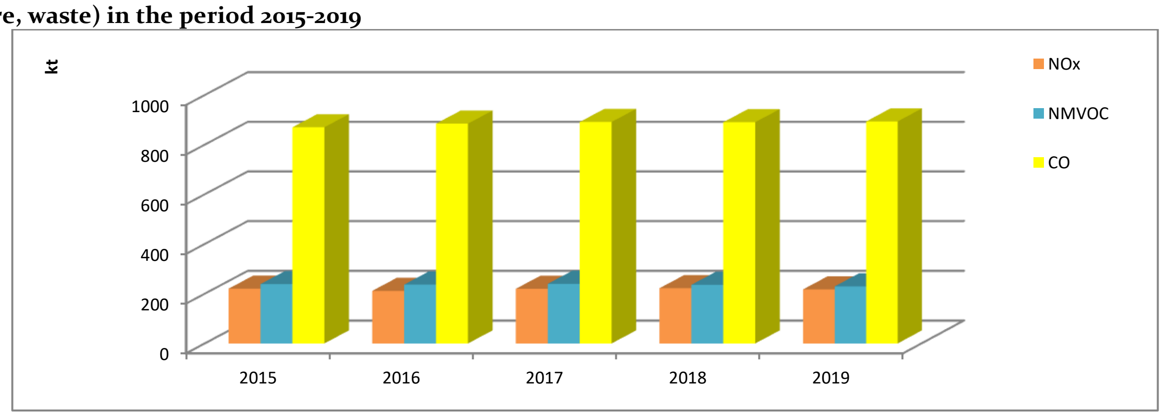
Sulphur dioxide emissions are developing downwards as a result of the progressive implementation by business holders of measures to comply with the emission limit values.

There are increasing or decreasing variations, from year to year, by sector, the decrease is mainly manifested in the energy and industry sectors, agriculture and transport sectors.

Emissions of ozone precursors

RO 02
Indicator code Romania: RO 02 EEA indicator code: CSI 02
TITLE: **EMISSIONS OF OZONE PRECURSORS**
DEFINITION:The indicator tracks trends in anthropogenic emissions of ozone precursor pollutants: nitrogen oxides (NOx), carbon monoxide (CO), methane (CH_4) and non-methane volatile organic compounds (VOCs) from the sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

Figure I.36 The trend of ozone precursor atmospheric pollutant emissions at national level (energy, industry, transport, agriculture, waste) in the period 2015-2019



Source: LRTAP-RO-2021

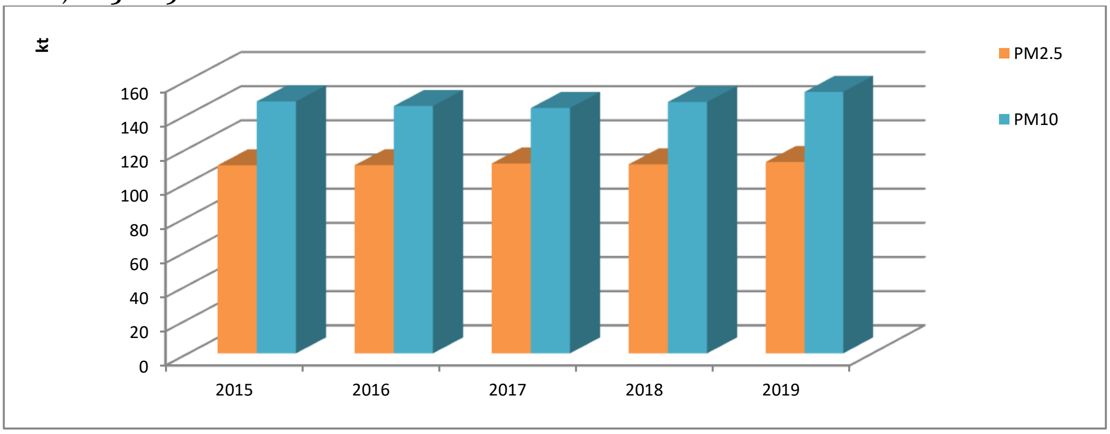
From the analysis of the data sets presented regarding the trend of emissions of ozone precursor pollutants at national level, small variations are also observed over the analyzed period as a result of the implementation of the principles of sustainable development and the adoption of environmental policies, such as:

- *the production of electricity by partially replacing fossil fuels with alternative sources: nuclear energy (commissioning of reactors 3 and 4 at CNE Cernavodă), wind energy, energy produced in the fields of photovoltaic panels, etc.;*
- *reducing the sulfur content of fuels and fuels and partially replacing diesel fuels with biodiesel;*
- *replacing the heating of rural households (traditional wood-burning stoves) with modernized stoves that use pellets as fuel and that have high combustion efficiencies and low pollutant emissions;*
- *the introduction into operation of vehicles equipped with hybrid and electric engines;*
- *the provision of economic-financial mechanisms to allow the replacement of installations with a significant polluting effect on the environment with less polluting ones;*
- *the provision of facilities for the retention, capture, storage of polluting substances (e.g. capture and storage of carbon at large combustion plants-IMA, electrostatic filters, low NOx burners, scrubbers, etc.).*

Emissions of primary particles and secondary particle precursors

RO 03
Indicator code Romania: RO 03 EEA indicator code: CSI 03
TITLE: **EMISSIONS OF PRIMARY PARTICLES AND SECONDARY PARTICLE PRECURSORS**
DEFINITION:This indicator shows the trends in emissions of primary particles with a diameter smaller than 2.5 µm (PM2.5) and respectively 10 µm (PM10) and secondary particle precursors (nitrogen oxides (NOx), ammonia (NH3) and carbon dioxide sulfur (SO2), from anthropogenic sources, by source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste other sources.

Figure I.37 The trend of emissions of primary particles in suspension at national level (total energy, industry, transport, agriculture, waste) 2015-2019

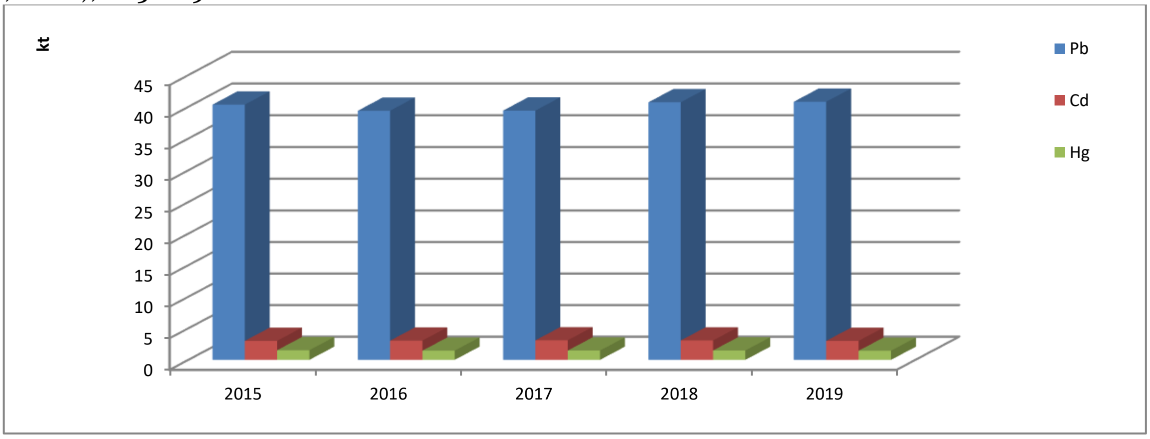


Source: LRTAP-RO-2021

Heavy metals emissions

RO 38
Indicator code Romania: RO 38 EEA indicator code: APE 05
TITLE: **HEAVY METALS EMISSIONS**
DEFINITION:Trends in anthropogenic emissions of heavy metals by activity sector: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

Figure I.38 The trend of heavy metals emissions (Cd, Hg and Pb) at national level (total energy, industry, transport, agriculture, waste), 2015-2019



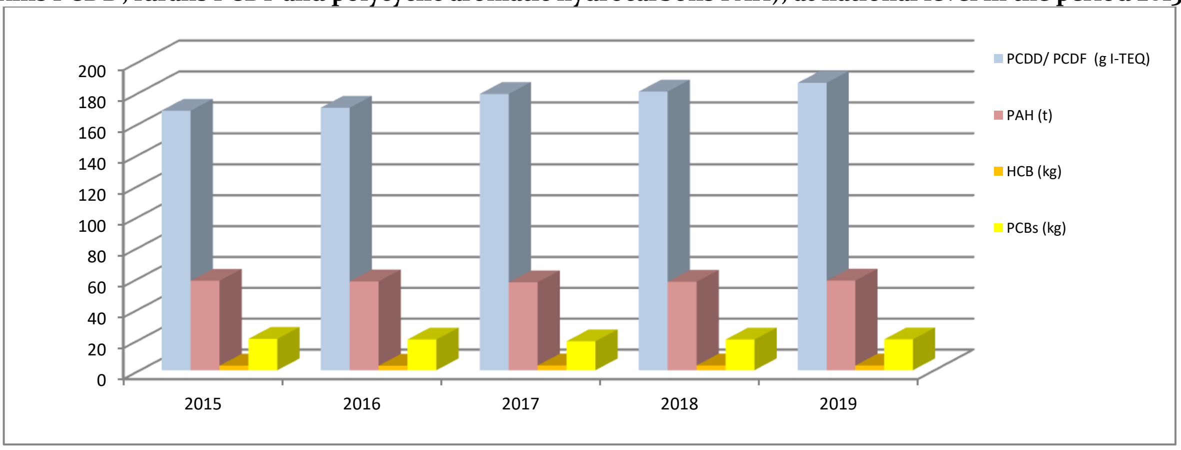
Source: LRTAP-RO-2021

At national level, from the analysis of the data presented regarding the trend of heavy metals emissions, an increase can be observed in the years 2015-2019, against the background of economic growth. The transport sector shows an annual growth trend mainly due to the increase in the car fleet at national level, both civil and industrial.

Emissions of persistent organic pollutants

RO 39
Indicator code Romania: RO 39 EEA indicator code: APE 06
TITLE: **EMISSIONS OF PERSISTENT ORGANIC POLLUTANTS**
DEFINITION:Trends in anthropogenic emissions of persistent organic pollutants, of polycyclic aromatic hydrocarbons (PAH), by activity sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, institutional and residential; use of solvents and other products; agriculture; waste; other sources.

Figure I.39 The trend of emissions of persistent organic pollutants (hexachlorobenzene HCB, polychlorinated biphenyls PCBs, dioxins PCDD, furans PCDF and polycyclic aromatic hydrocarbons PAH), at national level in the period 2015 - 2019



Source: LRTAP-RO-2021

In the industry and transport sectors, there is a moderate variation in the emissions of persistent organic pollutants mainly due to the variation in economic activities, respectively the increase in the car fleet.

FORECASTS REGARDING THE EMISSIONS OF THE MAIN ATMOSPHERIC POLLUTANTS

*Emissions of polluting substances discharged into the atmosphere have a downward trend as a result of the implementation of the principles of sustainable development and the adoption of environmental policies*such as:

- *the production of electricity by partially replacing fossil fuels with alternative sources:*nuclear energy (commissioning of reactors 3 and 4 at CNE Cernavodă), wind energy, energy produced in photovoltaic panel fields, biomass, etc.;
- *reducing the sulfur content of fuels and conbustibles* and the partial replacement of gasoline and diesel fuels with biofuels and electric cars;
- *replacing the heating of households in the rural area*(traditional wood-burning stoves) with modernized stoves that use pellets or gas as fuel and that have high combustion efficiencies and low pollutant emissions;
- *the introduction into operation of motor vehicles equipped with electrically powered engines;*
- the provision of economic-financial mechanisms to allow the replacement of installations with a significant polluting effect on the environment with less polluting ones;
- *provision of facilities for retention, capture, storage of polluting substances*(e.g. carbon capture and storage at large combustion plants – IMA, electrostatic filters, low NOx burners, scrubbers, etc.).

The preliminary forecasts developed include a number of different estimates (scenarios), comprising combinations of supporting elements related to changes in activity levels (eg, economic growth or decline), as well as the impact of new technologies, techniques and practices that correspond to efforts local, national or regional ("policies and measures").

These are intended to reduce emissions, ranging from emission controls for motor vehicles and industrial facilities and incentives for cleaner fuels and technologies or changes in economic factors (eg fuel price increases), measures aimed at fuel switching and behavioral changes (eg awareness raising).

These approaches include measures such as: the application of complex techniques and technologies for reducing and controlling or encouraging new technologies.

Assumptions related to the preliminary forecasts made are based on a range of data sets, including forecasts of industrial development, population growth, changes in farming patterns and transport demand. Medium- and long-term emission factors reflect technological advances, environmental regulations, improvements in the operating conditions of facilities and machinery used, and any anticipated changes in fuel formulations. Penetration rates of new technologies are important in the development of high confidence, emission sector factors for any forecast target year.

POLICIES, ACTIONS AND MEASURES TO IMPROVE AMBIENT AIR QUALITY

The assessment of ambient air quality is regulated by Law no. 104/2011 on ambient air quality transposing Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe and Directive 2004/107/EC of the European Parliament and of the Council on arsenic, cadmium, mercury, nickel, polycyclic aromatic hydrocarbons in the ambient air. Law no. 104/2011 on the quality of the surrounding air provides for the establishment of agglomerations and air quality management areas where the ambient concentrations of pollutants do not comply with the air quality objectives (limit values or target values). For these areas it is necessary ***to manage air quality by developing and implementing air quality plans/ programs****, which must include in addition measures to reduce emissions and measures to protect sensitive population groups.*

CHAPTER II
WATER

WATER RESOURCES, QUANTITIES AND FLOWS

Natural water resources at the level of 2020 RO 18

Romania indicator code: RO 18
EEA indicator code: CSI 18

TITLE: USE OF FRESH WATER RESOURCES

DEFINITION: The Water Exploitation Index (WEI) is the average annual total freshwater abstraction relative to the national average annual renewable water resources at national level, expressed as a percentage and calculated using the following formula.
WEI = CT / RTx100
where: WEI is the water exploitation index, expressed in %;
CT - total average annual freshwater intake, expressed in billion m³/year;
RT - the total average annual resources of renewable water at the national level, expressed in millions of m³/year.

Potential and technically usable water resources (theoretical and usable)

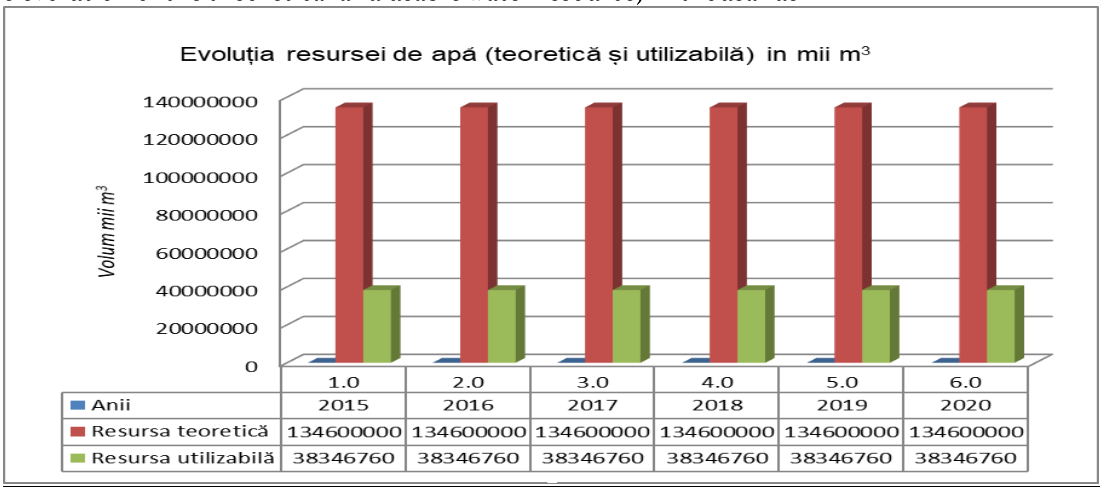
Table II.1 Potential and technically usable water resources (theoretical and usable)

Years	Theoretical resource (thousand m³)	Usable resource (thousand m³)
2015	134600000	38346760
2016	134600000	38346760
2017	134600000	38346760
2018	134600000	38346760
2019	134600000	38346760
2020	134600000	38346760

Source: NARW

The usable resource, according to the degree of development of the hydrographic basins, also includes the resource related to the coastal lakes, as well as the resource provided by indirect external reuse along the river.

Figure II.1 The evolution of the theoretical and usable water resource) in thousands m³



Source: NARW

Surface water resources

Table II.2 Water resources of 2020, compared to the previous period (2015-2019)

The river basin	Parameter	F (km²)	Q annual average (m³ / s)							Q2020 / Qavg (%)
			2015	2016	2017	2018	2019	MED 2015-2019	2020 *	
TISA*	Q	4540	50.1	62.2	74.57	70.7	65.87	64,688	62.1	96.0
	V		1579	1980	2352	2230	2077	2043.6	1964	
SOMEȘ	Q	17840	92.6	129.8	95.21	93.21	109.38	104.04	80.3	77.2
	V		2919	4105	3003	2939	3450	3283.2	2539	
CRIȘURI	Q	14860	55	90.4	64.92	81.48	79.88	74,336	52.1	70.1
	V		1734	2859	2047	2569	2519	2345.6	1648	
MUREȘ	Q	29390	124	176.4	116.1	159.4	139.2	143.02	135.2	94.5
	V		3910	5578	3661	5027	4391	4513.4	4275	
BEGA - TIMIȘ - CARAȘ	Q	13060	57.13	78.85	46.61	66.3	80.86	65.95	65.9	99.9
	V		1802	2487	1470	2091	2550	2080	2084	
BLACK - CERNA	Q	2740	41.75	35.8	19.38	33.01	32.4	32,468	31.1	95.8
	V		1317	1132	611	1041	1022	1024.6	983	
JIU	Q	10080	129	154	70.8	111	92.7	111.5	79.0	70.9
	V		4068	4870	2233	3500	2923	3518.8	2498	
OLT	Q	24050	168	162	134	205	156	165	135	81.8
	V		5298	5123	4226	6465	4920	5206.4	4269	
VEDEA	Q	5430	17.6	15.9	7.15	25.1	10.28	15,206	4.81	31.6
	V		555	503	225	791	324	479.6	152	
ARGEȘ	Q	12550	83.8	75	57.68	74.85	89.27	76.12	48.8	64.1
	V		2642	2372	1819	2361	2815	2401.8	1543	
IALOMIȚA	Q	10350	42.5	45.1	40.2	45	33	41.16	28.8	70.0
	V		1340	1426	1268	1419	1041	1298.8	911	
DANUBE	Q	34141	36.9	33.1	23.55	35.17	32.09	32,162	21.1	65.6
	V		1164	1047	743	1109	1012	1015	667	
SIRET	Q	42890	206	217	160.3	272.57	241.45	219,464	187.2	85.3
	V		6481	6862	5055	8596	7614	6921.6	5920	
PRUT **	Q	10990	6.92	7.39	13.72	15.16	15,363	11.7106	6.86	58.6
	V		218	234	433	478	484	369.4	217	
DOBROGEA	Q	5480	3.92	4.88	2.63	3.34	1.67	3,288	1.12	34.1
	V		124	154	82.8	105	53	103.76	35	
Total Romania without the Danube river	Q	238391	1115	1288	926.83	1291.29	1179.45	1160,114	939.39	81.0
	V		35151	40732	29228	40722	37195	36605.6	29705	

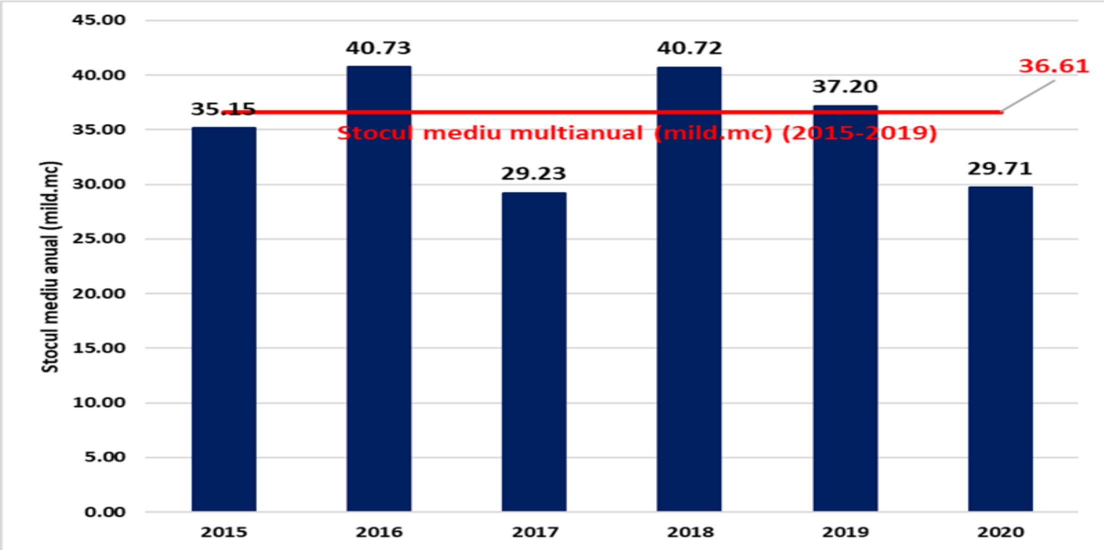
Source: NARW

Note: Q - Flow Q (m³ / s), V - total volume (10⁶m³)

** - does not include the flow and volume of the river Tisa*

*** does not include the flow and volume of the Prut River (92.5 m³ / s), this being a border watercourse*

Figure II.2 Water resources (volume 10^6 m³) of 2020, compared to the previous period (2015-2019)



Source: NARW

Extending the analysis of the comparative evolution of the resource related to 2020 at the level of the main basins, it is found that at national level, the volume drained in 2020 was deficient compared to the multiannual average of the last 5 years.

The Danube River presents a situation similar to the one registered on the inland rivers, the volume drained at the entrance to the country (st. H. Baziaș) and the one registered at the exit of the country (st. H. Gruia + sh Oancea / Prut) being below the level average calculated over the last 5 years (table II.3).

The resource corresponding to the Danube river at the entrance to the country was 69869 billion m³ in 2020 (respectively, 78035.5 billion m³ in the period 2015-2019), about 10% less than the multiannual average of the river which, for the last 60 years, is approx. 85,000 billion m³ (values represent 50% of the volumes drained on the Danube at the entrance to the country, related to Romania, the other half belonging to the Republic of Serbia).

Table II.3 Water resources of the Danube river in 2019, compared to the previous period (2015-2019)

Hydrometric control stations on the Danube river	Parameter	Q annual average (m³ / s)							Q2020 / Qavg (%)
		2015	2016	2017	2018	2019	MED 2015-2019	2020 *	
Baziaș	Q	4920	5410	4530	5072	4813	4949	4419	89.3
	V	155157	170610	142858	159950	151783	156071	139738	
	V 1/2	77579	85305	71429	79975.3	75891.5	78035.5	69869	
Isaccea	Q	6170	6470	5210	6499	5593	5943	4893.5 *	82.3
	V	194577	204038	164303	204952	176381	187418	154742	

Source: NARW

Note: Q - Flow Q (m3 / s), V - total volume (106m3), V 1/2 - values representing 50% of the volumes drained on the Danube at the entrance to the country, related to Romania, the other half belonging to the Republic of Serbia
** - due to the inconclusiveness of the data from the Isaccea hydrometric station, the Danube water resource, at the exit of the country, was determined for 2020 by summing the water stock determined at the Grindu hydrometric station on the Danube river with the summing of the water stock of Prut river determined at the Oancea hydrometric station.*

Romania had at the level of 2020 a specific resource from inland rivers of 1500 m³ / inhabitant / year compared to 19137691 thousand inhabitants (Romania's population in 2020 according to https://www.worldometers.info/world-population/romania-population/).
Extending the analysis, the specific resource on each river basin analyzed was calculated. Thus, by GIS techniques, the population corresponding to each river basin was determined based on the shp "Localities", the field "Population" based on data obtained from the 2011 Population and Housing Census (http://www.recensamantromania.ro/). The data obtained are presented in table II.4.

Table II.4 Specific resource calculated on river basins based on data from the 2011 Population and Housing Census

The river basin	F (km2)	Annual average volume (mil.m³)	Nr. inhabitants (2011)	Theoretical specific resource (m³ / place / year)
TISA	4540	1964	300747	6530
SOMEȘ	17840	2539	1505499	1686
CRIȘURI	14860	1648	853134	1932
MUREȘ	29390	4275	1902949	2247
BEGA - TIMIȘ - CARAȘ	13060	2084	874429	2383
NERA - CERNA	2740	983	52651	18670
JIU	10080	2498	929184	2688
OLT	24050	4269	1892452	2256
VEDEA	5430	152	360155	422
ARGEȘ	12550	1543	3379628	457
IALOMIȚA	10350	911	1279917	712
DANUBE	34141	667	1537039	434
SIRET	42890	5920	3563802	1661
PRUT	10990	217	1072436	202
DOBROGEA	5480	35	617565	56.7
Total Romania without the Danube river	238391	29705	20121587	1476

Note: The values of the volumes from 2020 were reported to the data resulting from the Census of Population and Housing from 2011
Source: NARW

Groundwater resources

The total groundwater resources in Romania were estimated at 9.68 billion m³ / year, of which 4.74 billion m³ / year groundwater and 4.94 billion m³ / year of deep groundwater, representing about 25 % of surface water.
In Romania, the identification and delimitation of groundwater bodies was done in accordance with the specific methodology for characterizing groundwater developed within the National Institute of Hydrology and Water Management (INHGA), which took into account the provisions of the Water Framework Directive 2000/60 / EC and the Guidelines developed within the Joint Strategy for the Implementation of the Water Framework Directive (WFD). In Romania, a number of 143 groundwater bodies have been identified, delimited and characterized. Of these, 115 are groundwater bodies and 28 are deep groundwater bodies.
In general, the groundwater from the first aquifer horizon found in the depths, is used for irrigation and industry, for the supply of the population being used the water captured from deep springs and boreholes.
The water quality is determined by the mineralogical and chemical composition of the rock in which the groundwater is located, but also by the regional and / or local tectonic evolution.
Thus, there are deep underground waters with a high degree of mineralization, such as those in the northern part of Moldova (where the deposits are mainly made up of sandy clays and fine sands, the aquifers having a low withdrawal capacity and low thickness), the central-northern part of the Transylvanian Depression or in the area of the curvature of the Carpathians (due to diapirs at the surface or at a shallow depth). These qualitative aspects mean that groundwater cannot be used to supply the population. In the Transylvanian Depression, the Western Plain, the western Oltenia, the deep waters have locally, naturally, high ammonium contents, which determines their insatiable character and the application of some treatment measures.

Analysis of the evolution of shallow groundwater levels in the period 2015-2020

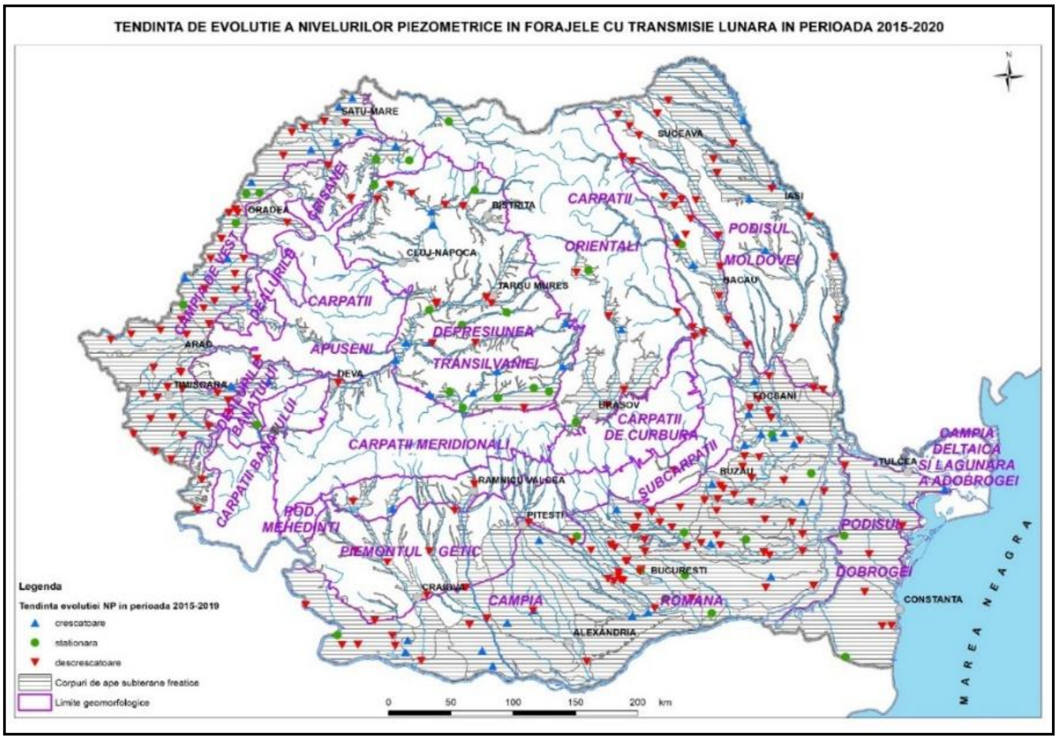
Table II.5 and figure II.3 show synthetically the evolution trend of the annual average piezometric levels during the analyzed period. Thus, the increases occurred in about 19% of the number of boreholes located in the Romanian Plain, the Getic Piedmont and the Getic Subcarpathians, in 17% in the Western Plain, the Crisana and Banat Hills, 18% in the Moldavian Plateau, the Eastern and Curvature Subcarpathians and in 26% of the total measurement points in the Transylvanian Depression and the depressions in the Eastern Carpathians. The frequency of situations of decreasing levels is higher than 65% in all areas of the country except the Transylvanian Depression and reaches 80% in the Moldavian Plateau, the Eastern Subcarpathians and the Curvature.

TableII.5 The evolution trend of piezometric levels in the period 2015-2020

Unitati geomorfologice	Tendinta				
	scaderi	stationari	cresteri	total	Observatii
Câmpia Română, Piemontul Getic şi Subcarpaţii Getici	77	10	21	108	5 foraje cu date incomplete
	71%	9%	19%		
Câmpia de Vest, Dealurile Crişanei şi Banatului	46	8	11	65	
	71%	12%	17%		
Depresiunea Transilvaniei şi depresiunile din Carpaţii Orientali	18	13	11	42	
	43%	31%	26%		
Podişul Moldovei, Subcarpaţii Orientali şi de Curbură	32	1	7	40	
	80%	3%	18%		
Podişul Dobrogei	6	2	1	9	
	67%	22%	11%		
Romania	179	34	51	264	
	68%	13%	19%	264	

Source: NARW

Figure II.3 Trend in the evolution of monthly piezometric levels (NP) in the period 2015-2020-monitoring boreholes for monthly transmission



Source: NARW

Table II.6 shows the evolution of the piezometric levels of 2020 compared to the multiannual average of the period 2015-2020. In 38% of the analyzed boreholes in the Romanian Plain, the Getic Piedmont and the Getic

Subcarpathians, there are increases compared to the multiannual average compared to the Dobrogea Plateau, where there are decreases in the piezometric level in 70% of the analyzed boreholes.

Among the 264 boreholes analyzed in Romania, it is found that in 2020 there were several decreases in the piezometric level (43%) compared to increases (22%), compared to the multiannual average of the period 2015-2020.

Table II.6. Comparison of annual average values of piezometric levels with multiannual averages in the period 2015-2020

Unitati geomorfologice	Comparatia nivelurilor medii anuale cu valoarea medie multianuala			
	scaderi	stationari	cresteri	total
Câmpia Română, Piemontul Getic şi Subcarpaţii Getici	38	29	41	108
	35%	27%	38%	
Câmpia de Vest, Dealurile Crişanei şi Banatului	23	34	8	65
	35%	52%	12%	
Depresiunea Transilvaniei şi depresiunile din Carpaţii Orientali	19	20	3	42
	45%	48%	7%	
Podişul Moldovei, Subcarpaţii Orientali şi de Curbură	28	8	4	40
	70%	20%	10%	
Podişul Dobrogei	5	2	2	9
	56%	22%	22%	
Romania	113	93	58	264
	43%	35%	22%	

Source: NARW

Conclusions

The analysis of the evolution of the piezometric levels in the period 2015-2020 was carried out based on the data coming from the representative quantitative monitoring drillings from the Monthly Transmission Program, which represents approximately 10% of the total number of boreholes managed by the Water Basin Administrations, so that its character is informative. According to the graphs of evolution of the levels, maps and synthetic tables presented in this report, the analyzed period is characterized, in terms of precipitation, for the entire territory of Romania, by quantities above the monthly norms, especially in June-July 2018.

During 2015-2020, the average monthly levels recorded increases in the Romanian Plain, the Getic Piedmont and the Getic Subcarpathians and in the Transylvanian Depression and the Depressions of the Eastern Carpathians, in the other regions of the country the trend of evolution manifested being that of decreasing.

In the Romanian Plain, the Getic Piedmont and the Getic Subcarpathians, the trend is to balance, with increases occurring in approximately 38% of the number of monitoring points.

Characterization of the shallow groundwater flow regime in 2020 compared to 2019

From the calculation of the average values of the piezometric level for 2020, it results that, compared to the previous year, at the level of the entire country, the increases were registered in about 22% of the monitoring drillings (137 cm, Girov, Siret Corridor), but the decreases have a frequency of 72% (Gherla, Someşelor Mic and Mare Corridors) (Table II.7 and Figure II.4). The differences calculated between the average values of 2020, the average values of 2019 and the multiannual average values, grouped by geographical areas, are summarized in Table II.7.

Compared to 2019, the largest increases in the level of piezometri (NP) were recorded in the Moldavian Plateau, the Eastern and Curvature Subcarpathians, in about 60% of the number of monitoring points (Girov, Siret Corridor).

TableII.7. The differences between the annual averages 2020 compared to 2019 and the multiannual averages

Zona / Depasiri ale adancimii NP (cm)	Nr. Foraje	Diferentele mediilor anuale 2020 şi 2019 (cm)		Cresteri fata de anul 2019 (%)	Diferentele mediilor anuale 2020 si multianuale (cm)		Cresteri fata de anul 2019 (%)
		Max	Min		Max	Min	
A. Câmpia Română, Piemontul Getic şi Subcarpaţii Getici	113	161	-50	11	578	-425	37
B. Câmpia de Vest, Dealurile Crişanei şi Banatului	65	130	-47	28	316	-114	15
C. Depresiunea Transilvaniei şi depresiunile din Carpaţii Orientali	42	178	-36	29	199	-175	21
D. Podişul Moldovei, Subcarpaţii Orientali şi de Curbură	40	66	-137	63	219	-92	15
E. Podişul Dobrogei	9	90	-2	11	461	-128	22

NP - nivel piezometric

Source: NARW

The average values of 2020 were, compared to the multiannual average, at higher values by up to 425 cm (Siliştea, Câmpia Piteştiului) in 37% of the boreholes and lower by up to 578 cm (Conţeşti, Câmpia Burnas) in 63% of them (table II.7.).

Historical minimums identified at the level of 2020 (the maximum values of the depth of the piezometric level recorded during the entire period of drilling monitoring) showed exceedances compared to the previous year in 12 monitoring points presented in Table II.8.

The most important decreases, up to 40 cm, are noted in the Moldavian Plateau and in the Eastern Subcarpathians.

The precipitation regime was analyzed by comparison with the fluctuations of the piezometric levels and the result of the analysis is represented in figure II.6, which highlights the spatial distribution of the differences between the annual precipitations compared to the evolution of the levels (increasing, decreasing or stationary) in the monitoring drillings. The representation highlights the correlation of the increases for both parameters analyzed on small areas, extended areas in the east of the Romanian Plain and Dobrogea, Banat and the Siret meadow being affected by a deficient rainfall regime accompanied by a decrease in the groundwater levels.

At the level of the country's population, 2020 is deficient by almost 57% compared to the previous year, with quantities up to 321 l / m². Monthly rainfall below 50 l/m² was recorded in most regions during February-March, August-October and December 2019, January-April and October-November 2020

TableII.8 Historical minimum values recorded in the year 2020

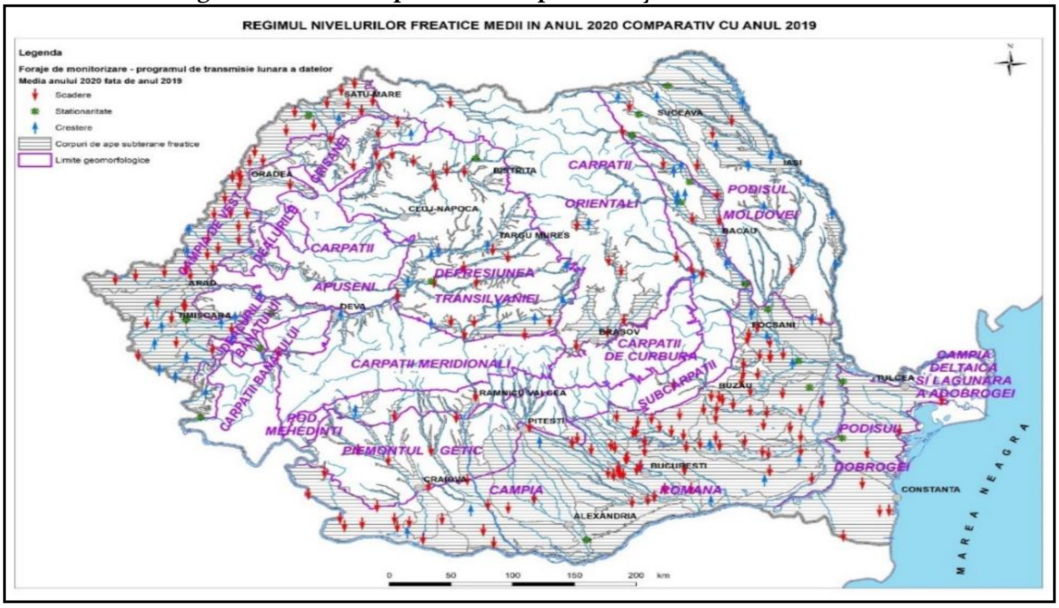
ABA	FORAJ	CORP DE APA SUBTERANA	SUBUNITATE GEOMORFOLOGICA	REGIUNE	MINIM ISTORIC 2019	MINIM ISTORIC 2020	DIFERENTA DE ADANCIME (cm)
01 SOMES-TISA	FOIENI ORD.II F1	ROSO06	Campia Valea Lui Mihai	CAMPIA BANATO-CRISANA (DE VEST)	521	530	9
01 SOMES-TISA	ODOREU F3	ROSO01	Campia Joasa a Somesului	CAMPIA BANATO-CRISANA (DE VEST)	846	854	8
01 SOMES-TISA	BIRSANA F1	ROSO02	Culoarul Izei	CARPATII ORIENTALI	278	286	8
01 SOMES-TISA	RETEAG F3	ROSO09	Culoarele Someselor Mic si Mare	DEPRESIUNEA TRANSILVANIEI	448	450	2
02 CRISURI	BERECHIU ORD.II F1	ROCR01	Campia Cermeiului	CAMPIA BANATO-CRISANA (DE VEST)	655	661	6
05 JIU	FILIASI F3	ROJI05	Culoarul Jiului	PIEMONTUL GETIC	353	376	23
BUZAU	BULIGA F6	ROIL11	Balta Borcei	CAMPIA ROMANA	587	596	9
08 IALOMITA-BUZAU	MINZU POLUARE (CILIBIA) F6	ROIL06	Lunca Buzaului	CAMPIA ROMANA	405	406	1
09 SIRET	LATINU-INDEPENDENTA F6A	ROSI05	Campia Siretului	CAMPIA ROMANA	239	265	26
09 SIRET	PALTINOASA F2	ROSI03	Culoarul Moldovei	SUBCARPATII	641	670	29
10 PRUT-BARLAD	TODIRENI F3	ROPR02	Colinele Ibanesei	PODISUL MOLDOVEI	393	433	40
11 DOBROGEA-LITORAL	CUZA VODA (CT) ORD.II F1	RODL10	Podisul Cernavodei	PODISUL DOBROGEI	1520	1530	10

Source: NARW

Conclusions

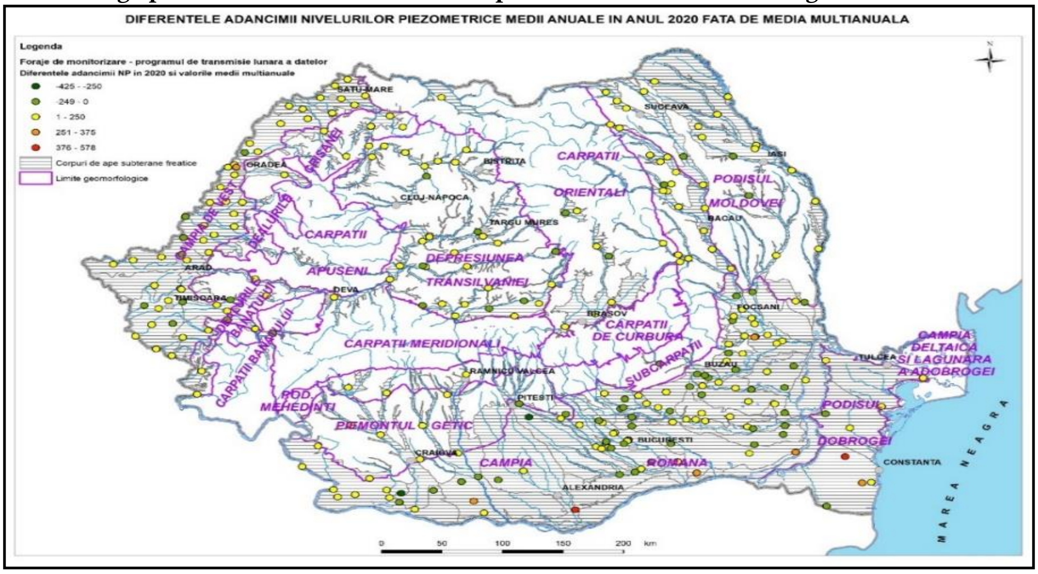
In 2020, there is a decrease in the levels in 192 drillings out of the total of 269 enrolled in the monthly transmission program of the water basin administrations, which represents 72%. About 74% of the analyzed drillings recorded depths of groundwater levels below the multiannual average. However, compared to 2019, there were increases of up to 60% of the levels measured in the drillings located in the Moldavian Plateau, the Eastern Subcarpathians and the Curvature. The Dobrogea Plateau and the deltaic area represent the area in which drops of up to 90 cm were recorded in 2020 (Techirghiol, Mangalia Plateau). Compared to the multi-year regime, the most frequent decreases were still manifested in the entire Moldavian Plateau and in significant areas in the Western Plain and the Bărăganului Plain.

Figure II.4. Groundwater flow regime in 2020 compared to the previous year



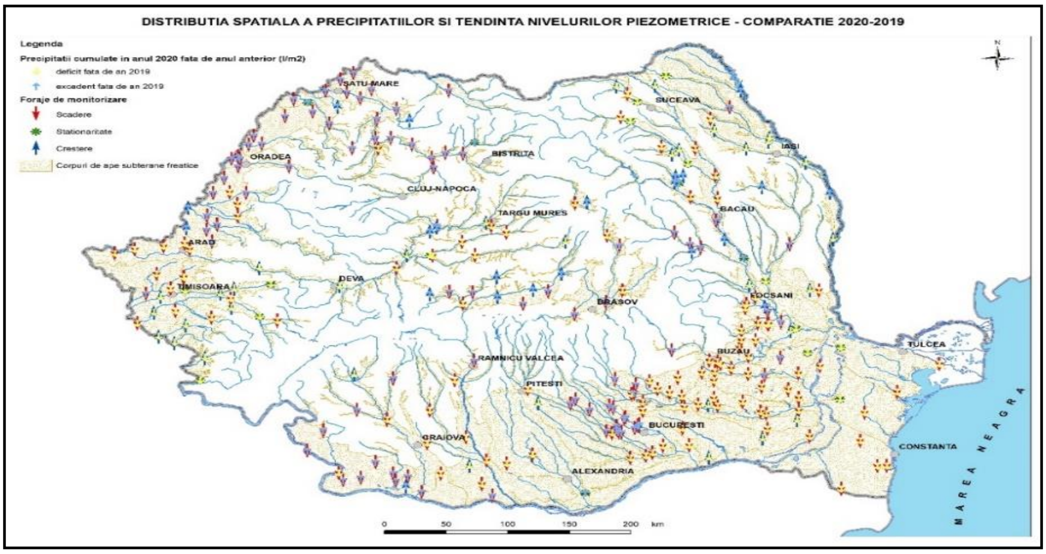
Source: NARW

Figure II.5. Depth of average piezometric levels of 2020 compared to multiannual average values



Source: NARW

Figure II.6. Spatial distribution of precipitation amounts in 2019 and 2020 compared to the trend of piezometric levels in the same period



Source: NARW

Use of water resources

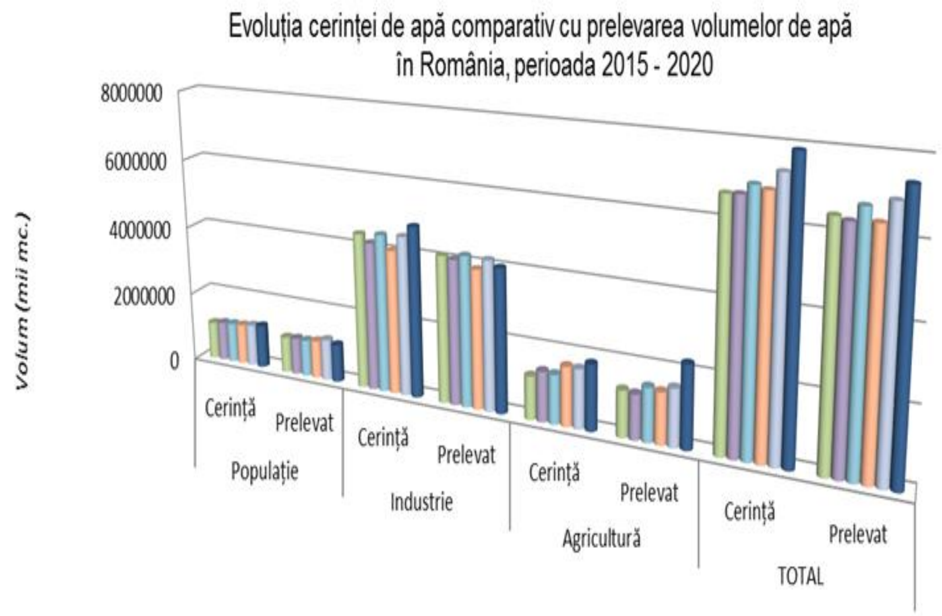
Table II.9 Evolution of water demand compared to water volumes (thousand m^3)

Source	Population		Industry		Agriculture		TOTAL	
	Requirement	collected	Requirement	collected	Requirement	collected	Requirement	collected
Surface	568137	546977	1782359	1285454	875837	910626	3226333	2743057
	579424	536969	1690074	1244955	998258	888659	3267756	2670583
	594990	535160	1707998	1350532	942300	1035709	3245288	2921401
	593806	557945	1307286	1255395	1099659	951952	3000751	2765292
	615797	612211	1730382	1322859	1120766	1028841	3466945	2963911
	627178	593018	1909807	1155263	1171368	1135911	3708353	2884192
Underground	434383	420464	173783	134530	35993	35365	644159	590359
	472993	454977	166987	140553	40674	39518	680654	635048
	482213	452958	162548	147014	44805	46458	689566	646430
	498167	467129	167239	159826	55458	51737	720864	678692
	521195	492378	184000	159092	60841	53341	766036	704811
	539058	411372	195651	198892	67492	185296	802201	795560
Danube	69200	62869	2449641	2716769	302339	344753	2821180	3124391
	69170	59187	2336364	2684657	363069	314452	2768603	3058296
	67599	60042	2595753	2725887	387068	408583	3050420	3194512
	68575	59876	2593468	2479875	502860	423146	3164903	2962897
	67222	71904	2592137	2719039	467507	508740	3126866	3299683
	68523	73362	2720136	2676840	599604	958882	3388263	3709084
Black Sea	61	49	11803	7011	-	-	11864	7060
	60	65	9503	9533	-	-	9563	9598
	58	52	10287	10253	-	-	10345	10305
	65	46	10179	9238	-	-	10244	9284

	74	47	10339	6405	-	-	10413	6452
	74	27	9602	7320	-	-	9676	7347
TOTAL 2015	1071781	1030359	4417586	4143764	1214169	1290744	6703536	6464867
TOTAL 2016	1121647	1051198	4202928	4079698	1402001	1242629	6726576	6373525
TOTAL 2017	1144860	1048212	4476586	4233686	1374173	1490750	6995619	6772648
TOTAL 2018	1160613	1084996	4078172	3904334	1657977	1426835	6896762	6416165
TOTAL 2019	1204288	1176540	4516858	4207395	1649114	1590922	7370260	6974857
TOTAL 2020	1234833	1077779	4835196	4038315	1838464	2280089	7908493	7396183

Source: NARW

Figure II.7 Evolution of water demand compared to water volumes in Romania, in the period 2015 - 2020



	Populație		Industrie		Agricultură		TOTAL	
	Cerință	Prelevat	Cerință	Prelevat	Cerință	Prelevat	Cerință	Prelevat
TOTAL 2015	1071781	1030359	4417586	4143764	1214169	1290744	6703536	6464867
TOTAL 2016	1121647	1051198	4202928	4079698	1402001	1242629	6726576	6373525
TOTAL 2017	1144860	1048212	4476586	4233686	1374173	1490750	6995619	6772648
TOTAL 2018	1160613	1084996	4078172	3904334	1657977	1426835	6896762	6416165
TOTAL 2019	1204288	1176540	4516858	4207395	1649114	1590922	7370260	6974857
TOTAL 2020	1234833	1077779	4835196	4038315	1838464	2280089	7908493	7396183

Source: NARW

Table II.10 Evolution of the water requirement compared to the sampling of water volumes (%)

Sursa	Anii	Populație			Industrie			Agricultură			TOTAL		
		Cerință	Prelevat	Grad de realizare (%)	Cerință	Prelevat	Grad de realizare (%)	Cerință	Prelevat	Grad de realizare (%)	Cerință	Prelevat	Grad de realizare (%)
Suprafață	2015	568137	546977	96.3%	1782359	1285454	72.1%	875837	910626	104.0%	3226333	2743057	85.0%
	2016	579424	536969	92.7%	1690074	1244955	73.7%	998258	888659	89.0%	3267756	2670583	81.7%
	2017	594990	535160	89.9%	1707998	1350532	79.1%	942300	1035709	109.9%	3245288	2921401	90.0%
	2018	593806	557945	94.0%	1307286	1255395	96.0%	1099659	951952	86.6%	3000751	2765292	92.2%
	2019	615797	612211	99.4%	1730382	1322859	76.4%	1120766	1028841	91.8%	3466945	2963911	85.5%
	2020	627178	593018	94.6%	1909807	1155263	60.5%	1171368	1135911	97.0%	3708353	2884192	77.8%
Subteran	2015	434383	420464	96.8%	173783	134530	77.4%	35993	35365	98.3%	644159	590359	91.6%
	2016	472993	454977	96.2%	166987	140553	84.2%	40674	39518	97.2%	680654	635048	93.3%
	2017	482213	452958	93.9%	162548	147014	90.4%	44805	46458	103.7%	689566	646430	93.7%
	2018	498167	467129	93.8%	167239	159826	95.6%	55458	51737	93.3%	720864	678692	94.1%
	2019	521195	492378	94.5%	184000	159092	86.5%	60841	53341	87.7%	766036	704811	92.0%
	2020	539058	411372	76.3%	195651	198892	101.7%	67492	185296	274.5%	802201	795560	99.2%
Dunăre	2015	69200	62869	90.9%	2449641	2716769	110.9%	302339	344753	114.0%	2821180	3124391	110.7%
	2016	69170	59187	85.6%	2336364	2684657	114.9%	363069	314452	86.6%	2768603	3058296	110.5%
	2017	67599	60042	88.8%	2595753	2725887	105.0%	387068	408583	105.6%	3050420	3194512	104.7%
	2018	68575	59876	87.3%	2593468	2479875	95.6%	502860	423146	84.1%	3164903	2962897	93.6%
	2019	67222	71904	107.0%	2592137	2719039	104.9%	467507	508740	108.8%	3126866	3299683	105.5%
	2020	68523	73362	107.1%	2720136	2676840	98.4%	599604	958882	159.9%	3388263	3709084	109.5%
Marea Neagră	2015	61	49	80.3%	11803	7011	59.4%				11864	7060	59.5%
	2016	60	65	108.3%	9503	9533	100.3%				9563	9598	100.4%
	2017	58	52	89.7%	10287	10253	99.7%				10345	10305	99.6%
	2018	65	46	70.8%	10179	9238	90.8%				10244	9284	90.6%
	2019	74	47	63.5%	10339	6405	61.9%				10413	6452	62.0%
	2020	74	27	36.5%	9602	7320	76.2%				9676	7347	75.9%
TOTAL	2015	*1071781*	*1030359*	*96.1%*	*4417586*	*4143764*	*93.8%*	*1214169*	*1290744*	*106.3%*	*6703536*	*6464867*	*96.4%*
TOTAL	2016	*1121647*	*1051198*	*93.7%*	*4202928*	*4079698*	*97.1%*	*1402001*	*1242629*	*88.6%*	*6726576*	*6373525*	*94.8%*
TOTAL	2017	*1144860*	*1048212*	*91.6%*	*4476586*	*4233686*	*94.6%*	*1374173*	*1490750*	*108.5%*	*6995619*	*6772648*	*96.8%*
TOTAL	2018	*1160613*	*1084996*	*93.5%*	*4078172*	*3904334*	*95.7%*	*1657977*	*1426835*	*86.1%*	*6896762*	*6416165*	*93.0%*
TOTAL	2019	*1204288*	*1176540*	*97.7%*	*4516858*	*4207395*	*93.1%*	*1649114*	*1590922*	*96.5%*	*7370260*	*6974857*	*94.6%*
TOTAL	2020	*1234833*	*1077779*	*87.3%*	*4835196*	*4038315*	*83.5%*	*1838464*	*2280089*	*124.0%*	*7908493*	*7396183*	*93.5%*

Source: NARW

Extreme events caused by watercourse flows

RO 52

Romania indicator code: RO 52
EEA indicator code: CLIM 16

TITLE:WATER COURSE FLOWS

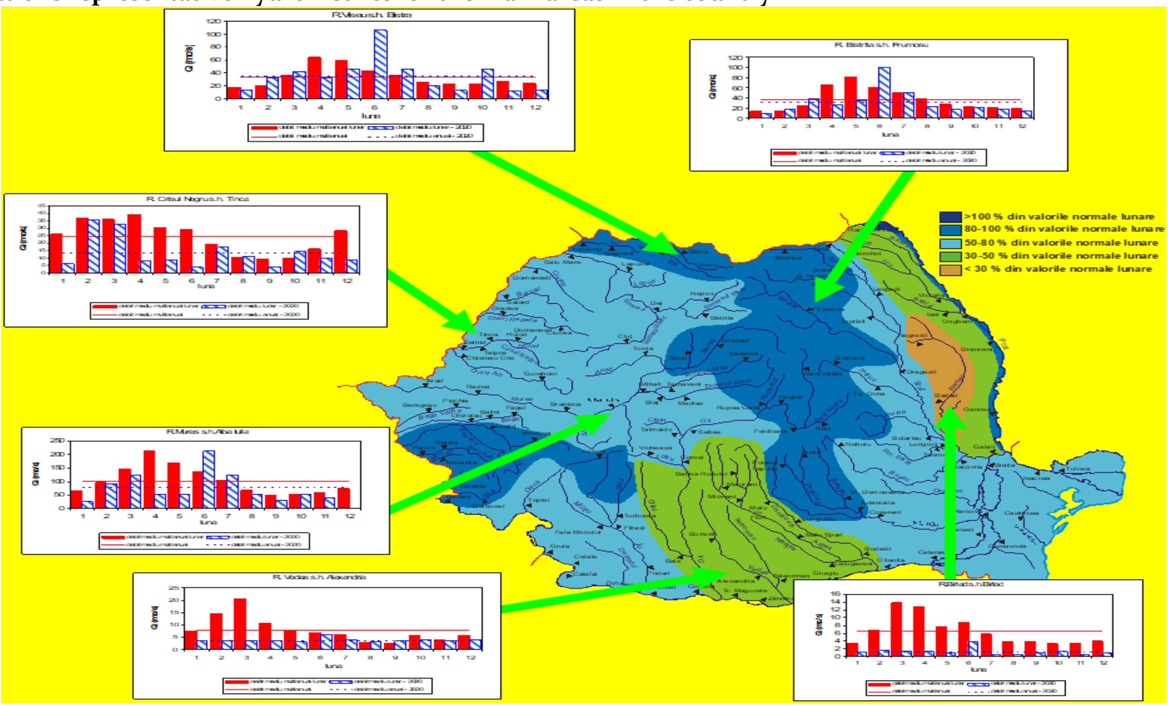
DEFINITION: The indicator defines the estimated changes in the average daily, monthly, seasonal and annual flows of watercourses.

Hydrological characterization of 2020

I) Inland rivers

In 2020, the hydrological regime was at values between 50 - 80% of the multiannual averages, higher (80-100% of the multiannual averages) on the rivers in the hydrographic basins: Vişeu, Iza, Tur, Timiş, Bârzava, Moraviţa, Caraş, Nera, Bistriţa, Suceava, the upper basins of the rivers: Jiu, Olt, Mureş, Buzău, Putna, Trotuş, the upper and middle basins of Ialomiţa and Moldovei and along the Prut downstream Ac. Stânca Costești and lower (30-50%) on the rivers from the lower Olt, Vedea, Argeş river basins and on the tributaries of the Prut. The lowest values of the average flows (below 30% of the monthly normals) were recorded on the rivers from the Bârlad basin, and on the upper course of the Prut river the flows had values above the multiannual monthly averages (figure II.8).

Figure II.8 The map with the distribution of the coefficients of the annual modules (the ratio between the average annual flow and the average multiannual flow) for the year 2020, the hydrograph of the average monthly flows ( ) compared to the normal monthly values ( ), the average annual flow 2020 ( ), the average multiannual flow ( ) at several stations representative hydrometrics for the main areas in the country

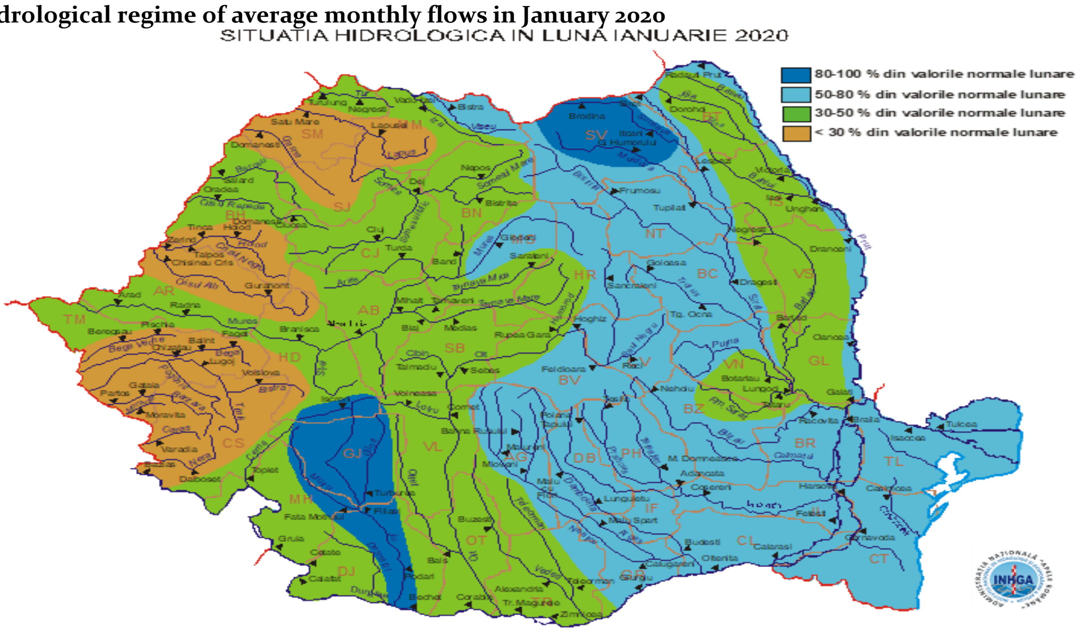


Source: NARW

In 2020, based on the hydrological situation and meteorological forecasts, before the onset of dangerous phenomena, **44 HYDROLOGICAL WARNINGS** were issued at national level (**34 ORANGE CODE and 10 RED CODE), 21 WARNINGS - YELLOW CODE, 148 warnings for immediate phenomena (which 38 RED CODE) and 264 warnings for immediate phenomena**.

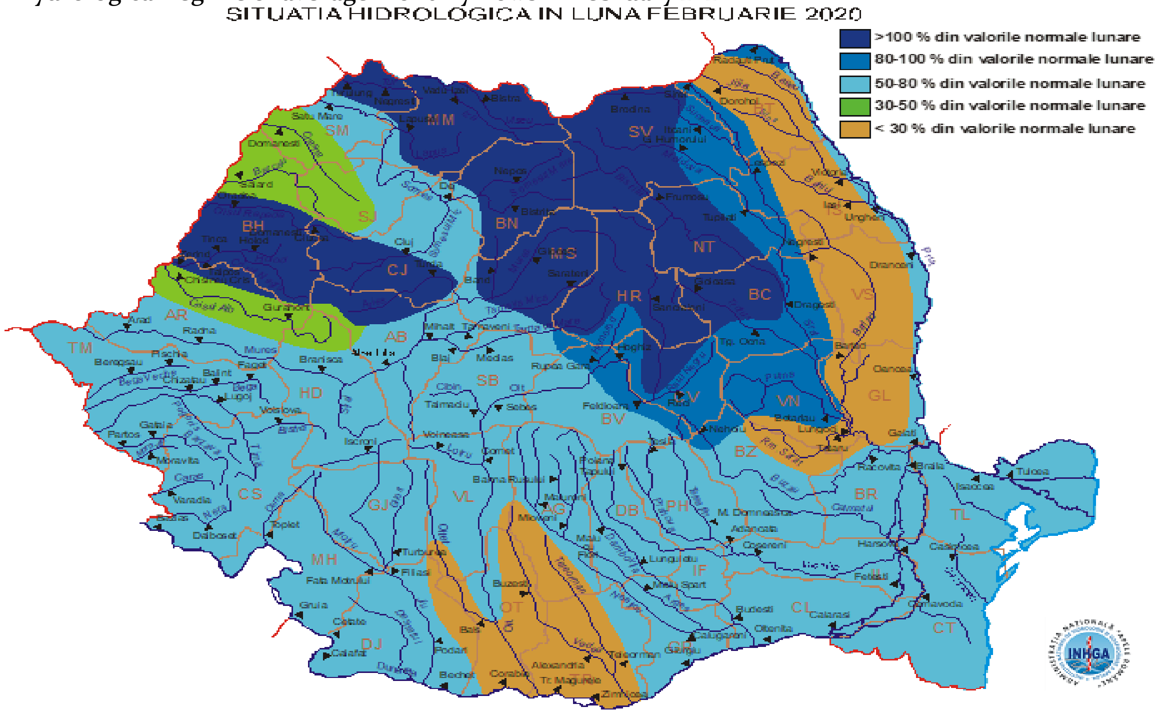
Characterization of the winter months 2020

Figure II.9 Hydrological regime of average monthly flows in January 2020



Source: NARW

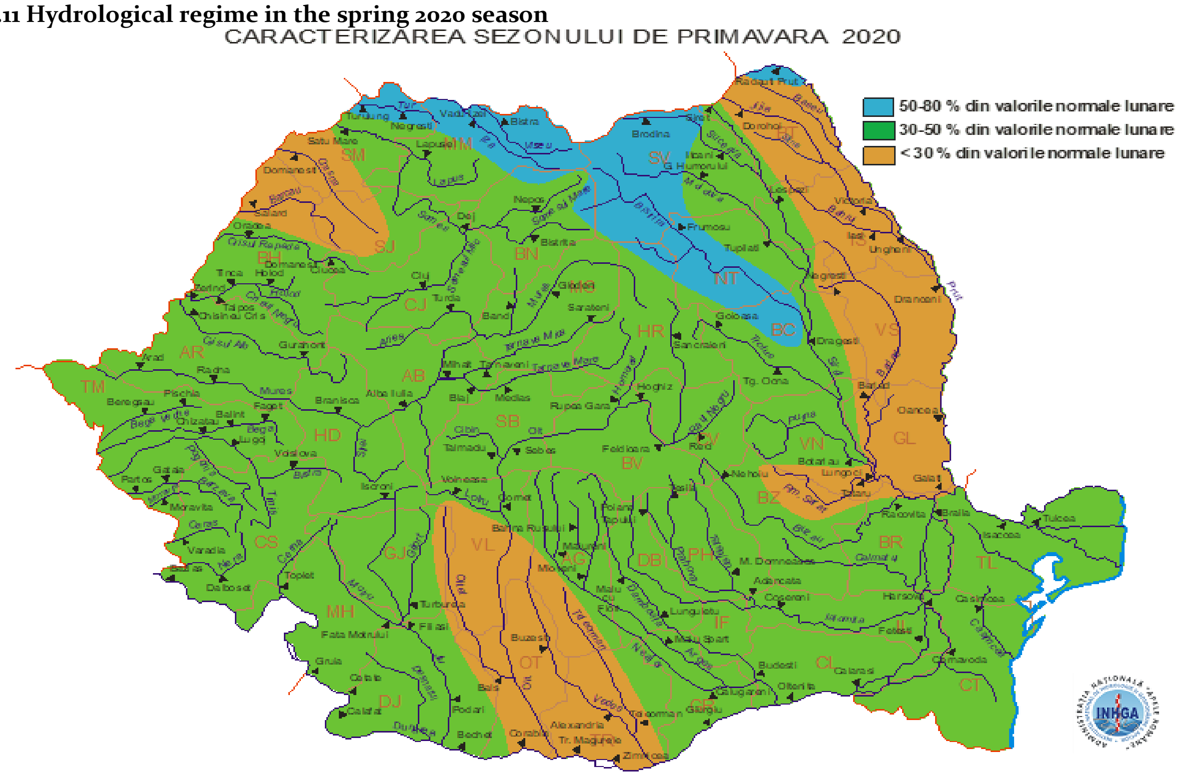
Figure II.10 Hydrological regime of average monthly flows in February 2020



Source: NARW

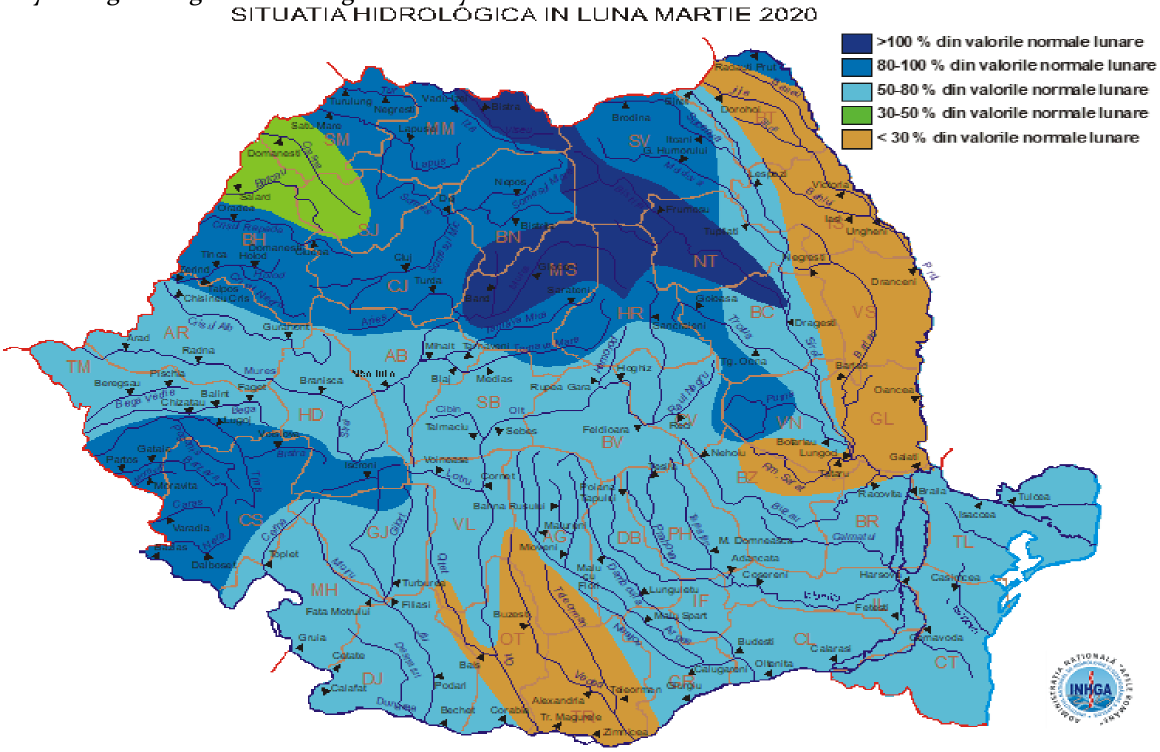
Characterization of the spring season 2020

Figure II.11 Hydrological regime in the spring 2020 season



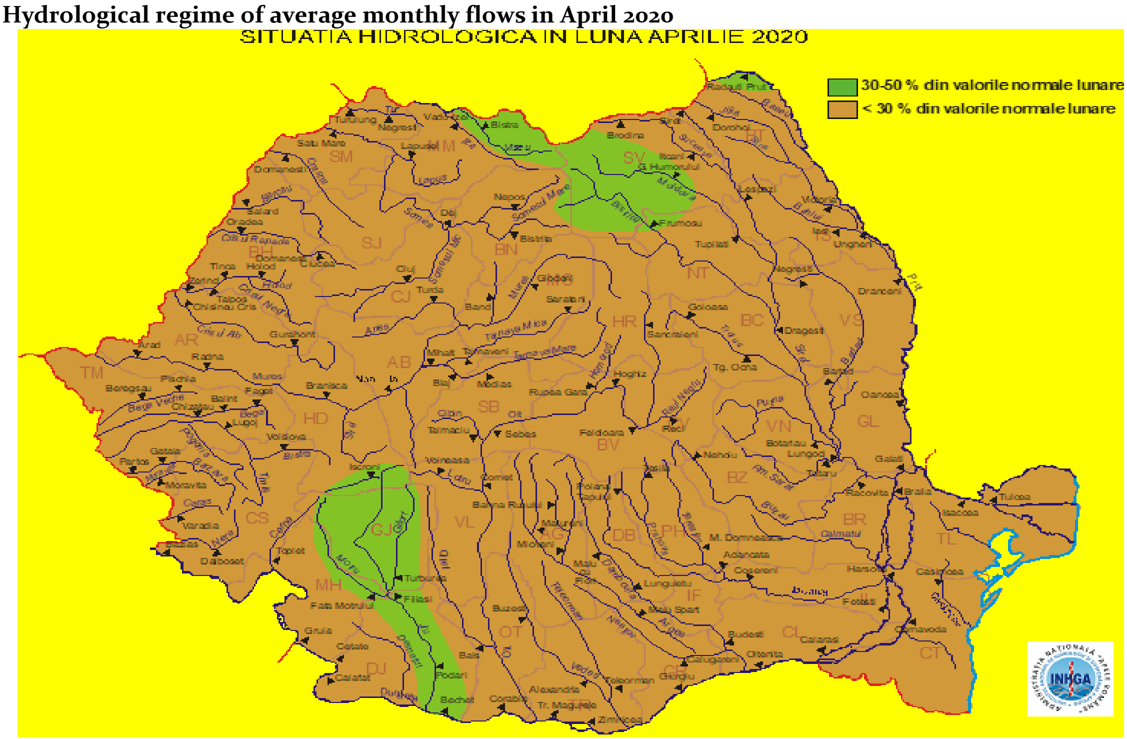
Source: NARW

Figure II.12 Hydrological regime of average monthly flows in March 2020



Source: NARW

Figure II.13 Hydrological regime of average monthly flows in April 2020



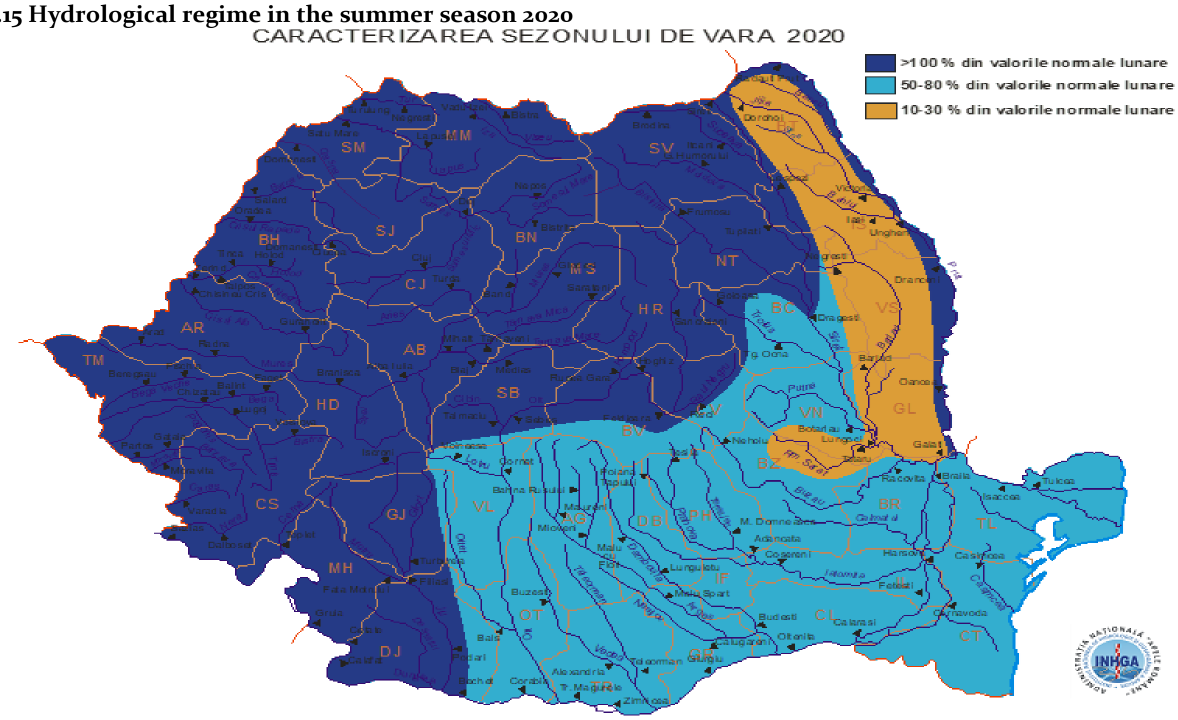
Source: NARW

Figure II.14 Hydrological regime of average monthly flows in May 2020

Source: NARW

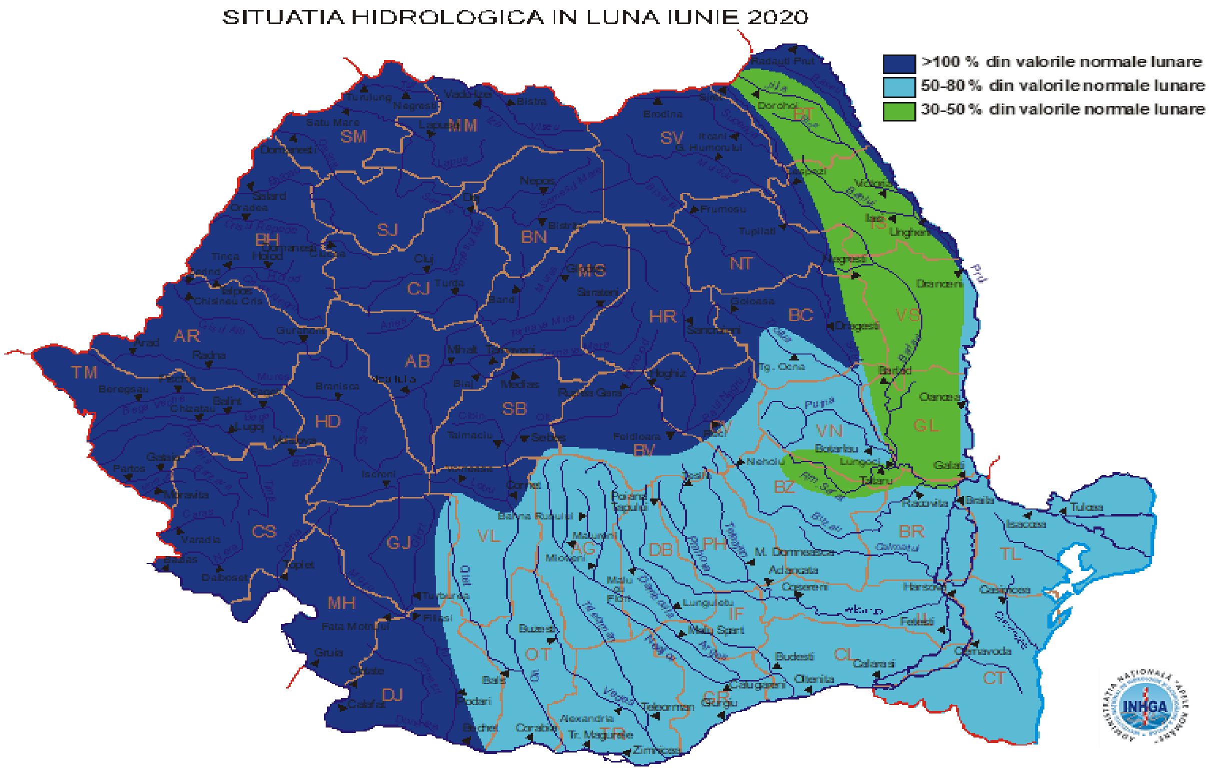
Characterization of the summer season 2020

Figure II.15 Hydrological regime in the summer season 2020



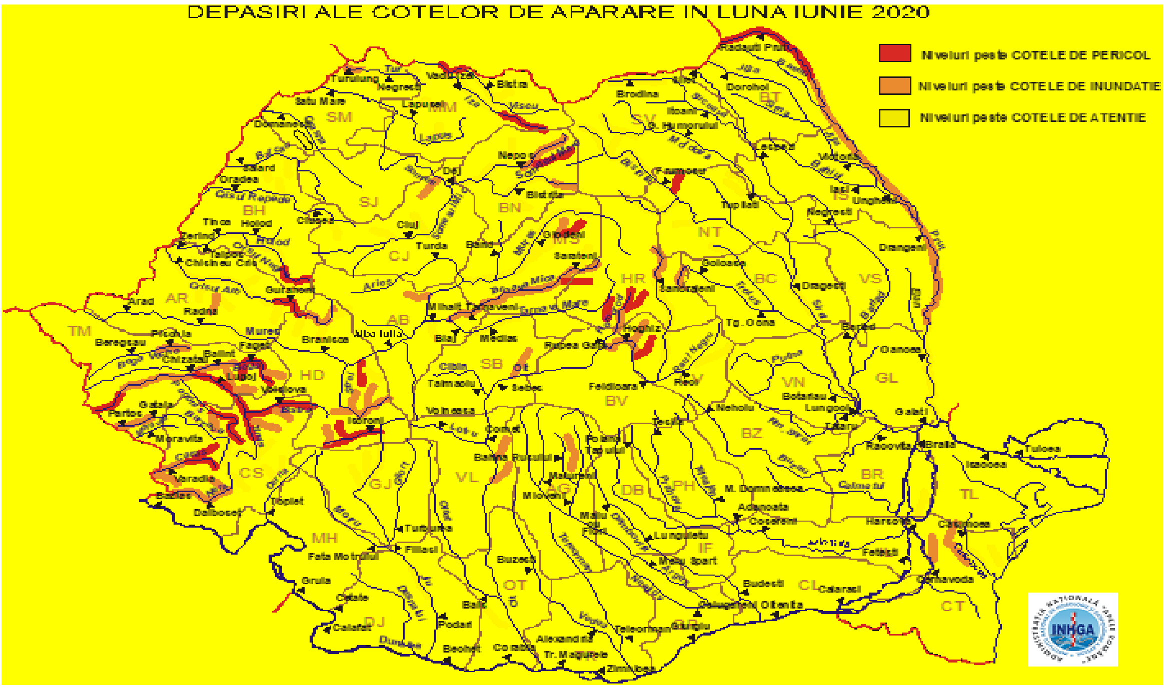
Source: NARW

Figure II.16 Hydrological regime of average monthly flows in June 2020



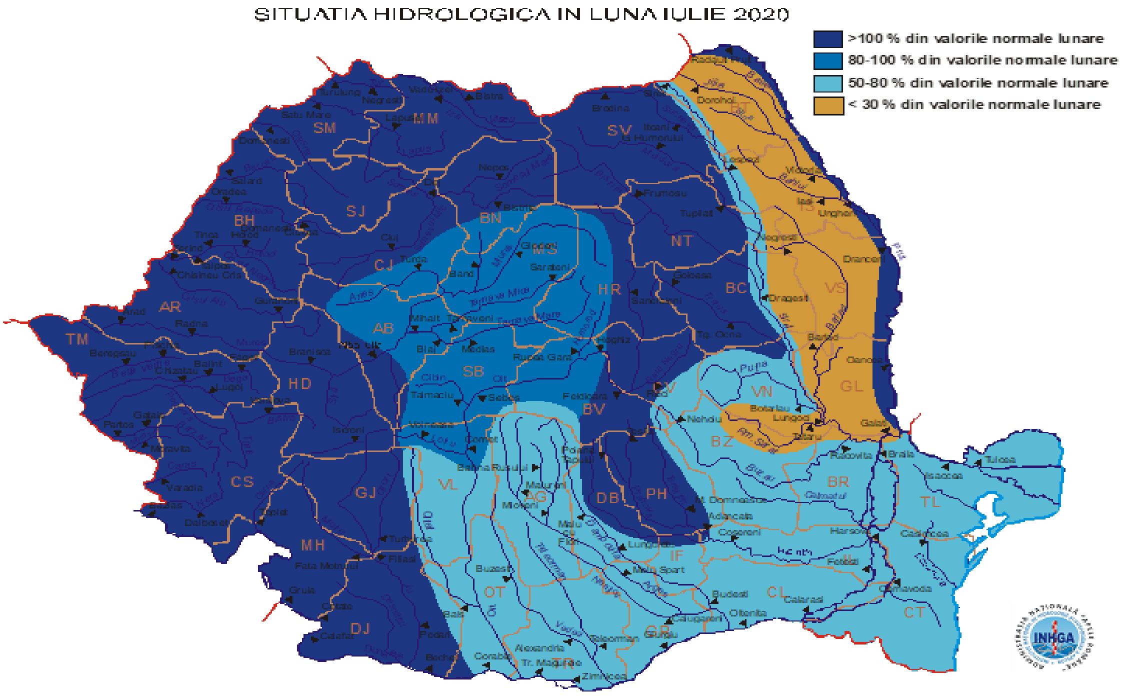
Source: NARW

Figure II.17 Situation of DEFENCE QUOTA overruns for June 2020



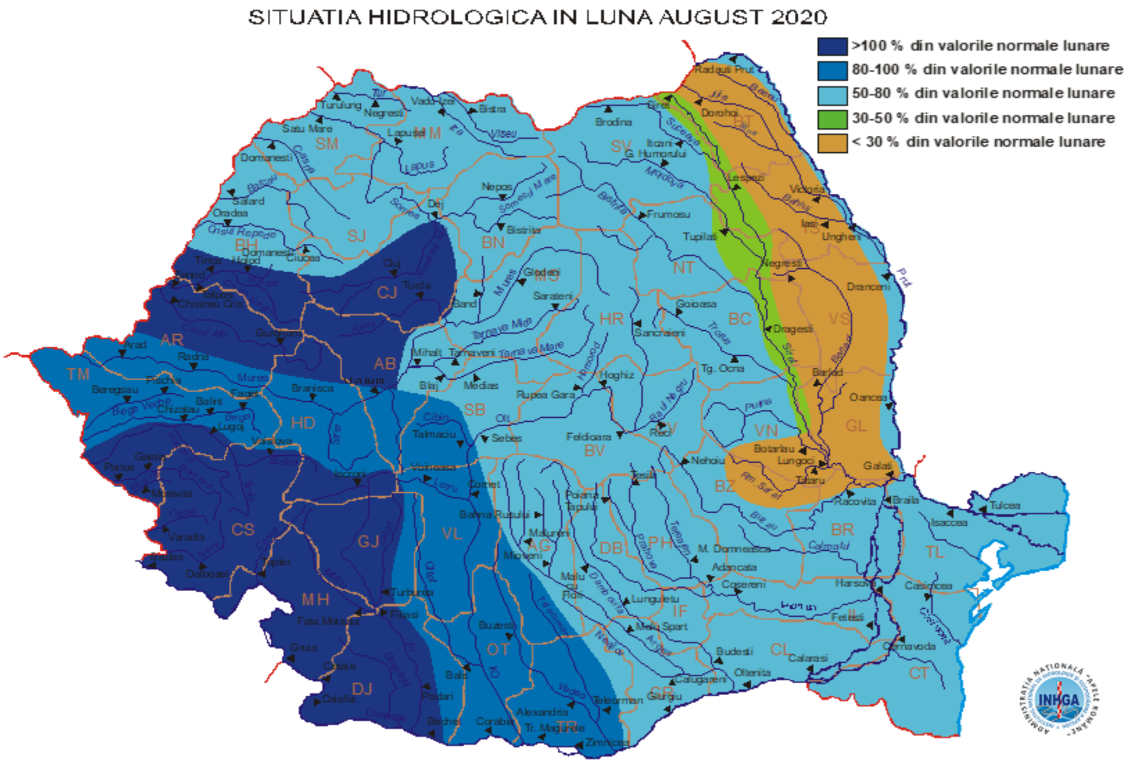
Source: NARW

Figure II.18 Hydrological regime of average monthly flows in July 2020



Source: NARW

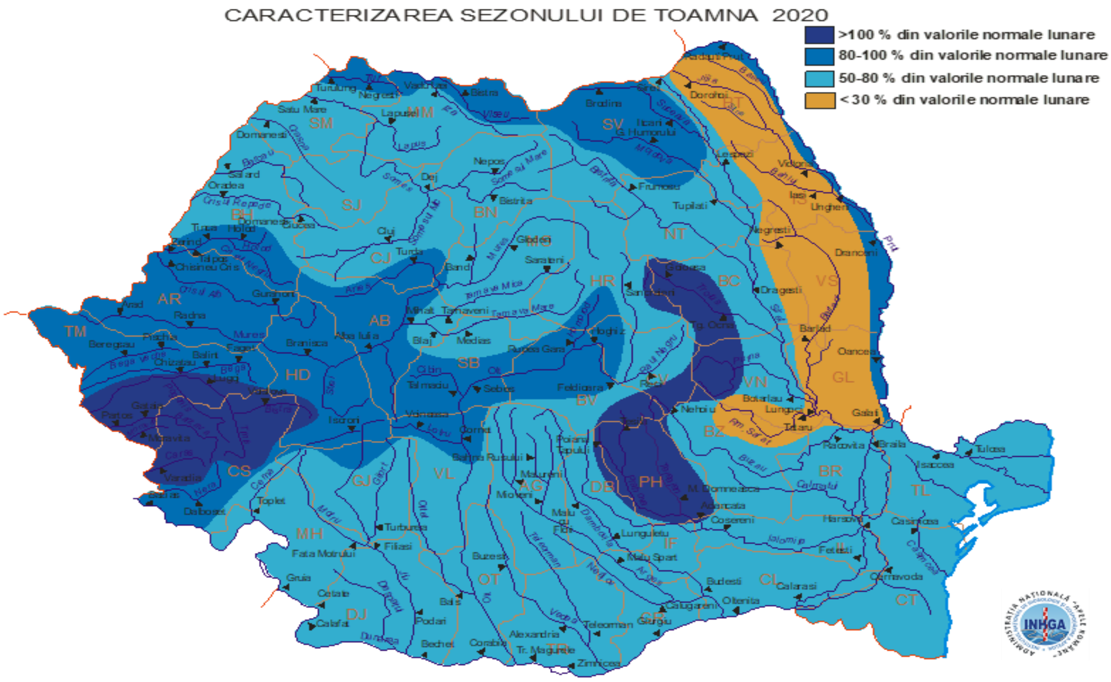
Figure II.19 Hydrological regime of average monthly flows in August 2020



Source: NARW

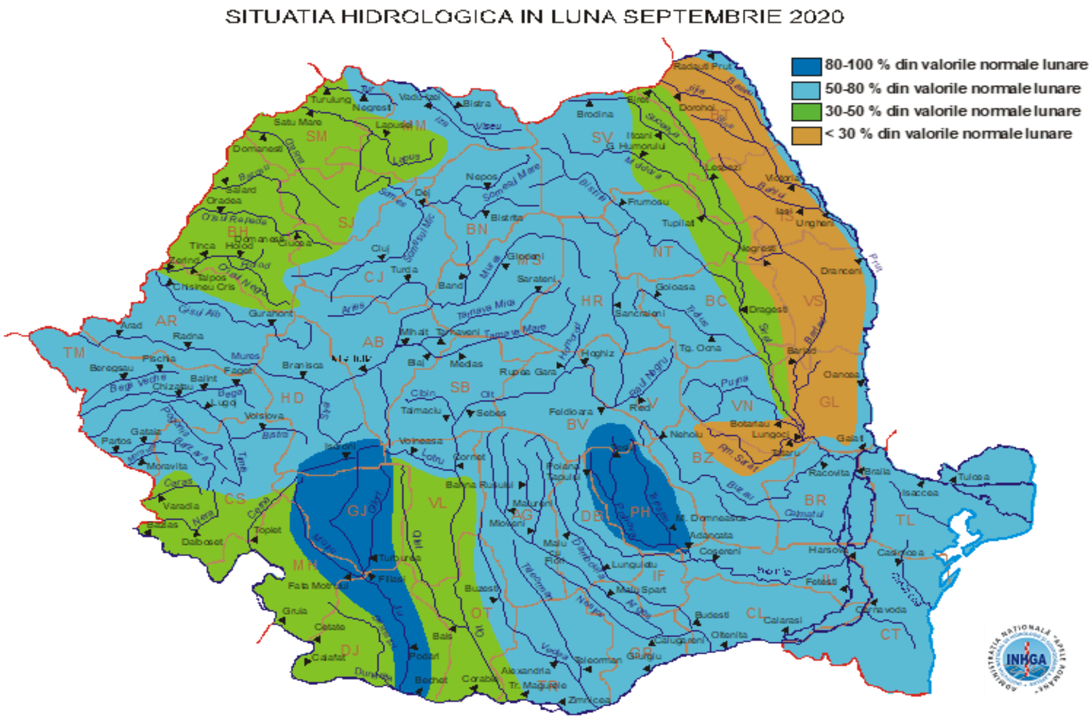
Characterization of the autumn season 2020

Figure II.20 Hydrological regime in the autumn season 2020



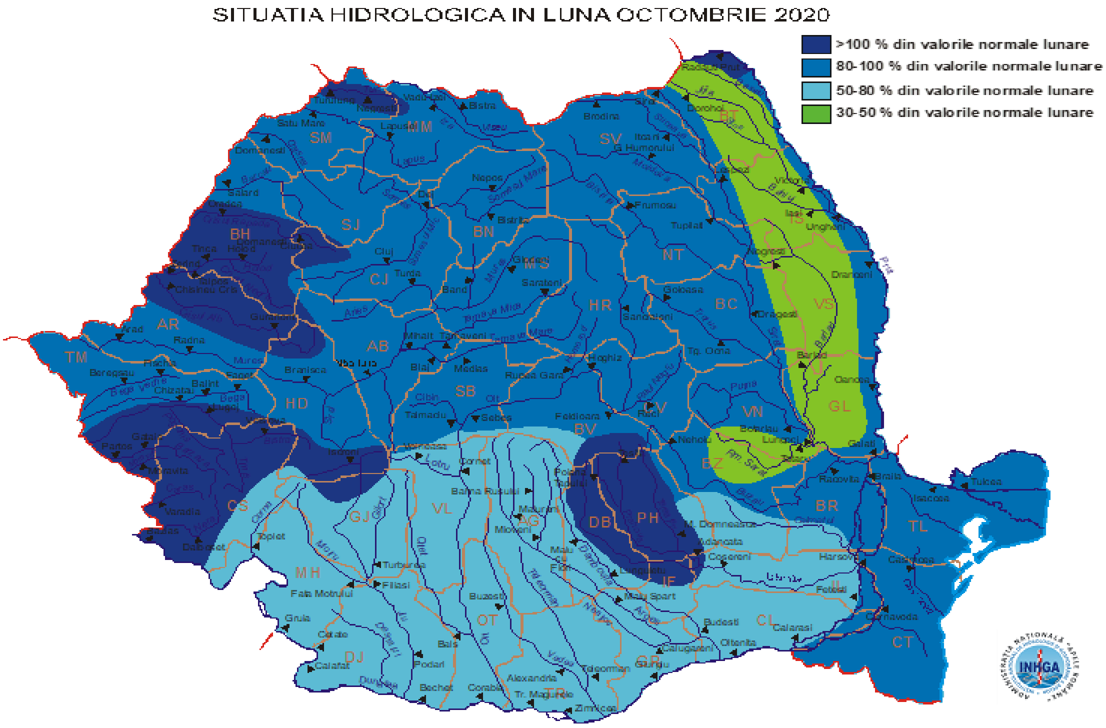
Source: NARW

Figure II.21 Hydrological regime of average monthly flows in September 2020



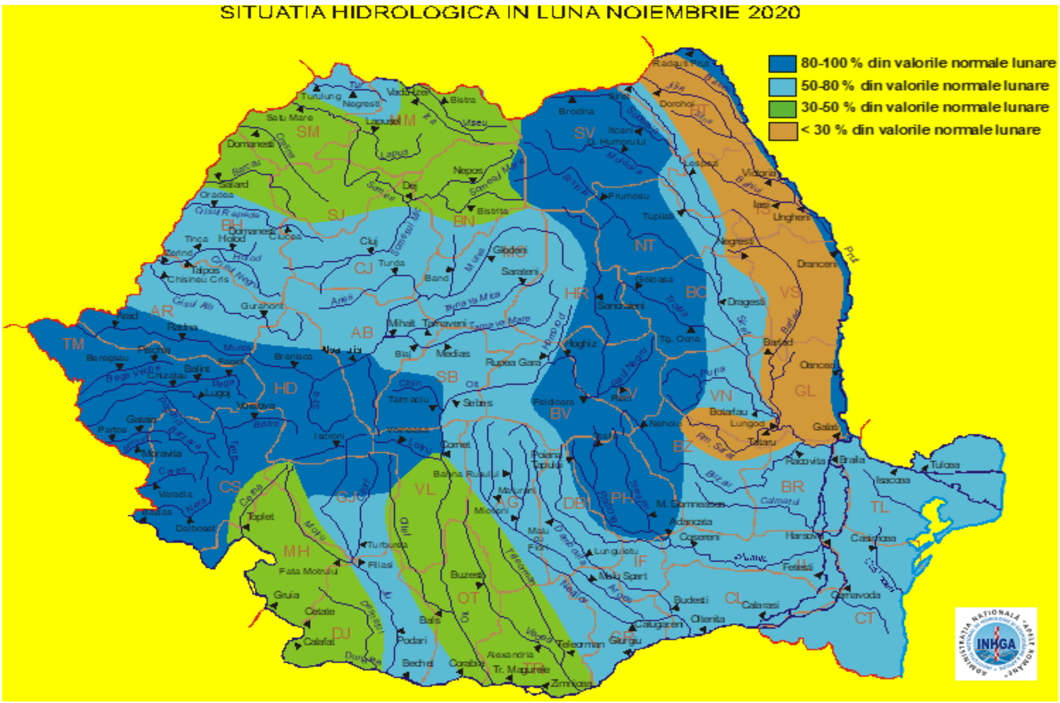
Source: NARW

Figure II.22 Hydrological regime of average monthly flows in October 2020



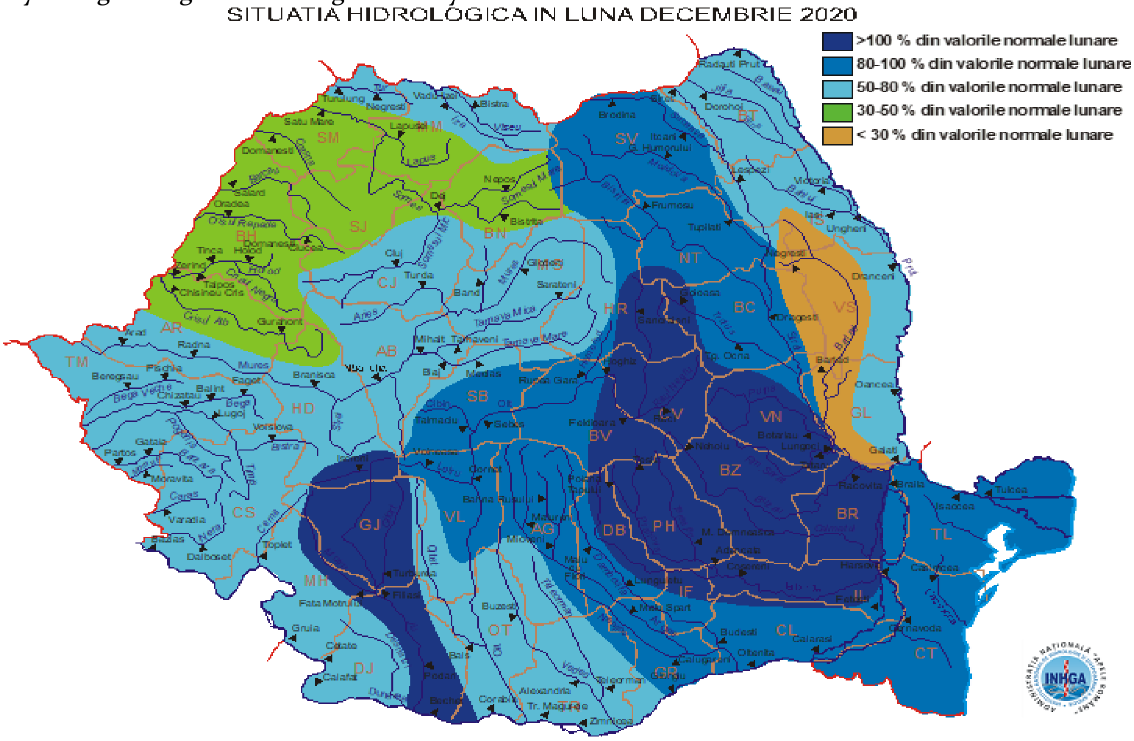
Source: NARW

Figure II.23 Hydrological regime of average monthly flows in November 2020



Source: NARW

Figure II.24 Hydrological regime of average monthly flows in December 2020



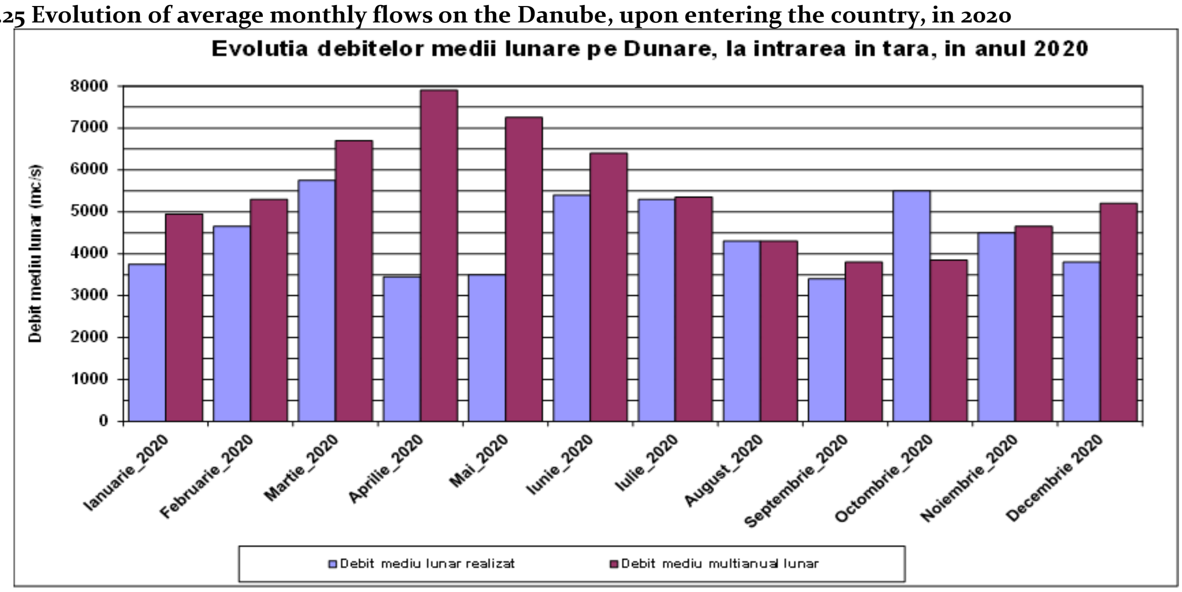
Source: NARW

DANUBE RIVER

In 2020, the average monthly flows recorded on the Danube at the entrance to the country (Baziaș section) were below the monthly normals, with values between 44-99% of the multiannual monthly averages between January and September 2020 and in November 2020 and above the multiannual monthly average in October 2020.

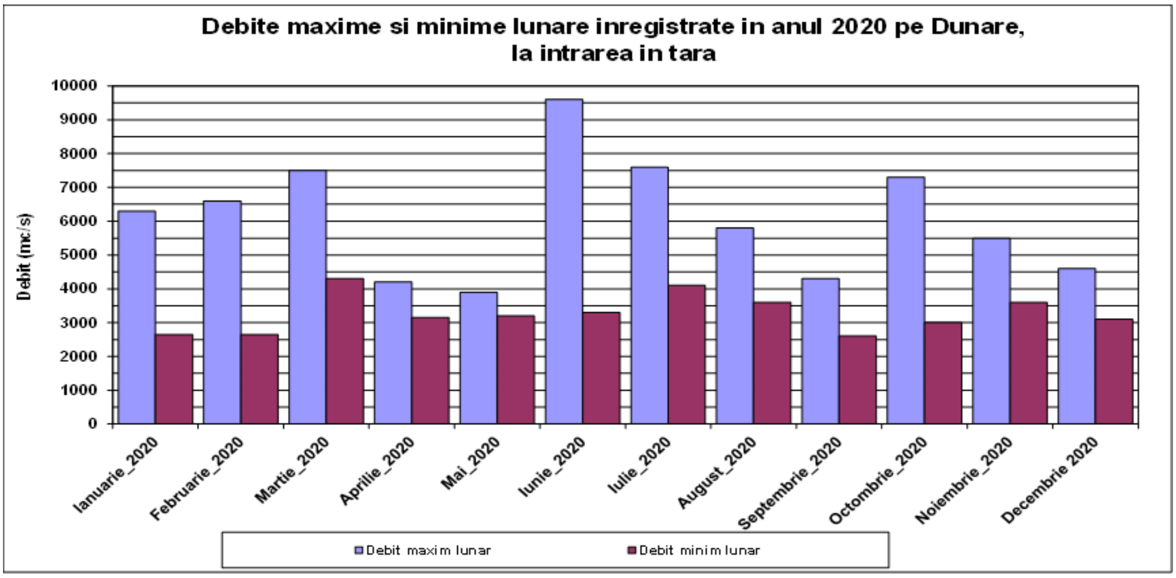
Figures II.25 and II.26 show the evolution of average, maximum and minimum monthly flows on the Danube, at the entrance to the country.

Figure II.25 Evolution of average monthly flows on the Danube, upon entering the country, in 2020



Source: NARW

Figure II.26 Evolution of the maximum and minimum monthly flows recorded on the Danube, upon entering the country, in 2020



Source: NARW

Characterization of the hydrological regime of the Danube in the winter season 2020

In the winter season, the average flows at the entrance to the country (Baziaş section) were below the multiannual monthly averages, with values between 75-88% of the monthly normals.

In January 2020, the flows at the entrance to the country (Baziaş section) were decreasing from the value of 6300 m³/s registered on the first day of the month (maximum monthly value) to the value of 2650 m³/s (minimum monthly value), on the last day of the month.

In February 2020, the flows at the entrance to the country (Baziaş section) were increasing from the value of 2650 m³/s registered on the first day of the month (minimum monthly value) to the value of 6600 m³/s registered on the 12th and February 13 (maximum monthly value), then decreasing to the value of 4100 m³/s on the last day of the month.

Characterization of the Danube hydrological regime in the spring of 2020

In the spring 2020 season, the average flows recorded on the Danube, at the entrance to the country (Baziaş section) had values below the multiannual monthly averages, with values between 43-85% of the monthly norms (table II.11).

Table II.11 Characteristic values for March, April and May

Characteristic values	Month		
	March	April	May
Multiannual monthly averages	6700 m³ / s	7900 m³ / s	7250 m³ / s
Minimum monthly averages (1931-2019)	2840 m³ / s (1949)	3450 m³ / s (2020)	3500 m³ / s (2020)
Multiannual monthly averages	6700 m³ / s	7900 m³ / s	7250 m³ / s
Monthly averages 1943	3160 m³ / s	4280 m³ / s	4400 m³ / s
Monthly averages 1949	2840 m³ / s	5970 m³ / s	4550 m³ / s
Monthly averages 1990	4440 m³ / s	4660 m³ / s	4220 m³ / s
Monthly averages 1991	4020 m³ / s	4490 m³ / s	6890 m³ / s
Monthly averages 2003	5400 m³ / s	5050 m³ / s	4410 m³ / s

Monthly averages 2007	6830 m^3 / s	4780 m^3 / s	3900 m^3 / s
Monthly averages 2011	5360 m^3 / s	4820 m^3 / s	3900 m^3 / s
Monthly averages 2020	5750 m^3 / s	3450 m^3 / s	3500 m^3 / s
Daily minimums (1931-2020)	1770 m^3 / s (1949)	2730 m^3 / s (1943)	3200 m^3 / s (2020)
Daily minimums 2020	4300 m^3 / s	3150 m^3 / s	3200 m^3 / s

Source: NARW

From the comparative analysis of the evolution of the average monthly flows made on the Danube at the entrance to the country (Baziaş section) in the spring season of 2020 and of those registered in the same season of the years considered with a deficient hydrological regime (1943, 1949, 1990, 1991, 2003, 2007) from the series of observations from 1931 to 2019, it is found that in April and May 2020 were recorded the lowest values of average flows, values well below the minimum values recorded in the reference period (3450 m3 / s in April 2020 compared to 4280 m3 / s in April 1943 and 3500 m3 / s in May 2020 compared to 3900 m3 / s in May 2007 and 2011).

Characterization of the hydrological regime of the Danube in the summer of 2020

In the summer season 2020, the average monthly flows of the Danube at the entrance to the country (Baziaş section) were below the monthly normals in June and July, with values between 84-99% and above the monthly normal in August (table II.12).

Table II.12 Characteristic values of June, July and August

Characteristic values	Month		
	June	July	August
Multiannual monthly averages	6400 m^3 / s	5350 m^3 / s	4300 m^3 / s
Monthly minimums 2020	3300 m^3 / s	4100 m^3/ s	3600 m^3 / s
Monthly averages 2020	5400 m^3 / s	5300 m^3 / s	4300 m^3 / s
Monthly maximums 2020	9600 m^3 / s	7600 m^3 / s	5800 m^3 / s

Source: NARW

Characterization of the hydrological regime of the Danube in autumn 2020

The average monthly flows of the Danube at the entrance to the country (Baziaş section) registered in the autumn season of 2020 were above the multiannual monthly averages, with values between 89-97%, in September and November and above the monthly average in October (table II.13).

Table II.13 Characteristic values for September, October and November

Characteristic values	Month		
	September	October	November
Multiannual monthly averages	3800 m^3 / s	3850 m^3 / s	4650 m^3 / s
Monthly minimums 2020	2600 m^3 / s	3000 m^3 / s	3600 m^3 / s
Monthly averages 2020	3400 m^3 / s	5500 m^3 / s	4500 m^3 / s
Monthly maximums 2020	4300 m^3 / s	7300 m^3 / s	5500 m^3 / s

Source: NARW

Characterization of the hydrological regime of the Danube in December 2020

In December 2020, the flows at the entrance to the country (Baziaş section) were decreasing from the value of 3500 m^3 / s on the first day of the month to the minimum monthly value of 3100 m^3 / s on December 5, stationary until the date of December 7, increasing to the maximum monthly value of 4600 m^3 / s recorded between December 15-18, decreasing to the value of 3300 m³ / s recorded on December 27, then increasing again to the value of 4600 m³ / s recorded on the last day of the month.

Hydromorphological changes of watercourses

Table II.14 shows the percentage evolution of the classification of water bodies, at national level, for a period of ten years (2004-2013), noting that natural water bodies predominate.

The total number of water bodies was modified considering the application of the criteria from the Management Plans of the basins / hydrographic spaces, approved by the Government Decision no. 80 for the approval of the National Management Plan related to the part of the international hydrographic basin of the Danube river which is included in the territory of Romania and the Government Decision no. 859/2016 for the approval of the updated National Management Plan related to the portion of the international river basin of the Danube River which is included in the territory of Romania.

Table II.14 Classification of water bodies at national level in the period 2004-2020

Year	Water body category			
	% no. natural water bodies	% no. artificial water bodies	% no. heavily modified water bodies	Total
2004	76.91	2.07	21.03 *	100
2007	82.11	2.79	15.09	100
2012	80.86	3.01	16.13	100
2013	81.64	2.43	15.93	100
2015	81.60	2.28	16.12	100
2016	81.60	2.28	16.12	100
2017	81.60	2.28	16.12	100
2018	81.60	2.28	16.12	100
2019	81.60	2.28	16.12	100
2020 **	81.32	2.28	16.40	100

* *including water bodies considered to be subject to significant change, according to the level of information available at that time (2004)*

** *according to the project of the updated National Management Plan 2021 (https://rowater.ro/despre-noi/descrierea-activitatii/managementul-european-integrat-resurse-de-apa/planurile-de-management-ale-bazinelor-hidrografice / national-management-plans/)*

Source: National Administration"Romanian Waters" reports according to the requirements of art. 5 and 13 of the Water Framework Directive 2000/60 / EC

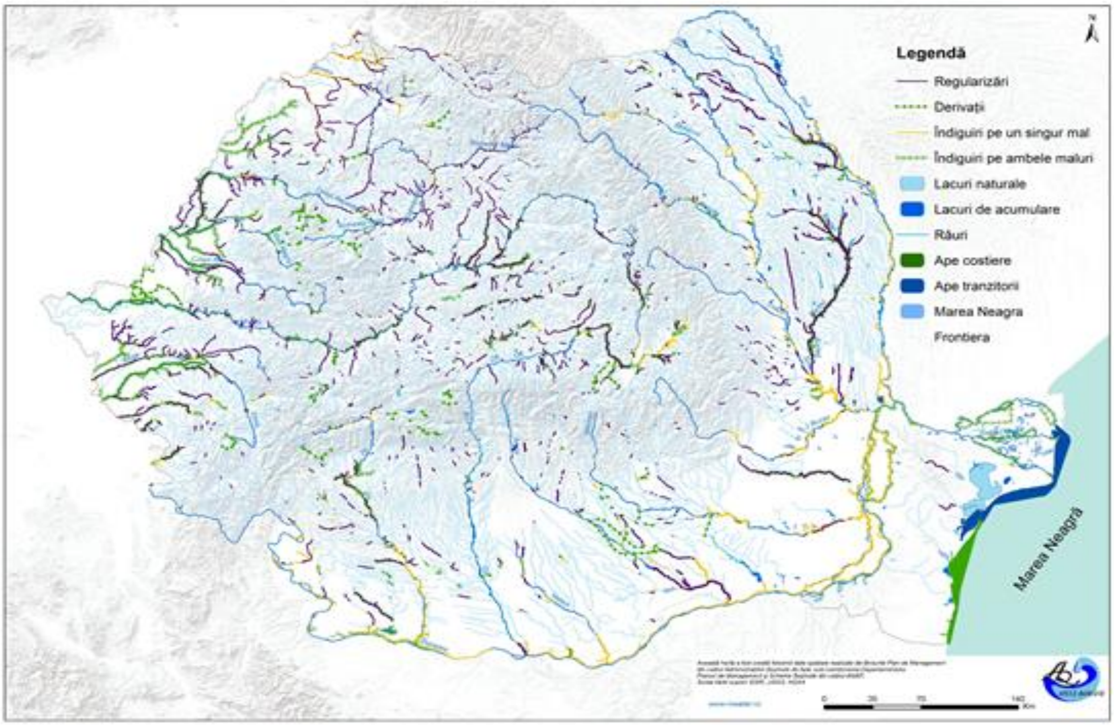
The criteria for identifying the hydromorphological pressures used in the National Management Plan approved by Government Decision no. 80/2011 (defined within the UNDP-GEF Regional Project of the Danube), were also used in the second updated National Management Plan approved by Government Decision no. 859/2016, taking into account the pressure intensity, established on the basis of abiotic parameters, as well as their effect on the biota. Thus, within the third National Management Plan for river basins / hydrographic areas in Romania, which was on June 30, 2021 in a project stage subject to public consultation until December 31, 2021, the types of potentially significant hydromorphological pressures were inventoried (a number of 407) identified at national level (table II.15 and fig. II.27).

Table II.15 Potentially significant hydromorphological pressures of water bodies

Nr. crt.	Hydromorphological pressures		Number	Length (km)	Examples
1	Cross barrage works located on the water body	Accumulation lakes with an area of more than 0.5 km²	230		The reservoirs were built for multiple purposes: flood protection, drinking and industrial water supply, energy, irrigation, fish farming. The most important accumulations at national level are represented by: Murani, Surduc, Poiana Mărului, Ișalnița, Fântânele, Caraula, Olt, Lotru, Cibin, Vidraru, Pecineagu, Văcărești, Bolboci, Măneciu, Paltinu, Siriu, PF1, PFII, Horia, Gura Apelor, Oașa, Tău, Lugașu, Tileag, Drăgan, Iad, Colibi, Someșul Cald, Gilău, Izvorul Muntelui, Bucecea, Rogojești, Stânca Costești, Solești, Râpa Albastră, Pușcași, etc.
2	Works along watercourses	Dams	1,824	8470,465	The most important regularization and dam works are located on the rivers Aranca, Bega, BegaVeche, Timiș, Jiu, Baboia, Jieț, Hușnița, Olt, Râul Negru, Hârtibaciu, Dâmbovița, Vedea, Călmățui, Chiciu - Isaccea, Isaccea - Sulina, Prahova , Ialomița, Buzău, Crișul Alb, Crișul Negru, Teuz, Barcău, Mureș, Târnava, Orăștie, Cerna, Someș, Crasna, Tur, Siret, Bistrița, Prut, Bârlad, Jijia.
		Regularization work		5,168.56	
3	Water sampling and restitution works	Water sampling	1,250		For the following uses: agriculture, water supply for the population, cooling water, electricity production, fish farms, others.
		Derivatives and channels	133	1162.62	Their purpose being to supplement the tributary flow for certain accumulations, as well as to ensure the water requirement for the afferent localities producing significant changes of the flows of the watercourses on which it operates. The most important branches are: Cerna - Motru, Timiș-Bega supply canal, Nera, Motru / Tismana, Jieț / Lotru, Buta / Accumulacion Valea de Pești, Ialomița-Mostiștea-Dridu-Hagiești, Crișul Repede, Tileagd - Sacadat, Canalul Matca, Cătămărești, Pușcași and Râpa Albastră, Râușor-Odovașnița - Cârlete, Vulcănița, Canalul Timiș and Lueta, Argeș / Dâmbovița, Ilfov / Dâmbovița, Iara (Lindru, Calu) -Dumitreasa, Pârâul Negru (Negruța)-Dumitreasa, Dumitreasa-Someșul Rece.
4	Waterway				The Danube River is the main navigable route in Romania; also, the Danube - Black Sea canal (DBSC) and the Poarta Albă - Midia - Navodari canal (PAMNC). The only inland waterway is the Bega Canal. Currently, only recreational navigation is carried out on the Bega canal, very low and only on the Timișoara - Sânmihaiul Român section, due to the non-functioning of the lock from Sânmihaiul Român.

Source: "Romanian Waters" National Administration, draft of the updated National Management Plan 2021, https://rowater.ro/despre-noi/descrierea-activitatii/managementul-european-integrat-resurse-de-apa/planurile-de-management-ale-bazinelor-hidrografice/planuri-de-management-nationale/

Figure II.27 Hydrotechnical works - potentially significant hydromorphological pressures (dams, regularizations and derivations) in 2019



Source: National Administration "Romanian Waters", draft National Management Plan updated 2021)

In addition to the impact of existing hydromorphological alterations on the condition of water bodies, there are a number of projects in various stages of planning and implementation, which can contribute to the physical alteration of water bodies. Future infrastructure projects are mainly the subject of the following types of activities:

- flood risk management (National Flood Risk Management Strategy (SNMRI) for medium and long term, Flood Risk Management Plans, POIM, PODD, PNRR projects;
- energy production through hydroelectric power plants (Romania's Energy Strategy 2020 - 2030, with the perspective of 2050);
- water supply for irrigation (National Strategy for rehabilitation and expansion of irrigation infrastructure in Romania, National Program for Rehabilitation of the main Irrigation Infrastructure, PNDR projects);
- ensuring the conditions of road transport, rail and navigation (National Strategy for Sustainable Development of Romania 2030, POIM, PODD, PNRR projects);
- coastal erosion reduction (Coastal Erosion Reduction Phase II project, funded by the Large Infrastructure Operational Program 2014-2020);
- infrastructure for water supply and sewerage - treatment (Large Infrastructure Operational Program 2014-2020, National Resilience Plan 2021-2026, Operational Program Sustainable Development 2021-2027 and the future National Strategy on water supply, collection and treatment of urban wastewater.

The Water Framework Directive emphasizes the key role of water quantity and dynamics in supporting the quality of aquatic ecosystems and meeting environmental objectives. According to it, the list of quality elements related to the environmental objectives for each category of surface water includes: hydromorphological elements and physico-chemical elements and specific pollutants that represent support for biological elements. The hydrological regime is included in the category of hydromorphological elements.

At European level, concerns about the definition of an ecological flow have arisen as a result of the requirements of the Water Framework Directive on the establishment of a hydrological regime to support the achievement of environmental objectives ("ecological flow"). Thus, in the context of achieving the environmental objectives for surface water bodies in Romania was introduced by the Water Law no. 107/1996 with subsequent amendments and completions, the notion of ecological flow, defined in accordance with European recommendations. Subsequently, by approving the Government Decision no. 148/2020, it was established the method of determining and calculating the ecological flow, which was based on the requirements of the WFD CIS Guide no. 31, national legislation, recent results from the literature, as well as the possibilities of operative implementation. By Order no. 828/2019 of the Minister of Waters and Forests, it was regulated the framework content of the Impact Assessment Study on water bodies, necessary to regulate works and activities in the field of water management. Non-deterioration of the condition of water bodies, is the identification and establishment of additional practical / feasible measures to mitigate / reduce the impact, including cumulative impact, for water bodies at risk of deterioration of the condition.

Forecast of water requirements for uses (population, industry, irrigation, animal husbandry, aquaculture / fish farming) for the year 2030

It was elaborated in 2014 within the theme: Updating the substantiation studies of PABH - Assessment of water requirements (reference year 2011) at the level of the 11 Water Basin Administrations, for the time horizon 2020 - 2030. In order to achieve the water requirements forecast for 2030, the "Methodology for forecasting the water requirements of uses" was applied, developed within the National Institute of Hydrology and Water Management, methodology applied in the elaboration of the National River Basin Development Plan, component part of the Master Plan for the Planning and Management of River Basins. The forecast of water requirements was estimated by specific forecasting methods for each category of water use: Population, Industry, Irrigation, Animal Husbandry, Aquaculture / Fish Farming.

Table II.16 Water demand forecast for 2030

The use of water	Water requirement (mil. mc)
	2030
Population	2,097
Industry	7,383
Irrigation	1,689
Animal husbandry	164
Aquaculture / fish farming	949
Total Romania	**12,282**

Source: NARW

Flood risks and pressures

RO 53

Romania indicator code: RO 53
EEA indicator code: CLIM 17

TITLE: FLOODS

DEFINITION: The indicator highlights the trend of major floods at the national level, as well as the expected changes in the variation of floods with a recovery period of 100 years.

Table II.17 Summary table on floods in Romania

Nr. Crt.	Year	No. of events	No. of significant events	Affected urban localities
1	2010	94	9	117
2	2011	45	1	19
3	2012	39	6	39
4	2013	74	4	47
5	2014	151	14	72
6	2015	49	2	20
7	2016	171	18	93
8	2017	137	***	68
9	2018	164	***	138

10	2019	154	***	131
11	2020	158	***	111

Source: NARW

During 2020, a number of 158 extreme meteorological phenomena were registered, of which:
- 153 extreme events caused by floods by river overflows or by runoff from slopes;
- 2 events caused by melting snow or due to the freeze-thaw phenomenon;
- 2 extreme drought events;
- 1 extremely windy event, recorded on 24.02.2020, when the wind gusts with speeds of 130 km / h, affected the headquarters of the rainfall station Vlădeasa quota 1400.

The following events accompanied the flood phenomena:
- 15 extreme events caused by heavy rainfall and puddles;
- 6 extreme events caused by heavy rainfall and hail;
- 10 extreme events caused by heavy rainfall and wind;
- 18 events due to the inability of rainwater to be taken over by the sewerage network;
- 8 events were accompanied by landslides.

A number of 1030 ATUs, respectively a number of 2710 localities, 3714 dwellings were affected by the floods at least once, out of which: 5 destroyed dwellings, 1317 damaged dwellings, respectively 2392 flooded dwellings. Population affected by floods - 9,285 inhabitants.

*Note: *** Significant historical events are set in Cycle 3 of the implementation of the Flood Directive 2007/60 / EC*

WATER QUALITY

Water quality of watercourses

RO 65

Romania indicator code: RO 65
EEA indicator code: VHS 02

TITLE: HAZARDOUS SUBSTANCES IN WATER COURSES

DEFINITION: The indicator quantifies the concentrations (annual averages) of hazardous substances present in watercourses. The hazardous substances required for reporting are those listed in GD 570/2016 on the approval of the Program for the phase-out of discharges, emissions and losses of priority hazardous substances and other measures for the main pollutants.

For this indicator, the reporting of the priority substances from GD 570/2016 was taken into account, which are the basis for the evaluation of the chemical state of surface waters (WATER investigation environment and BIOTA investigation environment). The chemical status assessment shall consider compliance with the environmental quality standards established for the arithmetic mean value (SCM-MA) as well as the maximum allowable concentration value (SCM-CMA) for the water investigation environment, as well as compliance with the quality standards. established for the BIOTA investigation environment (SCM Biota) (according to Government Decision no. 570/2016).

Distribution of the number of priority substances monitored in watercourses by river basins / basins in 2020.

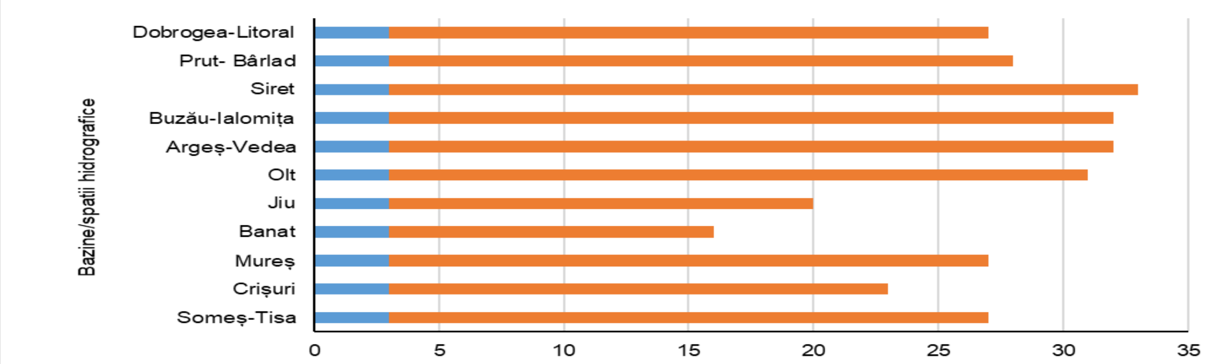
Table II.18 Priority substances monitored in watercourses by river basins / basins in 2020 - Water investigation environment and BIOTA investigation environment

Space / River basin	Monitored length (Km)	Monitored sections (no.)	WATER Priority substances		BIOTA priority substances	
			Priority metals (no.)	Organic micro-pollutants (no.)	Priority metals (no.)	Organic micro-pollutants (no.)
Someș-Tisa	4482.67	121	3	24	1	6
Crișuri	1343.04	55	3	20	1	8
Mureș	2857.62	71	3	24	1	6

Banat	2303.52	51	3	13	1	6
Jiu	1976,30	45	3	17	1	6
Olt	1537.00	67	3	28	1	4
Argeș-Vedea	508.86	19	3	29	1	6
Buzău-Ialomița	1223.00	57	3	29	1	6
Siret	2002.07	36	3	30	1	6
Prut- Bârlad	2430.16	57	3	25	1	6
Dobrogea Seaside	1326.11	49	3	24	1	6
Total	**21990,35**	**628**	**3**	**30**	**1**	**8**

Source: NARW

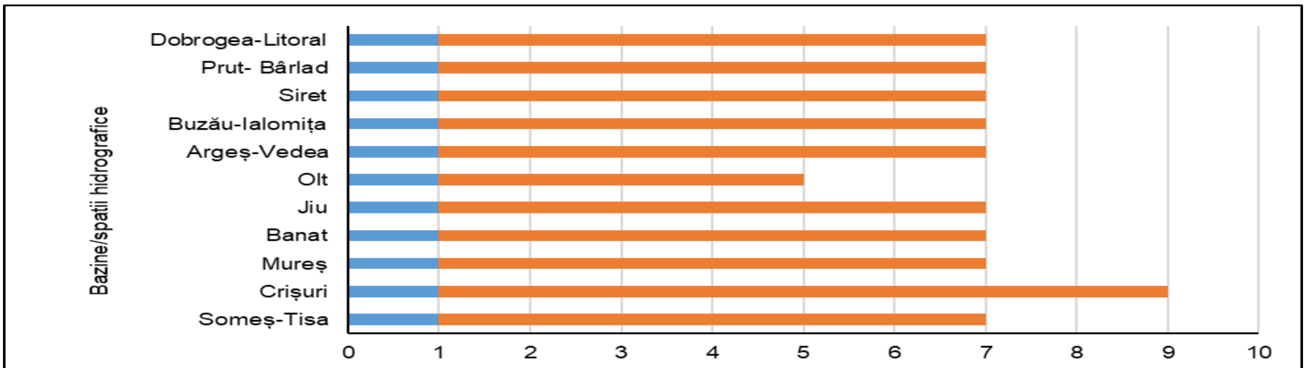
Figure II.28 Priority substances monitored in watercourses by river basins / basins in 2020 - WATER investigation environment



	Someș-Tisa	Crișuri	Mureș	Banat	Jiu	Olt	Argeș-Vedea	Buzău-Ialomița	Siret	Prut-Bârlad	Dobrogea-Litoral
Metale prioritare (nr.)	3	3	3	3	3	3	3	3	3	3	3
Micropoluanţi organici (nr.)	24	20	24	13	17	28	29	29	30	25	24

Source: NARW

Figure II.29 Priority substances monitored in watercourses on river basins / basins in 2020 - BIOTA investigation environment



	Someș-Tisa	Crișuri	Mureș	Banat	Jiu	Olt	Argeș-Vedea	Buzău-Ialomița	Siret	Prut-Bârlad	Dobrogea-Litoral
Metale prioritare (nr.)	1	1	1	1	1	1	1	1	1	1	1
Micropoluanţi organici (nr.)	6	8	6	6	6	4	6	6	6	6	6

Source: NARW

Table II.19 Share of monitoring sections with higher concentration than SCM (%) in the period 2015 - 2020

Year	2015	2016	2017	2018	2019	2020
Monitored priority substances (no.)	36	42	33	35	42	42
Monitoring sections (no.)	435	392	385	615	611	628
Share of sections with a concentration higher than SCM (%)	3.44	3.82	5.71	6.67	4.75	7.64

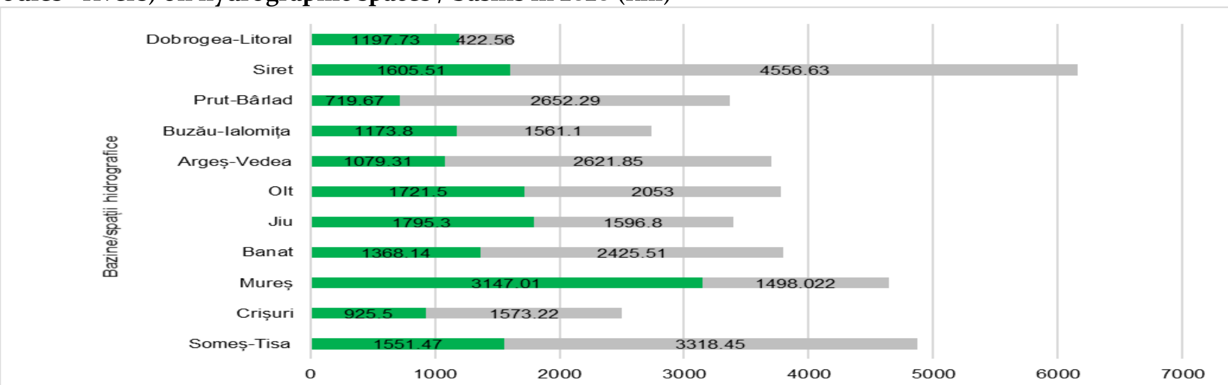
Source: NARW

RO 67
Romania indicator code: RO 67
EEA indicator code: WEC 04
TITLE:WATER COURSE CLASSIFICATION SCHEMES
DEFINITION: Watercourse classification schemes are designed to provide an indication of the degree of pollution.

ECOLOGICAL STATUS / ECOLOGICAL POTENTIAL OF MONITORED WATER COURSES (natural, heavily modified, artificial water bodies - rivers) ON HYDROGRAPHIC SPACES / BASINS AND AT NATIONAL LEVEL

Assessment of the ecological status / ecological potential of the monitored watercourses (natural, heavily modified, artificial water bodies - rivers) on hydrographic spaces / basins in 2020 (km)

Figure II.30 Ecological status / ecological potential of the monitored watercourses (natural, heavily modified, artificial water bodies - rivers) on hydrographic spaces / basins in 2020 (km)



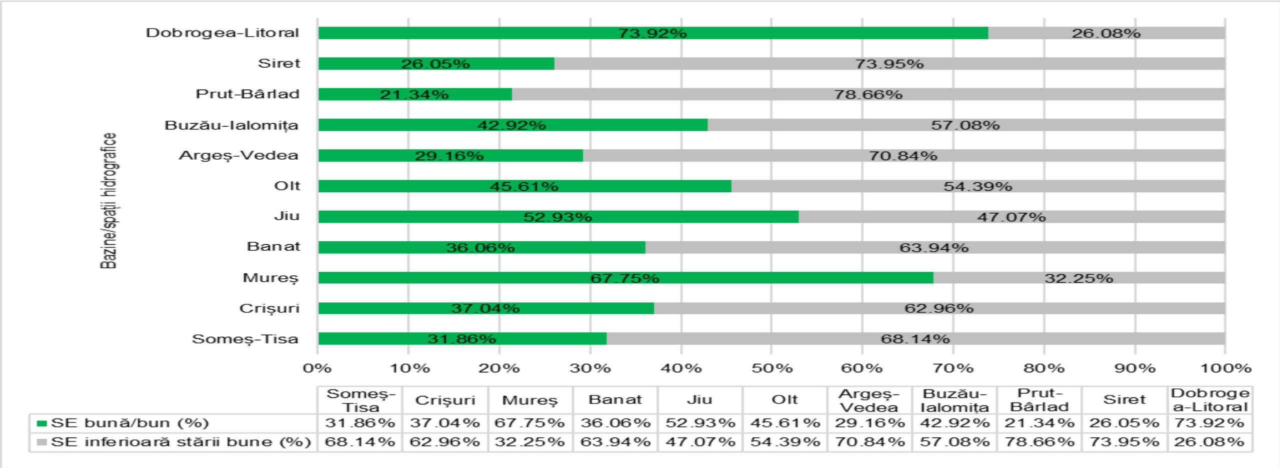
	Someș-Tisa	Crișuri	Mureș	Banat	Jiu	Olt	Argeș-Vedea	Buzău-Ialomița	Prut-Bârlad	Siret	Dobrogea-Litoral
SE bună/bun (km)	1551.47	925.5	3147.01	1368.14	1795.3	1721.5	1079.31	1173.8	719.67	1605.51	1197.73
SE inferioară stării bune (km)	3318.45	1573.22	1498.022	2425.51	1596.8	2053	2621.85	1561.1	2652.29	4556.63	422.56

Source: NARW

** SE - ecological status / ecological potential*

Assessment of the ecological status / ecological potential of the monitored watercourses (natural, heavily modified, artificial water bodies - rivers) on hydrographic spaces / basins in 2020 (%)

Figure II.31 Ecological status / ecological potential of monitored watercourses (natural, heavily modified, artificial water bodies - rivers) by river basins / basins in 2020 (%)



Source: NARW

Assessment of the ecological status / ecological potential of the monitored watercourses (natural, heavily modified, artificial water bodies - rivers) at national level in 2020

Table II.20 Assessment of the ecological status / ecological potential of the monitored watercourses (natural, heavily modified, artificial water bodies - rivers) at national level in 2020

Ecological status / Ecological potential	2020
Very Good and Good (%) / Maximum and Good (%)	40.15
Moderate (%) / Moderate (%)	52.20
Weak (%)	7.48
Bad (%)	0.17
SE below good condition (%)	59.85
Monitored river network length (km)	40564,37
Number of monitoring sections	1251

Source: NARW

Lake water quality

RO 66

Romania indicator code: RO 66
EEA indicator code: VHS 03

TITLE:HAZARDOUS SUBSTANCES IN LAKES

DEFINITION: The indicator quantifies the concentrations (annual averages) of hazardous substances present in lakes. The hazardous substances required for reporting are those listed in GD 570/2016 on the approval of the Program for the phase-out of discharges, emissions and losses of priority hazardous substances and other measures for the main pollutants.

For this indicator, the reporting of the priority substances from GD no. 570/2016 underlying the assessment of the chemical status of surface waters (WATER investigation environment). Also, exceeding SCM means both exceeding SCM-MA, **the value of the arithmetic mean, as well as the SCM-CMA, the value of the maximum allowable concentration (according to Government Decision no. 570/2016).**

Distribution of the number of priority substances monitored in lakes (natural lakes, heavily modified natural, heavily modified and artificial) by river basins in 2020

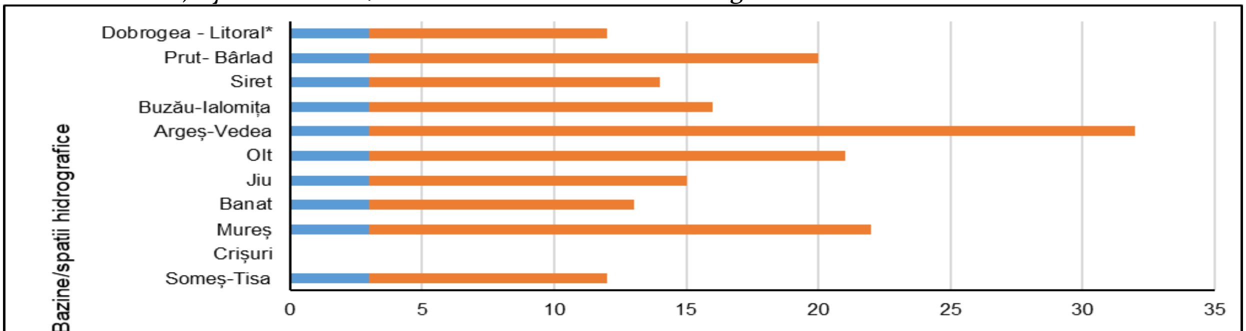
Table II.21 Distribution of monitored priority substances in lakes (natural, heavily modified, heavily modified and artificial natural lakes) by river basins / basins in 2020 - WATER investigation environment

Space / River basin	Monitored sections (no.)	Water priority substances	
		Priority metals (no.)	Organic micro-pollutants (no.)
Someș-Tisa	20	3	9
Crişuri	0	0	0
Mures	18	3	19
Banat	4	3	10
Jiu	6	3	12
Olt	13	3	18
Argeș-Vedea	1	3	29
Buzău-Ialomița	4	3	13
Siret	6	3	11
Prut- Bârlad	21	3	17
Dobrogea - Seaside *	11	3	9
Total	**104**	**3**	**29**

* it also includes the transitional lacustrine lake Sinoe

Source: NARW

Figure II.32 Distribution of monitored priority substances in lakes (natural lakes, heavily modified natural, heavily modified and artificial) by river basins / basins in 2020 - WATER investigation environment



	Someș-Tisa	Crișuri	Mureș	Banat	Jiu	Olt	Argeș-Vedea	Buzău-Ialomița	Siret	Prut-Bârlad	Dobrogea - Litoral*
Metale prioritare (nr.)	3	0	3	3	3	3	3	3	3	3	3
Micropoluanţi organici (nr.)	9	0	19	10	12	18	29	13	11	17	9

Source: NARW

Table II.22 Share of monitoring sections of priority substances with concentrations higher than SCM (%) in 2020 by river basins / basins - water investigation environment

Space / River basin	Monitoring sections (no.)	Monitoring sections with concentrations higher than SCM (no.)	Share of monitoring sections with concentrations higher than SCM (%)
Someș-Tisa	20	0	0
Crişuri	0	0	0
Mureș	18	0	0
Banat	4	0	0
Jiu	6	0	0

Olt	13	0	0
Argeș-Vedea	1	0	0
Buzău-Ialomița	4	0	0
Siret	6	0	0
Prut- Bârlad	21	2	9.52
Dobrogea - Seaside *	11	1	9.09
Total	**104**	**3**	**2.88**

* it also includes the transient lacustrine water body of Sinoe

Source: NARW

Evolution of monitoring sections with higher concentration than SCM

Table II.23 Share of monitoring sections with higher concentration than SCM (%) in the period 2015 - 2020

Year	2015	2016	2017	2018	2019	2020
Monitored priority substances (no.)	31	37	26	18	32	32
Monitoring sections (no.)	71	95	55	111	107	104
Share of sections with a concentration higher than SCM (%)	2.81	3.15	1.82	0.90	1.87	2.88

Source: NARW

Groundwater quality

RO 20

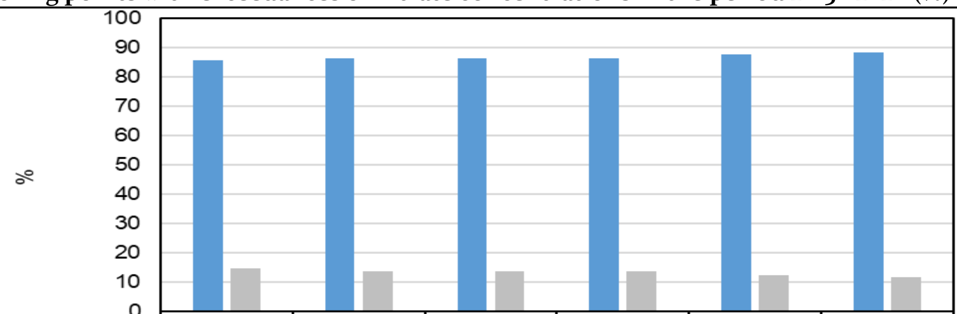
Romania indicator code: RO 20
EEA indicator code: CSI 20

TITLE: NUTRIENTS IN WATER

DEFINITION: The indicator quantifies the nitrates present in groundwater and is used to highlight the geographical variations of their concentrations and their evolution over time.

EVOLUTION OF THE NUMBER OF MONITORING POINTS WITH EXCEPTIONS TO NITRATE CONTENT IN THE PERIOD 2015 - 2020 (%)

Figure II.33 Evolution of monitoring points with exceedances of nitrate concentrations in the period 2015 - 2020 (%)



	2015	2016	2017	2018	2019	2020
Puncte de monitorizare cu conc. < 50 mg NO_3/l (%)	85.50	86.28	86.20	86.38	87.60	88.37
Depășiri ale conc. 50 mg NO_3/L (%)	14.50	13.72	13.80	13.62	12.40	11.63

Source: NARW

RO 64

Romania indicator code: RO 64
EEA indicator code: VHS 01

TITLE: GROUNDWATER PESTICIDES

DEFINITION: The indicator shows the concentration of an active substance or the sum of the concentrations of active substances in the class of pesticides determined in groundwater. The pesticides required for reporting are those provided in GD 53/2009 for the approval of the National Plan for the protection of groundwater against pollution and damage.

Distribution of the number of pesticide monitoring points by river basins in 2020

Table II.24 Pesticides monitored in 2020 (no.)

2020				
Space / River basin	Number of water bodies monitored	Total number of monitoring points	Number of points where pesticides are monitored	Monitored pesticides (no.)
Someș - Tisa	15	132	1	2
Crișuri	9	134	1	2
Mureș	21	115	5	14
Banat	20	215	15	4
Jiu	8	95	73	2
Olt	14	136	14	12
Argeș - Vedea	11	164	131	28
Buzău – Ialomița	18	192	51	11
Siret	6	109	2	18
Prut- Bârlad	7	120	56	18
Dobrogea - Seaside	9	75	7	11
TOTAL	**138**	**1487**	**356**	**28**

Source: NARW

Share of monitoring points with a concentration higher than 0,1µg / L of the number of boreholes in which pesticides were monitored in 2020

Table II.25 Share of monitoring points with a concentration higher than 0,1µg / L of the number of boreholes in which pesticides were monitored in 2020 (%)

Space / River basin	Points where pesticides are monitored (no.)	Monitoring points with conc. > 0.1 µg / L (no.)	Monitoring points with conc. > 0.1 /g / L (%)
Someș - Tisa	1	0	0
Crișuri	1	0	0
Mureș	5	0	0
Banat	15	0	0
Jiu	73	0	0
Olt	14	0	0
Argeș - Vedea	131	6	4.58
Buzău – Ialomița	51	2	3.92

Siret	2	0	0
Prut- Bârlad	56	0	0
Dobrogea - Seaside	7	0	0
Total	**356**	**8**	**2.25**

Source: NARW

Evolution of monitoring points with a concentration higher than 0.1µg / L for the period 2015 - 2020 (%)

Table II.26 Evolution of monitoring points with a concentration higher than 0.1µg / L for the period 2015 - 2020 (%)

Year	2015	2016	2017	2018	2019	2020
Number of pesticides monitored	19	20	21	2. 3	30	28
Total number of points monitored	1310	1523	1536	1535	1533	1487
Number of points where pesticides are monitored	365	574	550	272	275	356
The share of monitoring points with a concentration higher than 0.1µg / L from no. points where pesticides are monitored (%)	6.3	3.31	2.0	2.94	2.55	2.25

Source: NARW

Table II.27 Number of monitored points where pesticides are monitored and no. points with a concentration higher than 0.1µg / L in 2020

Nr. crt.	Pesticides	Nr. of points where pesticides are monitored	Nr. monitoring points with conc. > 0.1 /g / L
1	*alpha - Hexachlorocyclohexane*	196	0
2	*beta - Hexachlorocyclohexane*	196	0
3	*gama HCH - Lindan*	270	0
4	*alpha-Endosulfan*	313	0
5	*beta-Endosulfan*	309	0
6	*Trifluralin*	189	0
7	*Alachlor*	226	0
8	*Aldrin*	251	0
9	*Atrazine*	258	8
10	*Chlorfenvinphos*	193	0
11	*Chlorpyrifos*	193	0
12	*Dichlorvos (2.2-dichlorovinyl and dimethyl phosphate)*	189	0
13	*Dieldrin*	266	0
14	*Diuron*	132	0
15	*Endrin*	251	0
16	*Isodrin*	251	0
17	*Isoproturon*	132	0
18	*Linuron (3- (3.4-dichlorophenyl) -1-methoxy-1-methylurea)*	131	0
19	*Mevinfos (2-methoxycarbonyl-1-methylvinyl and dimethyl phosphate)*	58	0
20	*Monolinuron (3- (4-chlorophenyl) -1-methoxy-1-methylurea)*	131	0
21	*ortho-for-DDT*	135	0
22	*para-para DDD*	131	0

2. 3	*para-para-DDE*	131	0
24	*Para-para-DDT*	268	0
25	*Simazine*	247	0
26	*Methoxychlor*	131	0
27	*Chlorotoluron*	131	0
28	*Monuron*	131	0

Source: NARW

Bathing water quality

RO 22

Romania indicator code: RO 22
EEA indicator code: CSI 22

TITLE: BATHING WATER QUALITY

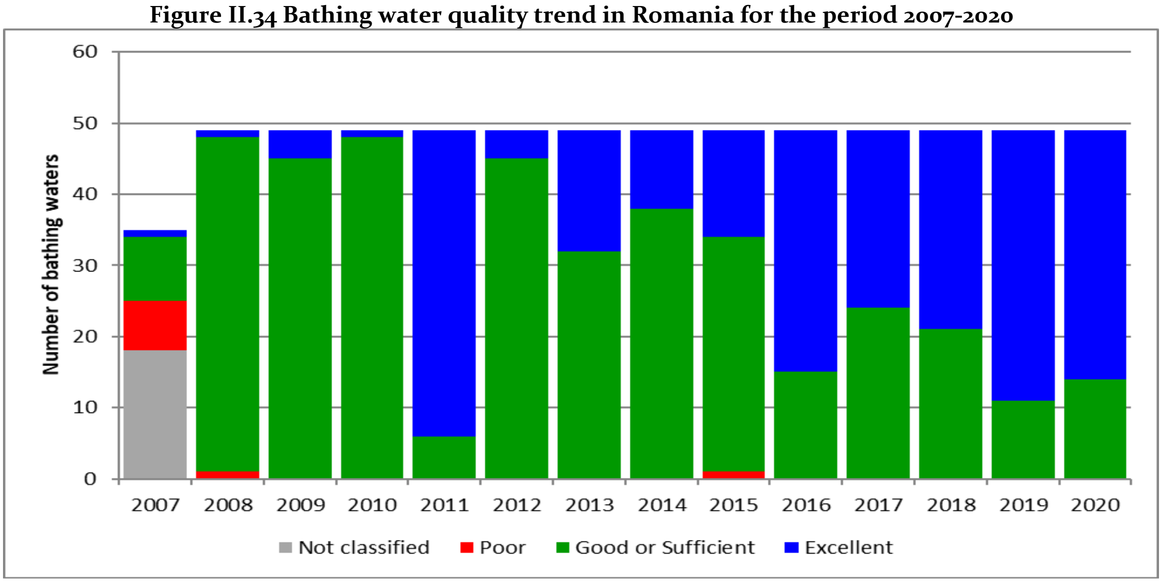
DEFINITION: The indicator shall express in percentage terms the coastal and inland bathing areas that comply with the mandatory standards and recommended levels for microbiological and physico-chemical parameters.

Water quality assessment of the 50 natural areas designed for bathing, identified and reported by Romania to the EC (EIONET platform - EU platform created by the EEA) in 2020, was performed for continuously monitored areas in the last 4 years and classification assessment was applied, using the current season database (2020) and from the previous 3 seasons; this assessment was performed according to Directive 2006/7 / EC, respectively the provisions of GD no. 546/2008, art. 18-24, and the provisions of annex no. 2, as follows:

- excellent 70.00% (35),
- good 26.00% (13),
- satisfactory 4.00% (2) and
- unsatisfactory 0.00% (0).

The evolution of the bathing water quality in the period 2007 - 2020 is presented graphically in figure II.34 taken from the "BWD Report For the Bathing Season 2020 Romania" of the EEA.

Figure II.34 Bathing water quality trend in Romania for the period 2007-2020

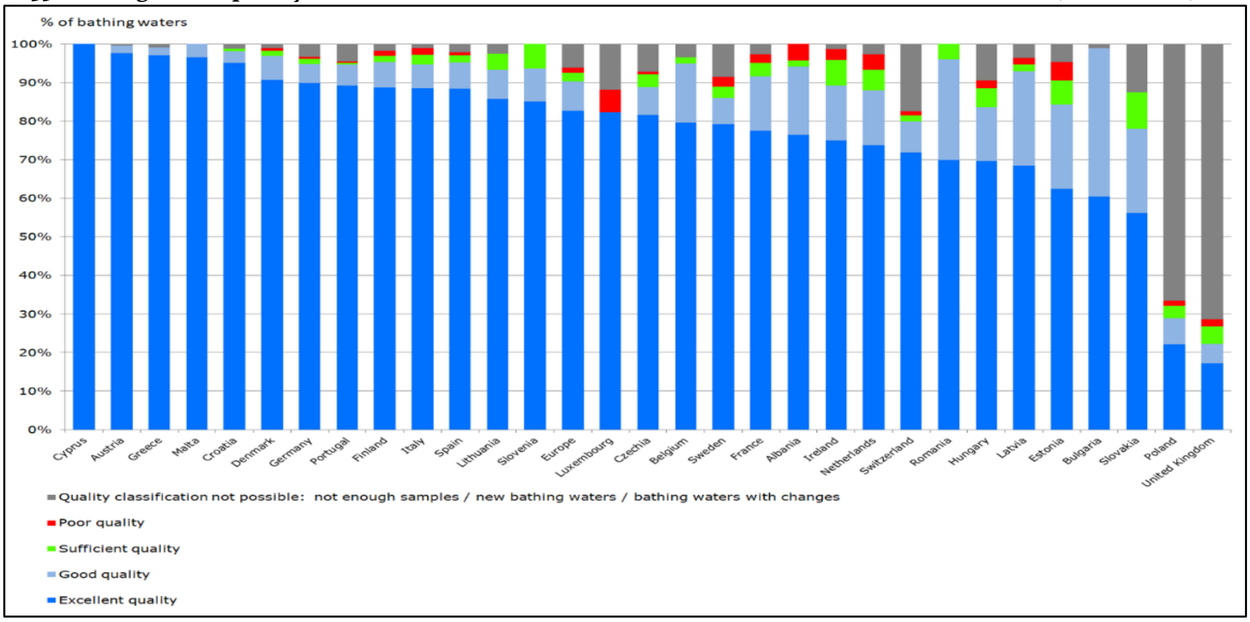


Source: INSP / CNMRMC

Figure II.34 shows that in Romania in the classifications of the last 5 years there have been no areas where water quality is unsatisfactory, the percentage of those classified as good and satisfactory is still high. The quality of the bathing waters is predominantly compliant only with the values from the mandatory norms and not with the reference ones to which we must strive.

From the annual reports of the EU Member States it was found that Romania does not have non-compliant bathing areas in the classification for 2020 (figure II.35).

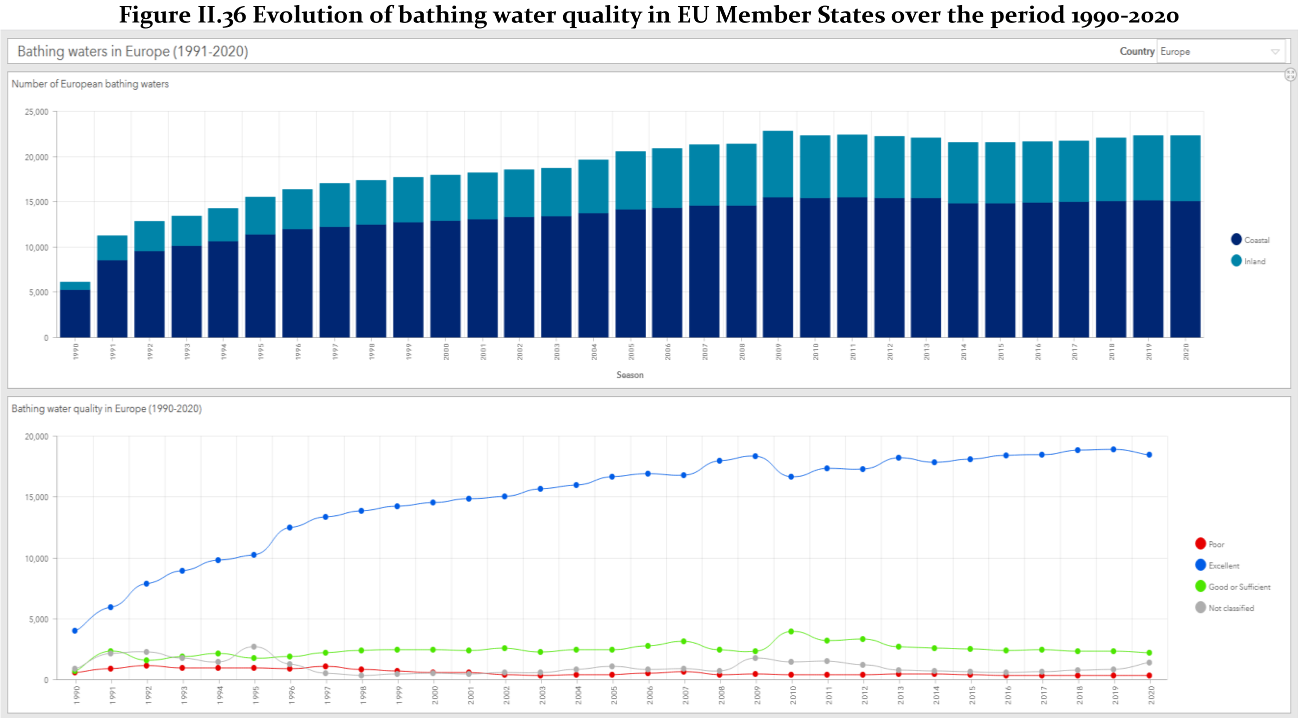
Figure II.35 Bathing water quality results in 2020 for 28 EU Member States, Albania and Switzerland (EEA source)



Source: WISE bathing water quality database (data from annual reports by EU Member States)

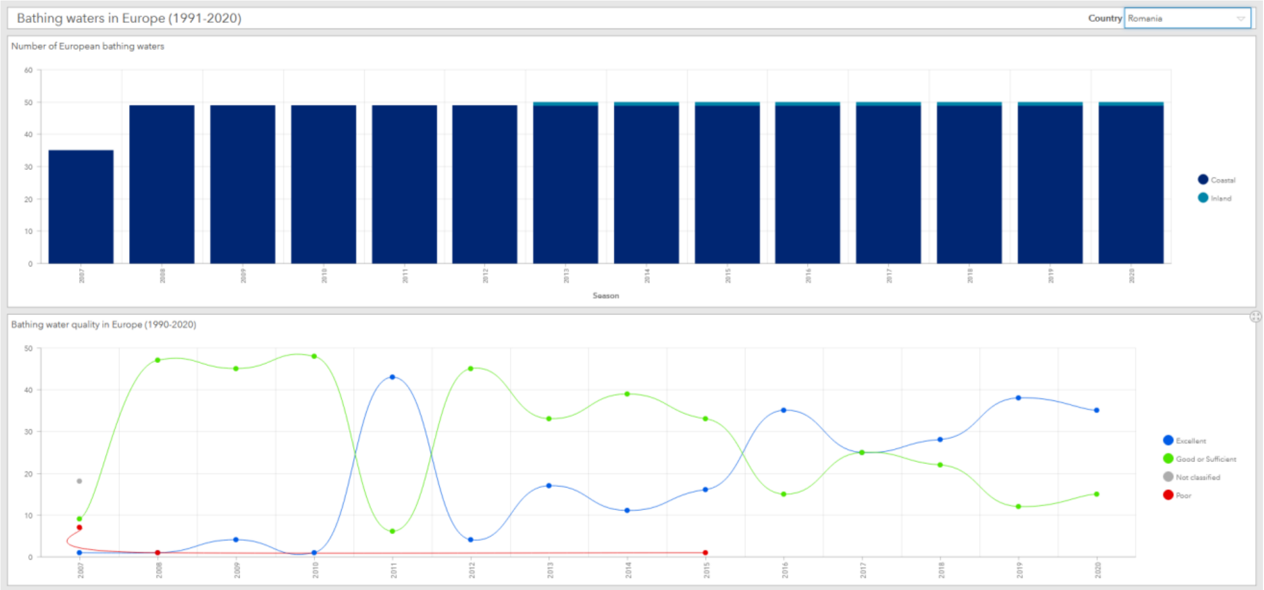
The latest assessment of bathing water quality in EU Member States presented in the 2020 report prepared by the European Environment Agency (EEA) in cooperation with the European Commission (EC), presents the evolution of quality over the period 1990-2020 for EU Member States (Fig. 36), respectively for Romania only from 2007 when it joined the EU until 2020 (Fig. 37).

Figure II.36 Evolution of bathing water quality in EU Member States over the period 1990-2020



Source: INSP / CNMRMC

Figure II.37 Evolution of bathing water quality in ROMANIA during 2007-2020



Source: INSP / CNMRMC

Figures II.36 and II.37 show the increasing trend of excellent bathing water quality in all Member States of the European Union in the period 1990-2020, respectively a less constant improvement in water quality in Romania. Thus, a better management of bathing areas is required for Romania.

The objective of continuous improvement of surface water quality must be taken into account, because the specialists / managers in the field of bathing waters within the EC want the elimination in the near future of the category of water of "satisfactory" quality (compliant only with the obligatory norms).

Determinant factors and pressures affecting water quality

Significant pressures on water resources in Romania

RO 25

Romania indicator code: RO 25
EEA indicator code: CSI 25

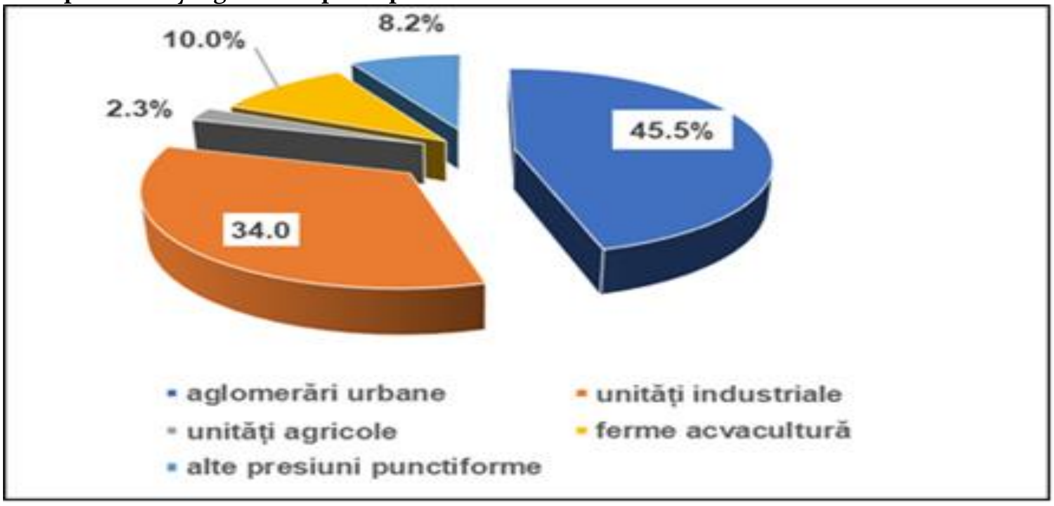
TITLE: GROSS NUTRIENT BALANCE

DEFINITION: The indicator estimates the excess nitrogen on agricultural land. This is done by calculating the balance between the total amount of nitrogen entering the agricultural system and the total amount of nitrogen leaving the agricultural system, relative to the unit area of agricultural land. The indicator shows all nitrogen inputs and outputs from agricultural land. The inputs consist of the amount of nitrogen applied by mineral and natural fertilizers, nitrogen fixed by plants and emissions to air. The nitrogen extracted is contained in crops, grass and crops consumed by animals. Nitrogen emissions to NO2 are difficult to estimate and are not taken into account.
The gross nutrient balance provides an indication of the risk of pollution of surface and groundwater bodies due to the leakage of surplus nutrients from agricultural areas.

According to the Water Framework Directive 2000/60/EC, significant pressures are considered in the context of the river basin/catchment management plans those that result in the failure to achieve the environmental objectives for the water body. The establishment of significant pressures is the basis for identifying the link between all categories of pressures – objectives – measures, using the DPSIR concept (Driver-Pressure-State-Impact-Response – Anthropic Activity-Pressure-State-Impact-Response). For the draft of the updated Management Plan 2021, the pressures were framed based on the types of pressures recommended by the EU Guide for reporting the updated Management Plan 2021, namely: point, diffuse pressures, hydromorphological alterations (including water abstractions), quantitative pressures for groundwater, other anthropogenic pressures, unknown pressures, etc. In the project of the National

Management Plan updated in 2021, a total number of 3,997 water users who use surface water resources as a receiver of discharged water were inventoried at national level, from which, taking into account the criteria mentioned above, a total number of 2,429 potentially significant point sources (1,104 urban, 827 industrial, 55 agricultural, 243 aquaculture and 200 other pressures such as forestry, etc.).

Figure II.38 Share of potentially significant point pressures



Source: National Administration "Romanian Waters", draft National Management Plan updated 2021

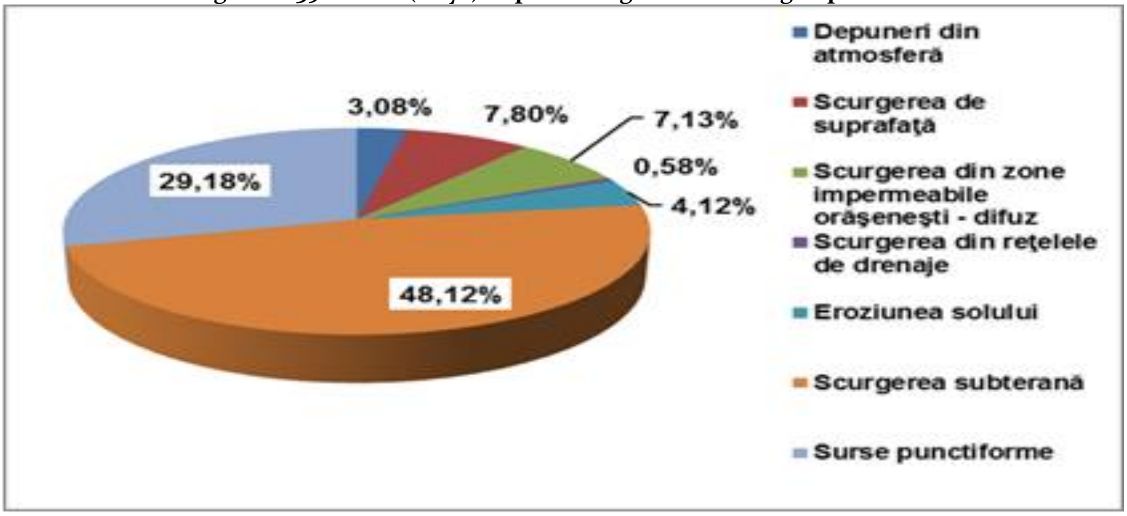
Figure II.38 shows that the largest share of point pressures is represented by human agglomerations, with approx. 46%, respectively wastewater discharged from the collection and treatment systems of urban agglomerations.

Regarding the ***diffuse sources of significant pollution***, identified with reference to the land use, it can be mentioned:

- human settlements / localities that do not have wastewater collection systems or adequate sludge collection and disposal systems in treatment plants, as well as localities that have non-compliant household waste landfills;
- agro-zootechnical farms that do not have adequate storage / use systems for manure, localities identified as areas vulnerable to nitrate pollution from agricultural sources, units that use pesticides and do not comply with current legislation, other agricultural units / activities that may lead at significant diffuse emissions;
- warehouses for raw materials, finished products, auxiliary products, non-compliant waste storage, units that produce diffuse accidental pollution, abandoned industrial sites.

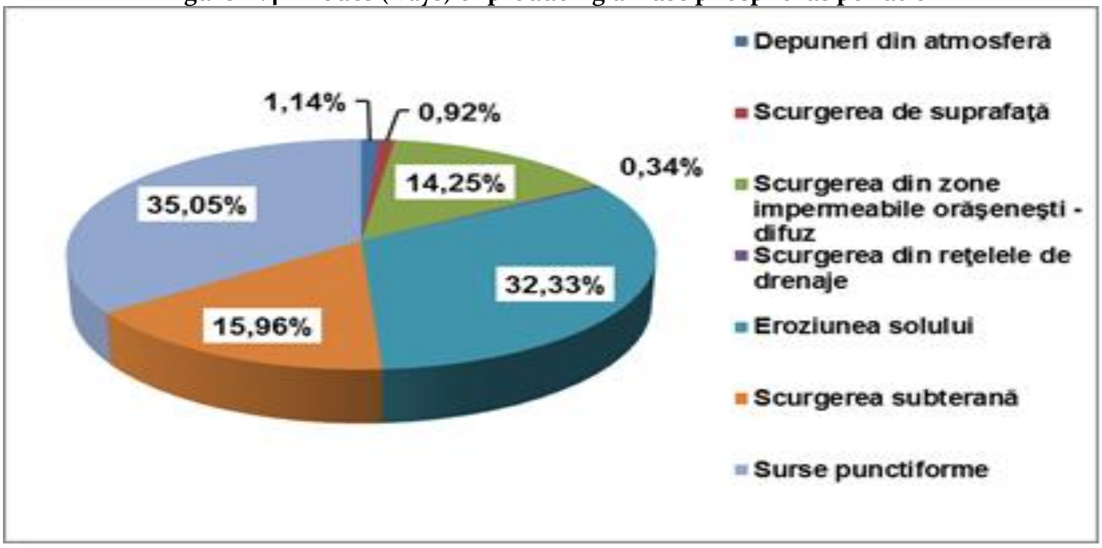
The quantities of pollutants emitted by diffuse sources can be estimated by applying mathematical models, for example, the MONERIS model (Modelling Nutrient Emissions in River Systems). It allows the estimation of nutrient emissions (nitrogen and phosphorus) taking into account six ways of producing diffuse pollution: surface runoff, runoff from drainage networks, underground runoff, runoff from urban impervious areas, deposition from the atmosphere and soil erosion. Application of the model MONERIS is carried out during the development of each management plan, the last information being available at the level of 2012. It is specified that these data were updated for the second management plan with values from the year 2012, based on the completion of the application of the MONERIS model at the national level (in within the Danube International District), as well as at the level of international sub-basins (Tisa). Figures II.39 and II.40 show the contribution of the modes of production of diffuse pollution with nitrogen and phosphorus for the year 2012, considering the ways presented above.

Figure II.39 Modes (ways) of producing diffuse nitrogen pollution



Data source: "Romanian Waters" National Administration, National Management Plan approved by GD no. 859/2016 for the approval of the updated National Management Plan related to the part of the international river basin of the Danube river that is included in the Romanian territory

Figure II.40 Modes (ways) of producing diffuse phosphorus pollution



Data source: "Romanian Waters" National Administration, National Management Plan approved by GD no. 859/2016 for the approval of the updated National Management Plan related to the part of the international river basin of the Danube river that is included in the Romanian territory

Table II.28 presents nitrogen and phosphorus emissions from diffuse pollution sources, taking into account the contribution of each category of pollution sources.

Table II.28 Nitrogen and phosphorus emissions from different diffuse sources, for 2021

Diffuse sources of pollution	Nitrogen emissions		Phosphorus emissions	
	tons	%	tons	%
Agriculture	16295	22.47	2,943,097	55.18
Human agglomerations	5035	6.94	1,014,474	19.02

Other sources	37148	51.21	566,124	10.61
Natural background	14056	19.38	810,124	15.19
Total diffuse sources	**72,533**	**100**	**5,334**	**100**
Specific average diffuse emission over the total area	3.05 kg N / ha		0.22 kg P / ha	
The average specific diffuse emission from agriculture on the agricultural area	1.18 kg N / ha		0.21 kg P / ha	

Data source: "Romanian Waters" National Administration, National Management Plan approved by GD no. 859/2016 for the approval of the updated National Management Plan related to the part of the international river basin of the Danube river that is included in the Romanian territory

A total of **5431 potentially significant diffuse pressures** contribute to diffuse pollution for water bodies that do not meet the environmental objectives, of which:

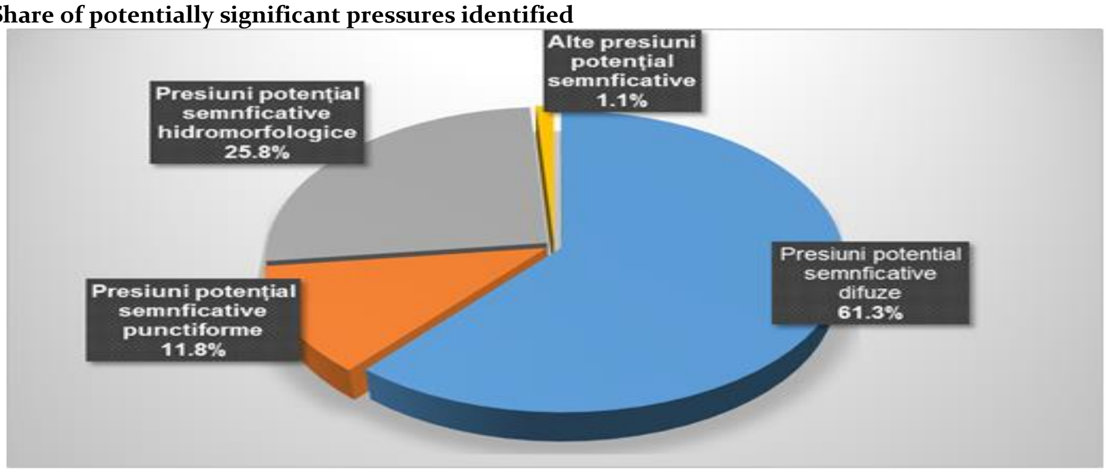
- 962 agglomerations larger than 2000 e.i which are not equipped with wastewater collection systems (including agglomerations where in 75 collection / treatment systems there are phenomena of water overflows in rainy weather);
- 5,065 agglomerations less than 2000 e.i without collection systems;
- 6,175 diffuse agricultural pressures;
- 411 industrial units and
- 695 others (fishing activities, etc.).

Following the application of the validation process of potentially significant diffuse pressures with the achievement of environmental objectives (ecological status / potential and chemical status of water bodies), a number of 3,449 significant diffuse pressures were identified (2,630 urban, 640 agricultural, 39 industrial and 140 pisciculture).

In 2019, a number of 5,314 **potentially significant hydromorphological pressures** were identified at national level. Following the application of the validation process of potentially significant pressures - hydromorphological alterations with the achievement of environmental objectives by surface water bodies, at national level a number of 407 **significant hydromorphological pressures** were identified.

In conclusion, in 2019 a total number of 20,585 **potentially significant pressures** was identified, their type and weight being presented in figure II.41. It is found that the largest share of potentially significant pressures is represented by diffuse pressures - human agglomerations without collection and agriculture systems, as well as hydromorphological pressures.

Figure II.41 Share of potentially significant pressures identified

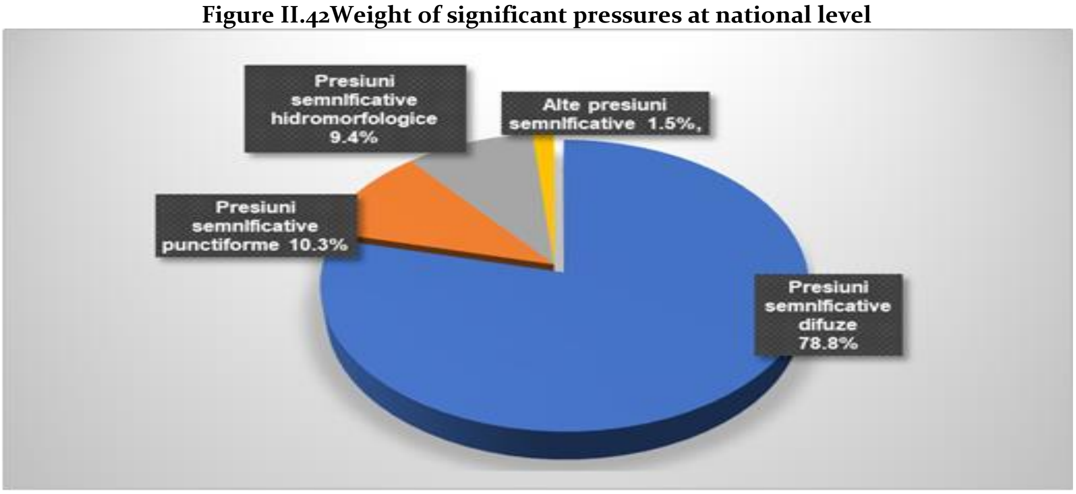


Data source: National Administration "Romanian Waters ", draft of the updated National Management Plan 2021

Share of potentially significant pressures identified

Regarding the significant pressures, a total number of 4,323 significant pressures was identified, their type being presented in figure II.42. It is found that the largest share of pressures is diffuse pressures, as in the case of potentially significant pressures, from human agglomerations without collection systems and from agriculture.

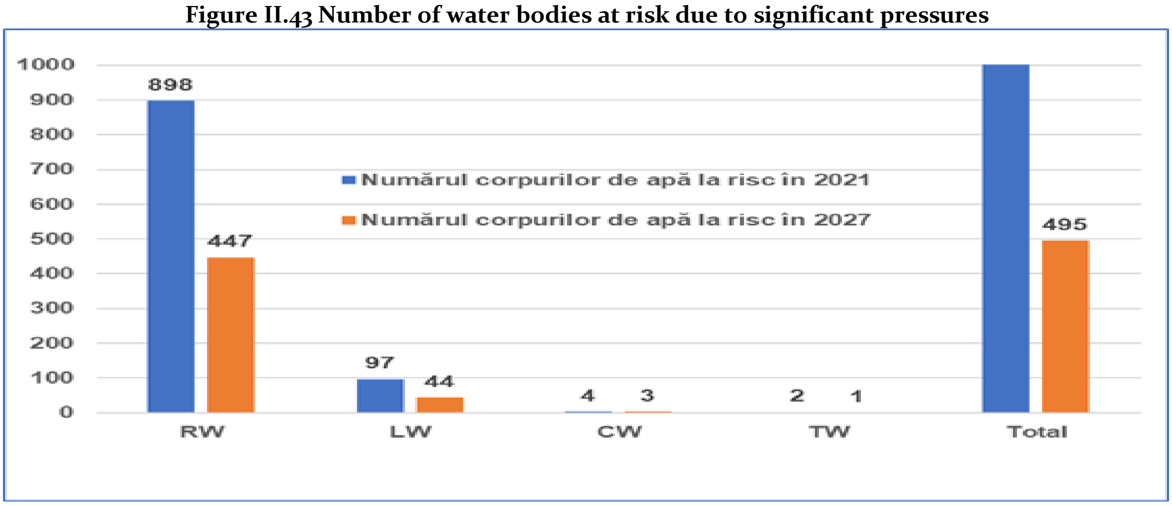
Figure II.42Weight of significant pressures at national level



Data source: National Administration "Romanian Waters", draft of the updated National Management Plan 2021

The analysis shows that at national level, out of a total of 3,025 water bodies, a total number of 1,001 water bodies were identified as being at risk in 2021. As a result of this analysis, compared to the number of water bodies that were identified in the updated National Management Plan, approved by Government Decision no. 859/2016 as being at risk of not achieving environmental objectives in 2021, respectively 971, in the updated National Management Plan project identified 1,001 (33%) water bodies at risk for 2027 (fig.II.43).

Figure II.43 Number of water bodies at risk due to significant pressures



Data source: National Administration "Romanian Waters", draft of the updated National Management Plan 2021

According to the Synthesis of water quality developed by the National Administration "Romanian Waters", at national level was identified a number of 1,853 water users who may cause accidental pollution and who have developed their own plans to prevent and combat accidental pollution. In 2020, there were 72 accidental pollutions of surface watercourses, mainly on inland rivers, with:

- crude oil, petroleum hydrocarbons, petroleum products, gasoline;

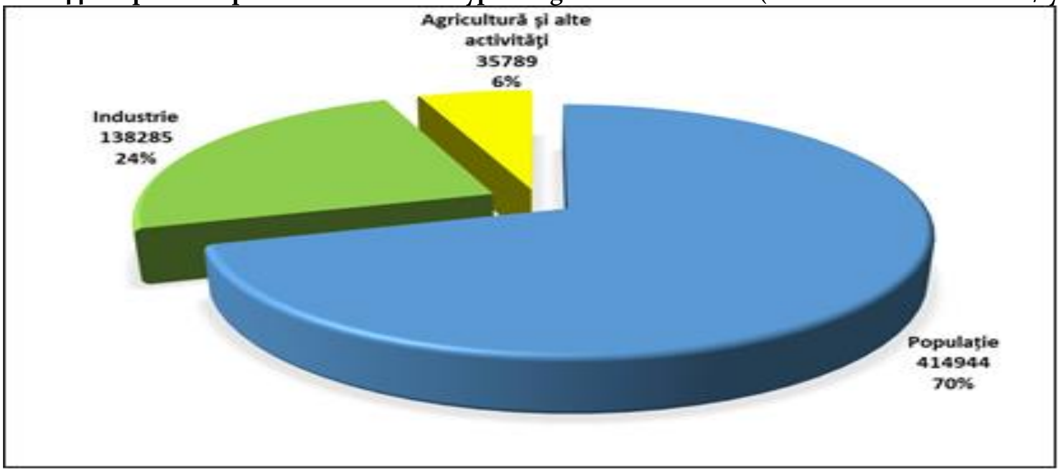
- bilge water and untreated technological wastewater (NH_4, CCO-Cr);
- phosphate rock, bauxite;
- untreated fecal wastewater;
- untreated and insufficiently treated mine waters;
- untreated wastewater loaded with suspended solids due to tailings entrainment from a tailings pond;
- organic and inorganic chemicals;
- alluvial suspended matter,

mainly due to the negligence shown by some economic operators during the development of technological processes or non-compliance with the legislative provisions on the discharge of wastewater into water resources. The phenomena had a local / basin impact, and due to the short duration, the nature of the pollutant, the length of the affected section and the inertia of the communities in the structure of aquatic biocenoses, the effects of the phenomena in question were reduced only to the local change , without long - term inducing a significant change in aquatic biodiversity.

With regard to the type and size of anthropogenic pressures that may affect groundwater bodies (according to Framework Directive 2000/60 / EC - Annex II - 2.1), the following shall be considered:

- *point and diffuse pollution sources* due to human agglomerations without wastewater collection and treatment systems, as well as diffuse pressures caused by agricultural activities,
- *water sampling* (> 10 m3 / day, according to the provisions of the WFD, Annex II - 2.3, selection criteria for water catchments) and recharging of groundwater bodies. In 2019, at national level, **26 significant groundwater exploitations** were identified, respectively catchments with flows greater than or equal to 1500 thousand m^3 / year.

Figure II.44 Graphical representation of the types of groundwater uses (thousand cubic meters / year)



Data source: National Administration "Romanian Waters" , draft of the updated National Management Plan 2021

The general trend of increasing the volumes of groundwater captured in recent years can be attributed to: the use of the capacity of catchment fronts; increasing the number of users and changing their profile; increasing the number of localities equipped with drinking water distribution networks and with catchments from underground sources. The recharging of aquifers in Romania is achieved by the infiltration of surface and meteoric waters. *As regards the sampling/recharging balance, which leads to the assessment of the groundwater body from the quantitative point of view, no particular problems are reported, the samples being lower than the natural refuelling rate.*

In the updated National Management Plan 2016-2021 approved by Government Decision no. 859/2016, 15 groundwater bodies were identified that did not reach good chemical status due to the following parameters: nitrates and ammonium, for which exceptions were provided from reaching the objectives until 2027. Due to the measures taken in the first implementation cycle (2010- 2015) and following the current assessment of the chemical state (2017-2019), 131 groundwater bodies are in good chemical condition and 12 are in poor chemical condition. **The values of groundwater quality indicators** were interpreted having as reference the standard values provided by the Groundwater Directive for nitrates and pesticides and the threshold values determined, as the case may be, for each groundwater body, approved by *Order no. 621 of July 7, 2014 on the* *approval of threshold values for groundwater in Romania and the provisions of Directive 118/2006 / EC with subsequent amendments and completions. The result of this analysis highlighted that in Romania there are 12 groundwater bodies that risk not reaching the good condition (figure II.45) from a chemical point of view, for the nitrogen indicator. The risk of non-achievement of environmental objectives for these groundwater bodies is mainly due to diffuse emissions caused by human agglomerations, especially those below 2,000 which have a low degree of connection to adequate sewerage and treatment systems, sources represented by agro-zootechnical units or complexes that have ceased or reduced their activity, as well as agricultural activities.*

Figure II.45 Groundwater bodies at chemical risk

Data source: National Administration"Romanian Waters" , draft of the updated National Management Plan 2021

Wastewater and sewerage networks

RO 24

Romania indicator code: RO 24
EEA indicator code: CSI 24

TITLE: URBAN WASTEWATER TREATMENT

DEFINITION: The indicator quantifies the level of connection of the population to wastewater collection and treatment systems. The indicator also illustrates the effectiveness of national wastewater treatment programs, the effectiveness of policies to reduce discharges of nutrients and organic substances, and the state of implementation of the wastewater treatment guidelines (91/271 / EEC and 98/15 / EC) at national level. .

In relation to their origin, wastewater is classified as follows: domestic wastewater, are those that are evacuated after being used for household needs in homes and units for public use; *urban wastewater*, defined as domestic wastewater or a mixture of domestic wastewater with industrial wastewater and / or meteoric wastewater and *industrial wastewater*, which are discharged as a result of their use in technological processes for obtaining industrial or agricultural – industrial finished products.

Urban wastewater are defined as domestic wastewater or a mixture of domestic wastewater with industrial wastewater (generally from the agri-food industry) collected through sewage systems and taken over and treated in treatment plants. ***Untreated wastewater from human settlements*** (*towns and villages) - the most concentrated inhabited areas*) *contribute to the* *pollution of surface and groundwater. The pollution is mainly due to the following aspects*:

- Reduced rate of population connection equivalent to wastewater collection and treatment systems;
- Improper operation of existing treatment plants;
- Improper management of sludge from treatment plants (by-products of the wastewater treatment process, considered biodegradable waste);
- The development of urban areas without the provision and endowment with water supply and sewerage systems and installations, which are then reflected in the discharges of untreated water into natural outlets, which leads to insufficient protection of water resources.

Surface water quality is directly influenced by discharges of wastewater, untreated or insufficiently treated, from point sources, urban, industrial and agricultural. The impact of these pollution sources on natural receptors depends on the flow of water and its loading with pollutants.

Structure of discharged wastewater. Pollutants and wastewater pollution indicators

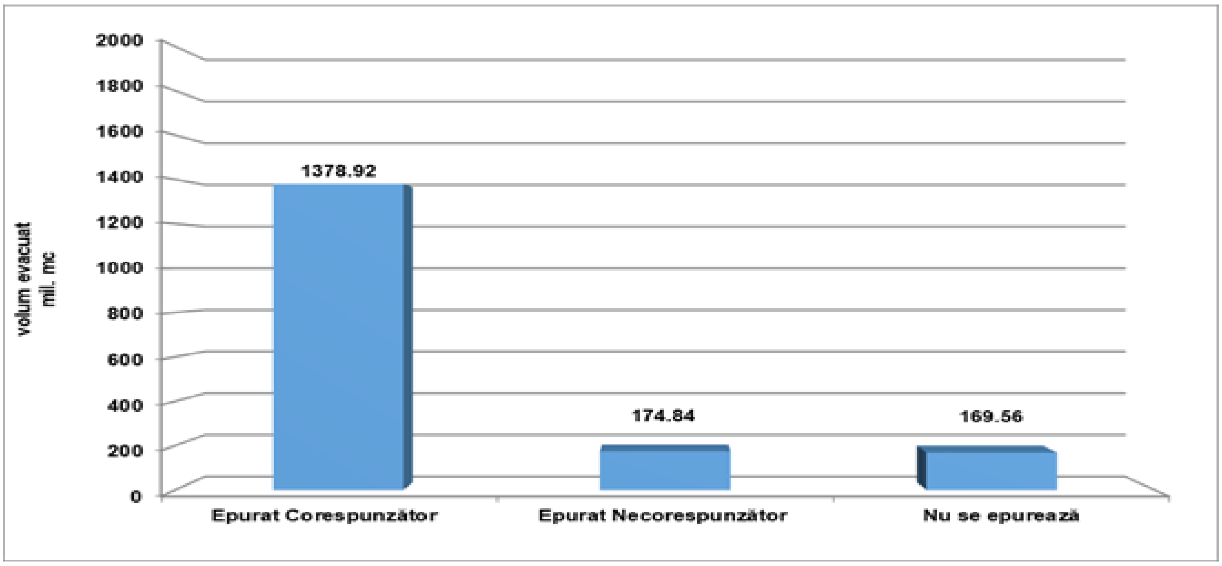
According to the results of the assessment of the situation at national level, the total volume discharged in 2020 was 4207.51 million cubic meters, of which 2484.19 million cubic meters. (59.04%) represents cooling water, water classified in the category of wastewater that does not require treatment. The situation regarding the volumes of wastewater discharged in 2020 is presented in table II.29 and figure II.46.

Table II.29 Volumes of wastewater discharged at natinal level in natural receptors in 2020 (thousand m3)

Year	Totally evacuated	No purification required	It is purified		Does not purify
			Suitable	Inadequate	
2020	4207512,63	2484192,56	1378917,10	174840,50	169562.48

Source: National Administration "Romanian Waters", Synthesis of water quality in Romania

Figure II.46 Volumes of wastewater requiring treatment, discharged at natinal level in natural receptors in 2020 (thousand m3)



Source: National Administration "Romanian Waters", Synthesis of water quality in Romania

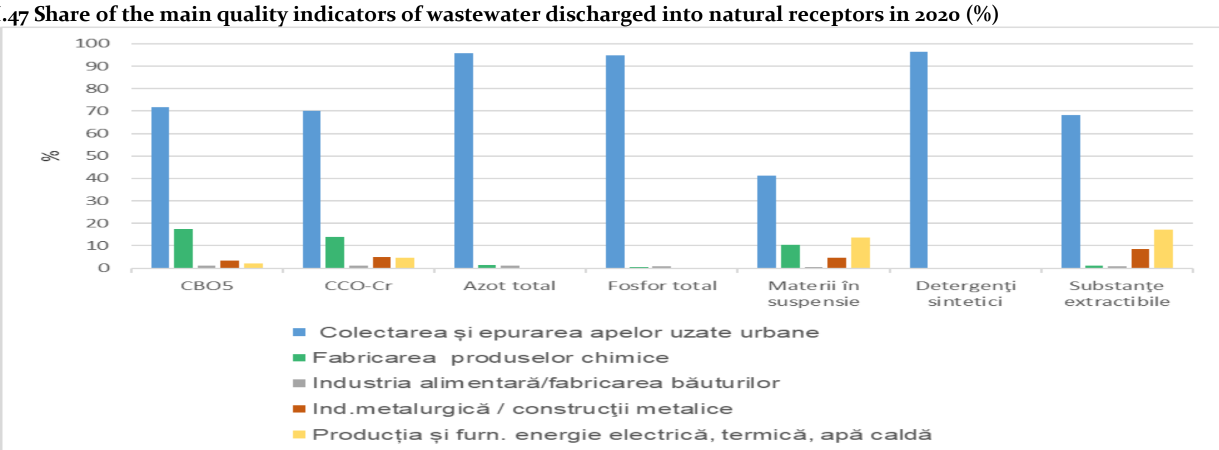
Regarding the share of loading the main quality indicators from wastewater discharged into natural receptors, by activities in the national economy, the situation is presented in table II.30 and figure II.47.

Table II.30 Share of the main quality indicators of wastewater discharged into natural receptors in 2020 (%)

The main economic activities	Share of the main quality indicators of wastewater discharged into natural receptors in 2020 (%)						
	CBO5	COD,	Total nitrogen	Total phosphorus	Suspended matter	Synthetic detergents	Extractable substances
Urban wastewater collection and treatment	71.88	70.02	95.75	94.90	41.15	96.60	68.15
Manufacture of chemicals	17.39	14.03	1.40	0.42	10.60	0.10	1.24
Food industry / beverage manufacturing	1.29	1.03	1.08	0.81	0.45	0.12	0.72
Metallurgical industry / metal constructions	3.34	4.88	0.05	0.07	4.75	0.17	8.59
Production and furnace. electricity, heat, hot water	1.99	4.66	0.02	0.02	13.74	0.01	17.29

Source: National Administration "Romanian Waters", Synthesis of water quality in Romania

Figure II.47 Share of the main quality indicators of wastewater discharged into natural receptors in 2020 (%)



Source: National Administration "Romanian Waters", Synthesis of water quality in Romania

The statistics compiled and presented annually in the "Synthesis of water quality in Romania" prove that among the wastewater that requires treatment, the greatest impact has the wastewater from urban agglomerations, especially in terms of pollution with organic substances (CBO5 and CCO-Cr) and nutrients (total nitrogen and total phosphorus) (Tables II.31 and II.32).

Table II.31 Total volume of urban wastewater discharged into natural receptors in 2020 (million m³ / year)

Year	Volume of urban wastewater discharged into natural receptors			
	Total	Suitable treated	Inadequate treated	Does not clean
2020	1071.82	915.89	115.74	40.19

Source: National Administration "Romanian Waters", Synthesis of water quality in Romania

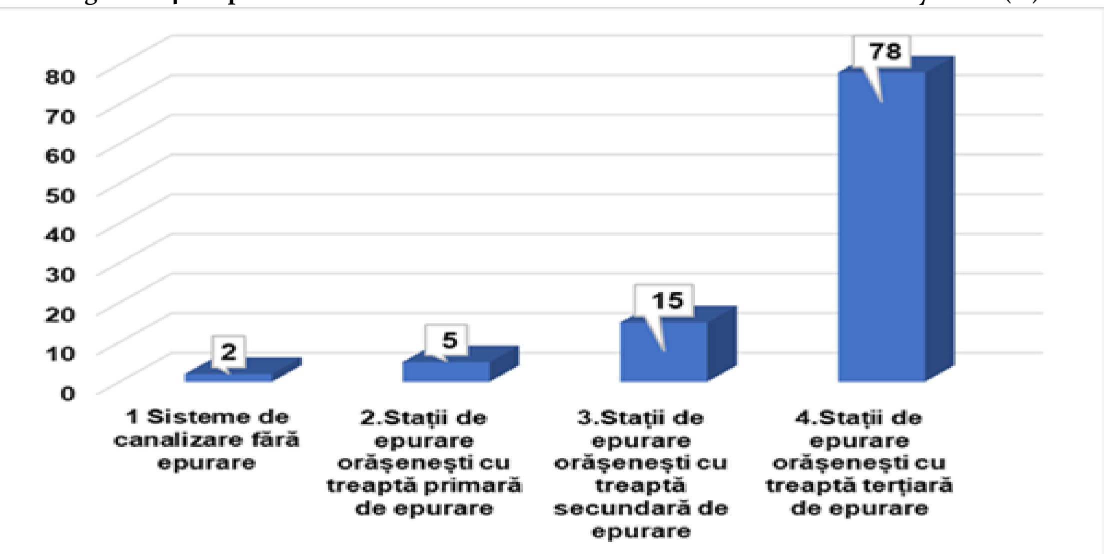
Table II.32Pollution loading (tons / year) of effluents discharged from urban agglomerations into natural receptors in 2020

Pollutant	Amount of pollutants (tons / year)
	2020
CBO5	18664,52
CCO-Cr	55848.34
Total nitrogen	11222,17
Total phosphorus	1031.70
Suspended matter	25559.25
Synthetic detergents	548.56
Extractable substances	3718.76

Source: National Administration "Romanian Waters", Synthesis of water quality in Romania

According to the National Institute of Statistics, in 2020, a number of 10794270 inhabitants had their homes connected to sewerage systems, representing approx. 55.8% of the Romanian population. Regarding the wastewater treatment, the population with the dwellings connected to the sewerage systems provided with treatment plants represented 10540388 persons, representing approx. 54.5% of the country's population. Also, the degrees of connection of the population to the wastewater collection and treatment systems differentiated by treatment levels are presented in figure II.48. The evolution of the degree of connection of the population to the wastewater collection and treatment systems depending on the type of treatment process applied (figure II.49) indicates a constant increase in the number of population benefiting from wastewater services, consequence of the expansion and construction of afferent infrastructure. It is noted that in recent times the proportion of tertiary treatment collection systems has increased in particular. *Primary (mechanical) treatment removes some of the suspended solids (approx. 40-70%), while secondary (biological) treatment uses aerobic and / or anaerobic microorganisms to decompose a large part of the organic matter (approx. 50-80%), to remove ammonium (about 75%) and to retain some of the nutrients (about 20-30%). Tertiary (advanced) treatment effectively removes organic matter, phosphorus compounds and nitrogen compounds.*

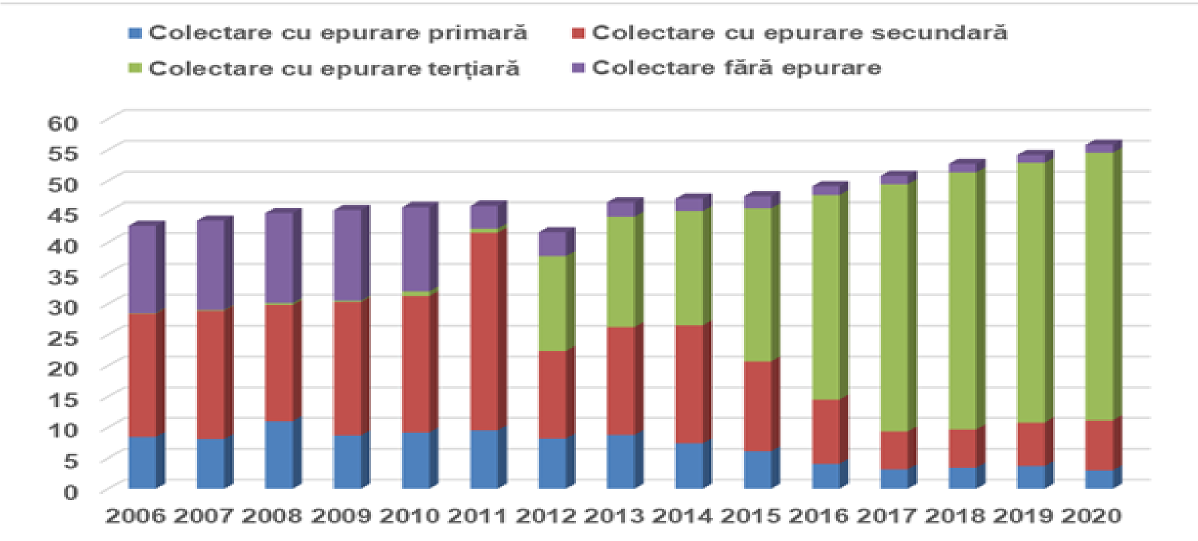
Figure II.48 Population connected to wastewater collection and treatment systems (%)



Source: National Institute of Statistics, www.insse.ro

The evolution of the degree of connection of the population to the wastewater collection and treatment systems

Figure II.49 Population connected to wastewater collection and treatment systems (%)



Source:National Institute of Statistics, www.insse.ro

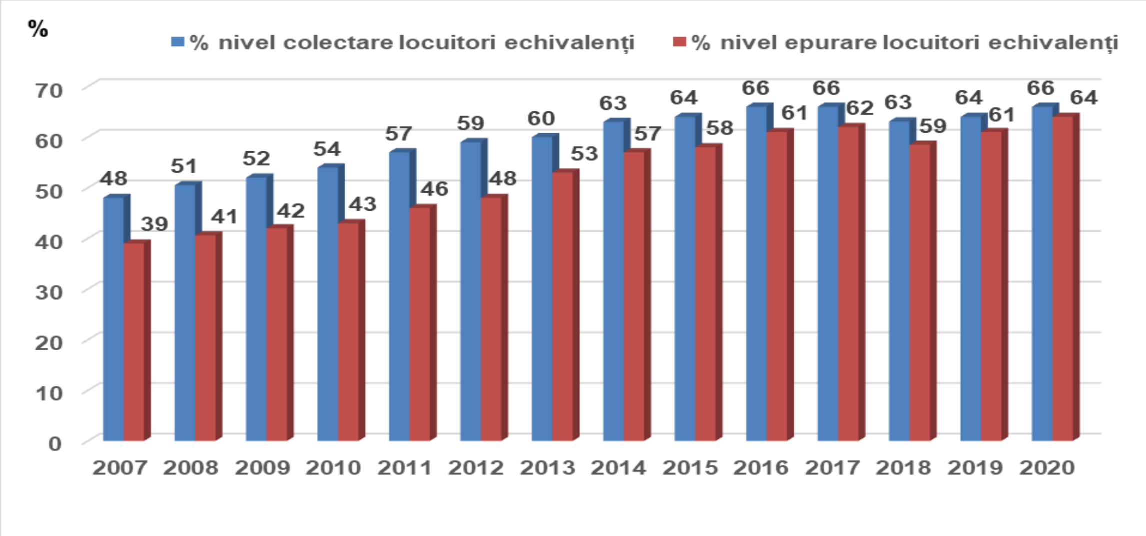
The efficiency of national programs on wastewater treatment, the effectiveness of existing policies to reduce discharges of nutrients and organic substances is assessed by the implementation of the requirements of Directive 91/271 / EEC on wastewater treatment, as amended by Directives 98/15 / EC and 2000/60 / EC . **The notion of "inhabitant-equivalent"** is a specific term of Directive 91/271 / EEC on waste water treatment which is the unit of measurement for biodegradable pollution and determines the extent of pollution from a human agglomeration, respectively the pollution resulting from both population and and from industrial activities that discharge wastewater into the agglomeration's sewerage network. ***Thus "an equivalent inhabitant (e.i.) means the biodegradable organic load with a biochemical consumption of oxygen in five days (BOD5) of 60 grams of oxygen per day is expressed as the average of that pollution produced by a person in a day.***
From the data of the National Administration “Romanian Waters”, regarding the works on water / wastewater infrastructure, at national level, the levels of collection and treatment of biodegradable organic load (expressed in%) from human agglomerations by more than 2,000 increased in last years. In 2020, the values of the levels of collection and treatment of biodegradable organic load were 66.2% for wastewater collection, respectively 63.6% for wastewater treatment.

The degree of connection of the population to wastewater collection and treatment systems in 2020

According to the report made by the National Administration “Romanian Waters”, in the human agglomerations bigger than 2000 e.i, the degree of connection to the wastewater collection system registered an increase of approx. 18% at the end of 2020 compared to 2007 (figure II.50). Regarding the degree of connection to urban wastewater treatment plants, it increased by approx. 25% in the period 2007-2020.
There is an increase in national levels of collection and treatment compared to 2019 which has the main causes: changes in the number and size of agglomerations, following the development of feasibility studies for European funding in 2014-2020. Thus, the change in national levels of collection and treatment has several causes, of which the following are mainly mentioned:

- **changing the number and size of agglomerations**- it is observed that the number of agglomerations greater than 2,000 has decreased, as a result of the redistribution of agglomerations, based on the updating of the planning, respectively the County Master Plans and the financing applications for the accomplishment of the works necessary for the accomplishment of the wastewater collection and treatment systems from human agglomerations; the decrease in the size of the agglomerations also contributes to the decrease in the number of population and economic activities, which led to the change of the classification of the agglomerations by size categories and implicitly to the change of their number and size. To this end, it is necessary to obtain a stable/final inventory of human agglomerations, on the basis of which to update the National Implementation Plan of Directive 91/271/EEC on urban waste water treatment, which will be possible after the completion of all applications of European funding for the second period of European financial planning 2014-2020 and the completion of some projects to substantiate the strategy in the water and wastewater sector;

Figure II.50 Evolution of levels of collection and treatment (%) of biodegradable organic wastewater loads (s) at national level in the period 2007-2020



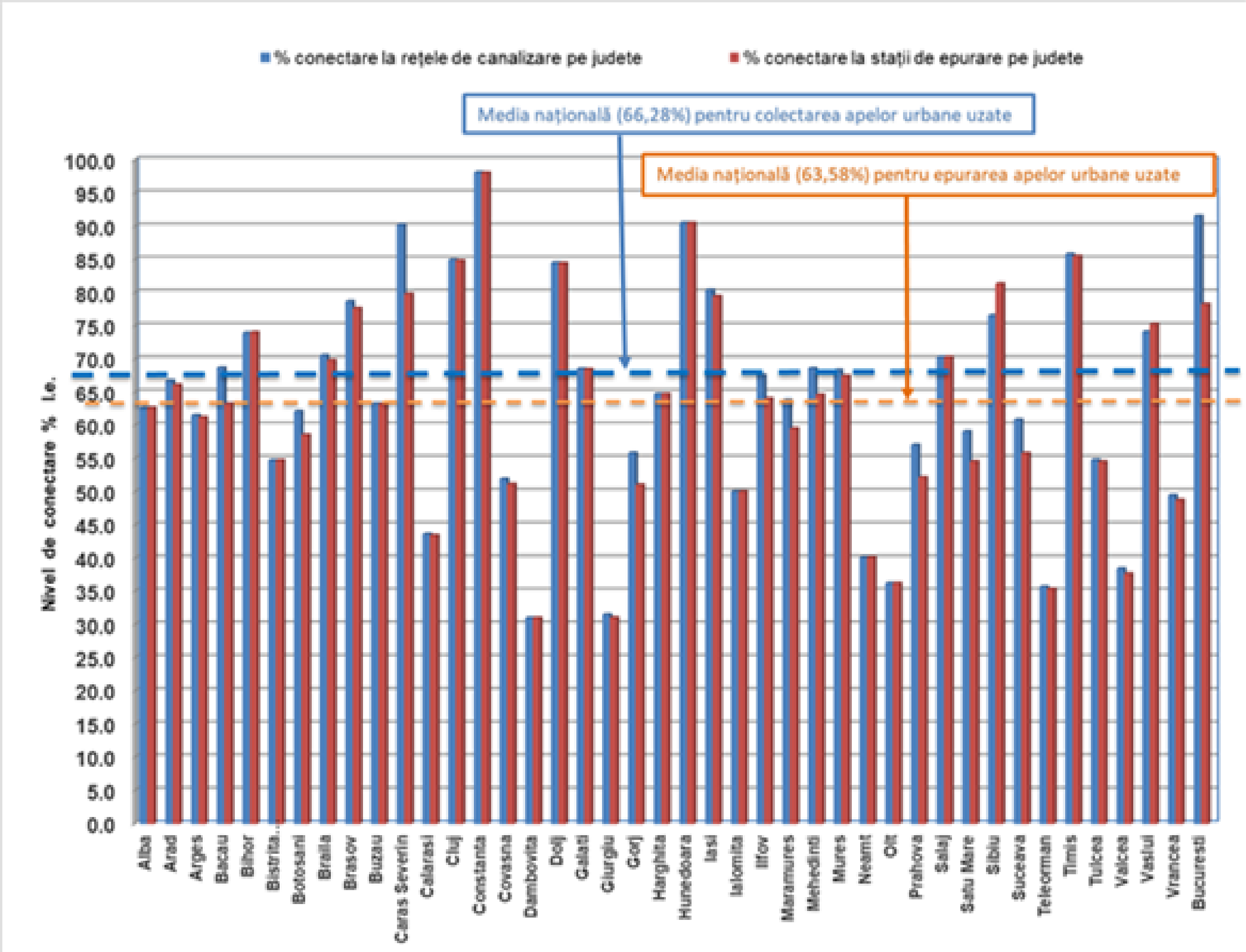
Source: National Administration "Romanian Waters", report "Status of works for the treatment of urban wastewater and of the capacities in execution and put into operation for human agglomerations"

- **low level of confidence in the data and information transmitted**, due both to misinterpretations of the requirements of the Directive and the data required for reporting, but also to the inconsistency of the information provided by water service operators and local authorities; thus, serious problems were identified in the interpretation of the notions of agglomeration versus cluster, delimitation and size in equivalent inhabitants of agglomerations (confusion between agglomeration and territorial administrative unit), calculation of the degree of connection of equivalent inhabitants to centralized collection and treatment systems (when calculating the degree of connection must be taken into account no. e.i. effectively connect to the sewerage system and do not take into account the sewerage network realized, and the degree is related to the entire size of the agglomeration).

At county level (figure II.51), the highest degrees of connection to sewerage networks (over 80%) are identified in 7 counties (Caraș Severin, Cluj, Constanța, Dolj, Hunedoara, Iași and Timiș) and in the agglomeration Bucharest, and at the opposite pole (between 30% - 50%) there are 8 counties (Călărași, Dâmbovița, Giurgiu, Neamț, Olt, Teleorman, Vâlcea and Vrancea). It is observed that no county has a percentage of less than 30% connection to sewerage networks, but most counties that remain with percentages below 50% are located mainly in the southern part of the country (poor areas). Regarding the degree of urban wastewater treatment at county level, the situation is as follows: in 6 counties (Cluj, Dolj, Constanța, Hunedoara, Sibiu and Timiș) there were values of the level of connection to the treatment plant of over 80 %. In some of the counties, the purification percentage increased compared to December 2019, values in the range of 30% - 50% being registered in the counties of Călărași, Dâmbovița, Giurgiu, Neamț, Olt, Teleorman, Vâlcea and Vrancea). Similar to the situation of connection to sewerage networks, the counties in the southern part of the country are lagging behind in the development of treatment plants.

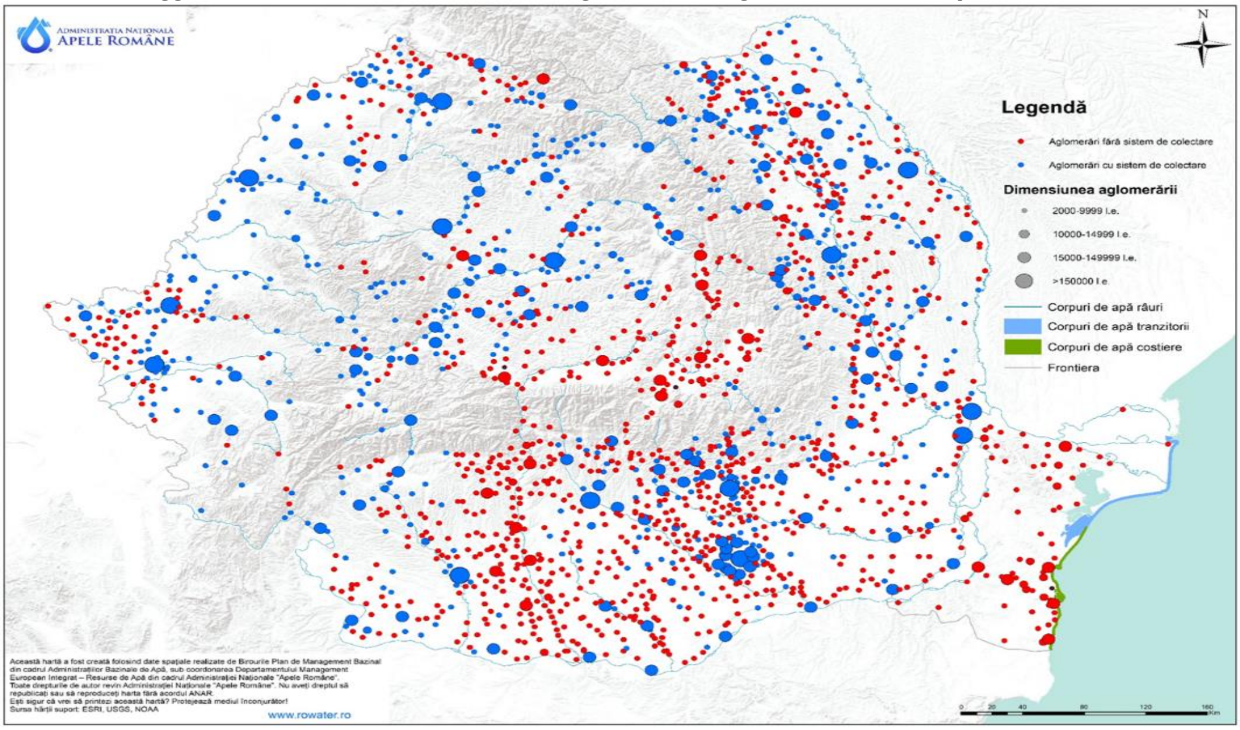
The situation of endowment of human agglomerations with collection and treatment systems is presented in figure II.52, respectively figure II.53.

Figure II.51 Situation at county level of collection and treatment of biodegradable cargo from wastewater (s) from human settlements with more than 2000 le in 2020



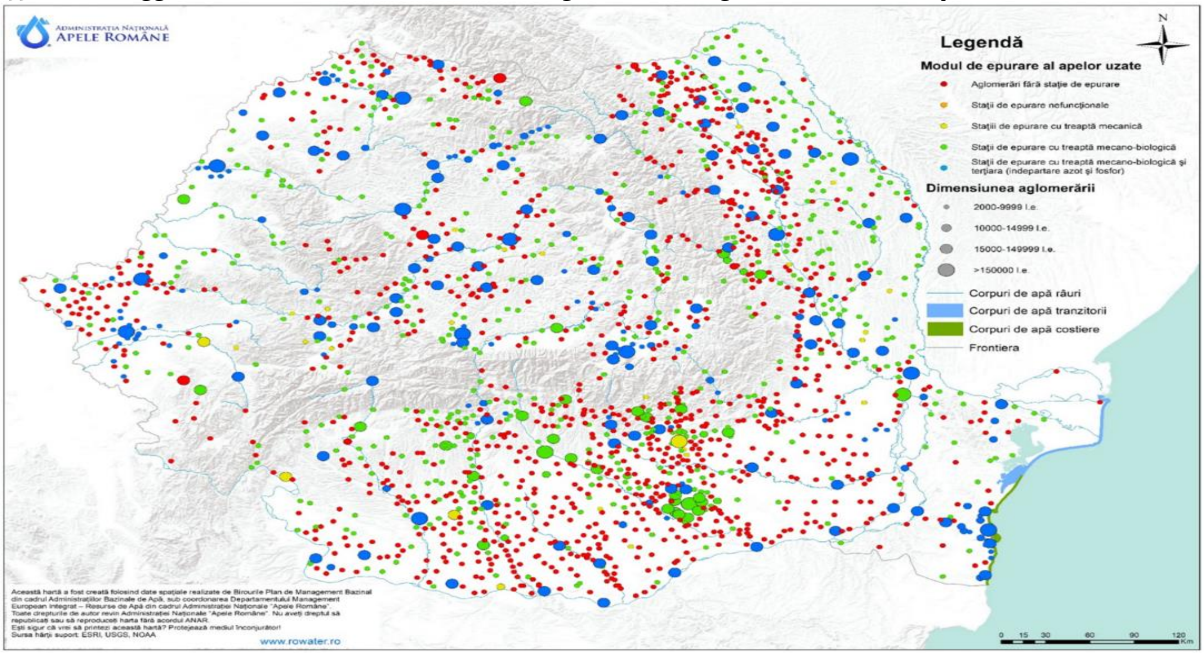
Source: National Administration "Romanian Waters", report "Status of works for urban wastewater treatment and capacities being implemented and put into operation for human settlements "in 2020

Figure II.52 Human agglomerations (> 2,000 le) and the degree of coverage with collection systems in 2020



Source: National Administration "Romanian Waters", report "Status of works for urban wastewater treatment and capacities being implemented and put into operation for human settlements "in 2020

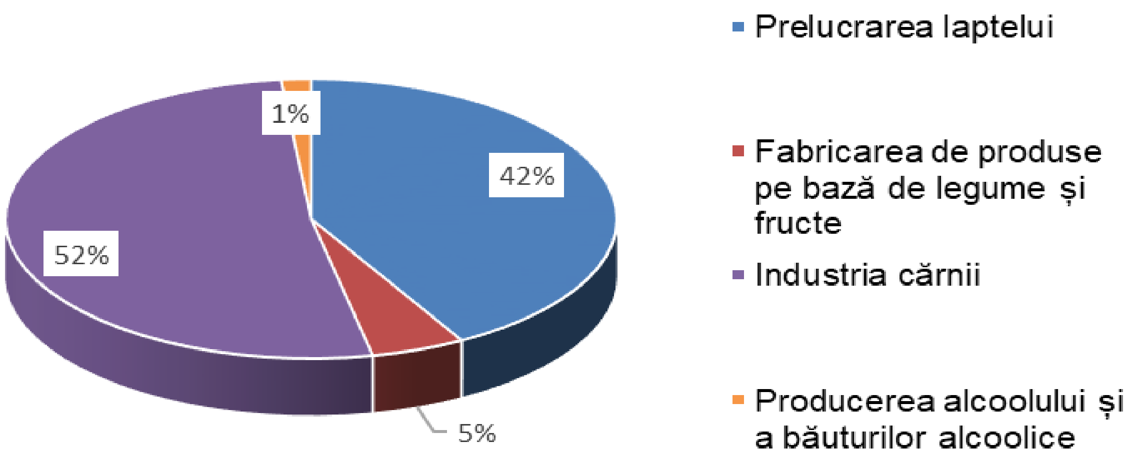
Figure II.53 Human agglomerations (> 2,000 le) and the degree of coverage with treatment systems in 2020



Source: National Administration "Romanian Waters", report "Status of works for urban wastewater treatment and capacities being implemented and put into operation for human settlements "in 2020

Regarding the activity profile, most agro-industrial units fall into the fields of industrialization of meat and milk, the manufacture of alcoholic beverages, the manufacture of vegetable and fruit products and the manufacture and bottling of non-alcoholic beverages (Figure II.54). The highest percentage of the biodegradable load produced by the agri-food industrial units with more than 4000 e.i at the discharge in water resources was identified for the meat industry (approx. 52%) and the milk processing industry (42%), and the units in the field of brewing and bottling of soft drinks are either closed or have greatly reduced their production (<4,000 e.i) or have ceased their activity.

Figure II.54 Share of biodegradable load produced by agri-food industrial units with more than 4000 e.i at discharge into water resources



Source: National Administration "Romanian Waters", report "Status of works for urban wastewater treatment and capacity in execution and commissioning for human settlements" in 2019

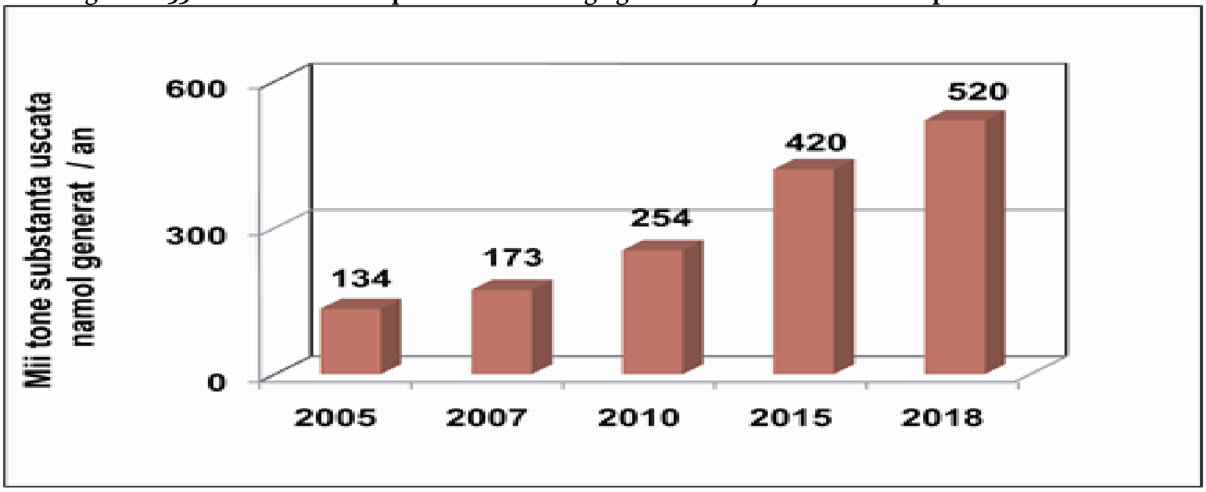
The implementation of the requirements of Directive 91/271 / EEC on urban wastewater treatment will implicitly lead to a significant increase in the volume of sludge resulting from urban wastewater treatment plants. From the situation provided by the National Institute of Statistics on the ***management of sludge from urban wastewater treatment plants at the level of 2019*** (table II.33) it is observed that, from the total amount of sludge generated in wastewater treatment plants approx. 18.89% was used in agriculture. According to the first National Management Plan for river basins / hydrographic areas in Romania (developed in 2009), it was estimated that at the end of the compliance period (2018) a quantity of sludge of approx. 520,850 tons of dry matter / year compared to approx. 172,529 tons of dry matter / year obtained in 2007 (figure II.55). This forecast corresponds to the planned situation regarding the compliance of agglomerations in 2004, according to the National Plan for the implementation of Directive 91/271 / EEC on urban wastewater treatment.

Table II.33 National use of sludge from urban wastewater treatment plants in 2019

Uses of sludge	Quantity of sludge (thousand tons s.u / year)
Total quantity produced	**230.59**
Use in agriculture	43.56
Composting and other applications	12.19
Storage on arranged platforms	130.02
Evacuation into the sea	0
Incineration	1.14
Other	43.67

Data source: National Institute of Statistics, TEMPO online database,www.insse.ro

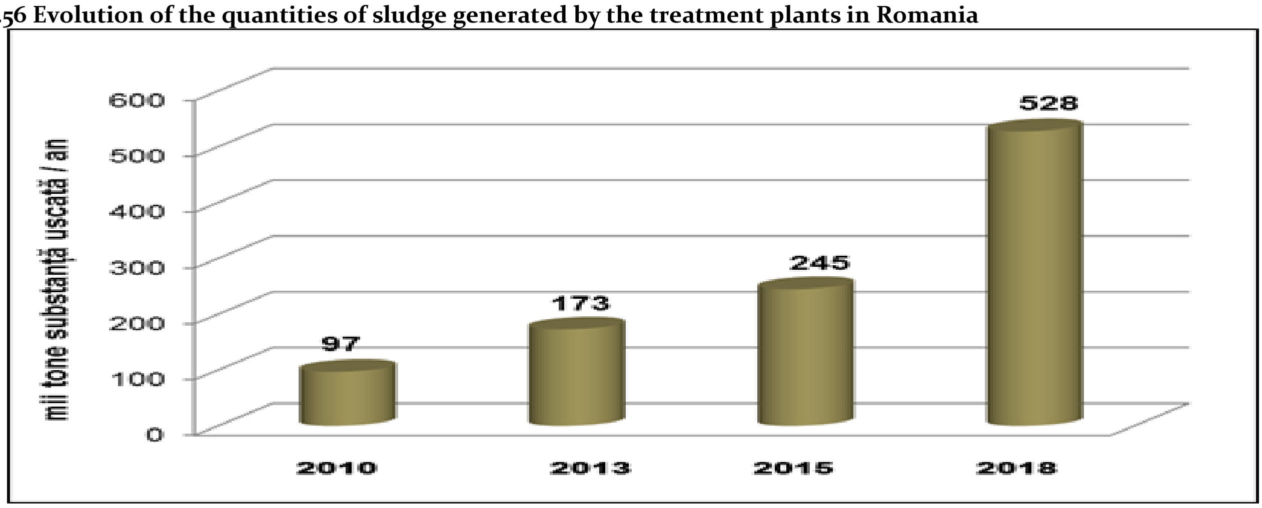
Figure II.55 Evolution of the quantities of sludge generated by the treatment plants in Romania



Source: National Administration "Romanian Waters", National Management Plan for river basins / hydrographic spaces in Romania approved by GD no. 80/2011

In the *National strategy for sewage sludge management*, developed within the technical assistance of SOP Environment, provides a framework for planning and implementing measures for the management of increasing volumes of sludge from existing, rehabilitated and new urban wastewater treatment plants in Romania. The estimated future quantities of sludge produced were evaluated according to Figure II.56. This forecast corresponds to the planned situation regarding the compliance of agglomerations at the level of 2011, taking into account the changes produced in the delimitation of human agglomerations and the type of treatment required for compliance.

Figure II.56 Evolution of the quantities of sludge generated by the treatment plants in Romania



Source: Ministry of Environment, Waters and Forests, National Strategy for the management of sewage sludge - project POSM / 6 / AT / I.1.2010, "Development of the national policy for the management of sewage sludge"

From the comparative analysis of the data in Table II.33 and Figures II.55 and II.56, the planning scenario for 2018 was optimistic, given that it started from the hypothesis that human agglomerations with more than 2,000 will be equipped all with appropriate treatment plants, which in fact was practically not achieved. Thus, in 2019, the amount of sludge generated in urban wastewater treatment plants reached approx. 55% the planned value from 2015, a value that is approx. 44% of the value for 2018.

In order to speed up the compliance process, the Compliance Plan for the implementation of the urban waste water treatment directive is being updated, constituting one of the objectives of the technical assistance project, called "**Improving the capacity of the central public authority in the field of water management in terms of planning, implementing and reporting european requirements in the field of water".** The project is financed from European funds through the Operational Programme Administrative Capacity 2014-2020, priority axis Efficient public administration and judicial system, the specific objective OS 1.1 Development and introduction of common systems and standards in public administration that optimize the decision-making processes oriented towards citizens and the business environment in accordance with SCAP. ***The project leader is the Ministry of Environment, Waters and Forests, the National Administration "Romanian Waters" implementing partner, and the World Bank consultants provide technical assistance during the 31 months of the project (2019-2022).*** The project contributes to the substantiation and support of measures aiming at adapting structures, optimizing processes and preparing human resources for the fulfillment of obligations under the acquis communautaire, and accelerated compliance with the requirements of Directive 91/271 / EEC on the treatment of waste water the field of water management. **The specific objectives and activities of the project** are mainly aimed at: updating the Implementation Plan of Directive 91/271 / EEC on urban waste water treatment, based on a new methodology for delimiting human agglomerations and calculating their load; elaboration of the National Strategy on water supply, collection and treatment of urban wastewater; development and implementation at the level of the National Administration "Romanian Waters" of an electronic system for data collection, processing and reporting; elaboration and promotion of a draft normative act for defining the obligations and responsibilities related to the collection and treatment of urban wastewater. ***Information on the project and implementation activities*** can be accessed on the website of the National Administration "Romanian Waters", as well as those of the Water Basin Administrations.

The above-mentioned project will be based on the results obtained from the ***technical assistance project*** financed from the Technical Assistance Operational Program 2014-2020, implemented by the Ministry of European Funds, through the Managing Authority for the Large Infrastructure Operational Program (MA POIM), under the technical assistance of the Bank European Agency for Reconstruction and Development (EBRD) and in collaboration with the Ministry of Waters and Forests, the Romanian Water Association and the National Regulatory Authority for Community Services of Public Utilities.

Trends and forecasts on water quality

The Water Framework Directive 2000/60 / EC is a new approach in the field of water management, based on the basin principle and imposing strict deadlines for the implementation of the program of measures. The central objective of the Water Framework Directive (WFD) is to achieve "good status" for all water bodies, both surface and groundwater, with the exception of heavily modified and artificial bodies, for which it is defined " the good ecological potential". In accordance with the requirements of Article 14(1b) of the Water Framework Directive, on 22 December 2019 was published the ***Document on important water management issues carried out at basin and national level***, which also included the results of the public information and consultation process for a period of 6 months (June - December 2019 *https://rowater.ro/wp-content/uploads/2020/12/Probleme-Importante-de-Gospodarire a Apelor Sinteza Nationala 2019.pdf*). The document aims to highlight the important problems of water management in Romania treated in relation to the pressures on surface and groundwater bodies for which there is a risk of failure to meet environmental objectives and economic sectors related to these pressures. These are in line with water management issues in the Danube International District in the Significant Water Management Issues 2019, prepared by the International Commission for the Protection of the Danube River (ICPDR), with the contribution of the Danube countries (https: // www. icpdr.org/main/public-participation-interim-overview-swmi).

Important water management issues that directly or indirectly affect the status of surface water and groundwater, with a major impact on water resources management are: pollution with organic substances, pollution with nutrients, pollution with dangerous substances and hydromorphological alterations.

Pollution with organic substances is mainly caused by direct or indirect emissions of insufficiently treated or untreated wastewater from human settlements, from industrial or agricultural sources, and produces significant changes in the oxygen balance in surface waters and consequently has an impact on the composition of aquatic species / populations. respectively, on the ecological status of the waters.

An important problem of water management is ***pollution by nutrients***, especially nitrogen and phosphorus. Excess nutrients lead to eutrophication of water, which causes a change in composition and a decrease in species biodiversity, as well as reducing the possibility of using water resources for drinking, recreational, etc. As in the case of organic substances, nutrient emissions come from both point sources (untreated or insufficiently treated urban, industrial and agricultural wastewater) and from diffuse sources (especially agricultural ones: animal husbandry, fertilizer use, etc.).

Council *Directive 91/676 / EEC on the protection of waters against pollution caused by nitrates from agricultural sources* is the main Community instrument governing pollution caused by nitrates from agriculture. *The implementation of Directive 91/676 / EEC is put into practice in Romania* by the Action Plan for the protection of waters against nitrate pollution from agricultural sources, approved by GD *964/2000 on the approval of the Action Plan for the protection of waters against nitrate pollution from agricultural sources, with subsequent additions and modifications*, following the decision of application of the Action Program on the entire territory of Romania. The provisions of the action program are mandatory for all farmers who own or manage agricultural holdings and for the local public administration authorities of communes, cities and municipalities on whose territory there are agricultural holdings. In order to reduce and prevent nitrate pollution from agricultural sources, it was provided as a basic general measure, on the entire territory of Romania, the application of action programs throughout Romania.

Government Decision no. 964/2000, by which Directive 91/676 / EEC on the protection of waters against pollution by nitrates from agricultural sources was transposed into national law in Romania has undergone amendments which entered into force on 4 June 2021, when the **Government Decision no. 587/2021** was published in the Official Gazette. The most important change, as far as farmers are concerned, is regarding their legal obligations, which are now included in the Action Program for the Protection of Waters against Pollution from Nitrates from Agricultural Sources (Action Program). Until the amendment brought by this Government Decision, the mandatory provisions were included in the Code of Good Agricultural Practices. By separating the mandatory norms from the recommendations, the legislative text is simplified and, consequently, the understanding and application of the legal provisions is facilitated . At the same time, the ***Code of Good Agricultural Practice*** has become a consultative document for farmers. It should be borne in mind that the application of farmers voluntarily does not refer to those measures which are also included in the Action Program, the latter being mandatory. Also, in connection with the code of good agricultural practice, where its provisions are part of the legal requirements for management (SMR) and the standards of good agricultural and environmental condition (GAEC), they are mandatory under the conditions of application and approval of any form of financial support.

In addition, the implementation of measures in accordance with the requirements of Directive 91/271 / EEC on urban waste water treatment, as amended and supplemented by Directive 98/15 / EC, contributes to the reduction of nutrient emissions.

MARINE AND COASTAL ENVIRONMENT

The state of marine and coastal ecosystems

RO 41
Romania indicator code: RO 41 EEA indicator code: SEBI 07
TITLE: PROTECTED NATURAL AREAS OF NATIONAL INTEREST
DEFINITION: Marine protected areas. The indicator describes the evolution of marine protected areas and the areas covered by them.

Marine sites in the Natura 2000 network

In accordance with the provisions of ***Order no. 46/2016 on the establishment of the protected natural area regime and the declaration of sites of community importance as an integral part of the European ecological network Natura 2000 in Romania***, published in the Official Gazette no. 114 / 15.02.2016, the network of marine protected areas in Romania consists of the following sites of community importance:

1. ROSCI0066 Danube Delta Biosphere Reserve - marine area
2. ROSCI0413 The southern lobe of Zernov's Phyllophora Field
3. ROSCI0197 Submerged beach Eforie Nord - Eforie Sud
4. ROSCI0273 Marine area at Cape Tuzla
5. ROSCI0281 Cap Aurora
6. ROSCI0293 Costinesti - August 23
7. ROSCI0311 The Brave Canyon
8. ROSCI0094 Submarine sulfur springs from Mangalia
9. ROSCI0269 Vama Veche - 2 Mai

Table II.34 shows the evolution of the areas of sites of community importance in the Romanian Black Sea sector.

Table II.34 Surfaces of sites of community importance in the Romanian Black Sea sector

Marine protected area	Surface 2007 (km2)	Surface 2011 (km2)	Surface 2016 (km2)
ROSCI0066 Danube Delta - marine area	1216.97	1233.74	3362.91
ROSCI0094 Mangalia	3.82	3.82	57.85
ROSCI0197 Eforie	1.4	1.4	57.17
ROSCI0237 Sf. Gheorghe	61.22	61.22	---
ROSCI0269 Vama Veche	52.72	71.96	123.11
ROSCI0273 Cap Tuzla	17.38	17.38	49.47
ROSCI0281 Cap Aurora	---	130.71	135.92
ROSCI0293 Costinesti	---	48.78	48.84
ROSCI0311 The Brave Canyon	---	---	353.77
ROSCI0413 Zernov's Phyllophora field - southern lobe	---	---	1868.15
TOTAL	1353.51	1569.01	6057.19

Source: NMRDI

Share of marine sites of Community importance in the Romanian sector of the Black Sea is registered in table II.35.

Table II.35 Share of sites of Community importance (SCI) in the Romanian Black Sea sector

Area	SCI surface (km2)	SCI surface (%)
Territorial waters (0-12 nautical miles)	3,529.09	84.95
Adjacent Area and Exclusive Economic Zone	2,528.10	10.38

Source: NMRDI

In 2020, there were no changes in the areas of sites of community importance in the Romanian Black Sea sector and also no legislative changes, which remain in the custody of ANANP.

Marine and coastal habitats

In 2020, the monitoring of coastal and marine habitats continued within the project POIM 120009 - "Completing the level of knowledge of biodiversity by implementing the monitoring system of the conservation status of species and habitats of community interest in Romania and reporting based on Article 17 of the Habitats Directive 92/43 / EEC (marine species and marine and coastal habitats)" in the Activity 8 "Assessment of the conservation status based on the new reporting format to the EC of the marine habitats of community interest in Romania", Subactivity 8.4. "Collection of field data for the elaboration of inventories and maps (including in GIS system) for marine and coastal habitats "(table II.36).

Table II.36 Monitored marine and coastal habitats

Natura 2000 name and code	DH / OUG 57/2007	Percentage covered by habitat type related to the	State of conservation in	Presence in the biogeographical

		entire project area	the project area	region *)
1110 - Shallow submerged sandbanks	Annex I / Annex 4	Small areas estimated at 0.005-0.01 ha	Inadequate with unknown tendency	**Black Sea**
1130 - Estuary	Annex I / Annex 4	No information available	Favorable with unknown trend	**Black Sea**
1140 - Surfaces of sand and mud discovered at low tide	Annex I / Annex 4	No information available	Inadequate with unknown tendency	**Pontic, Black Sea**
1150 * - Coastal lagoons	Annex I / Annex 4	Estimated areas at 20-30 ha	Inadequate with unknown tendency	**Pontic**
1160 - Sea arms and shallow bays	Annex I / Annex 4	No information available	Favorable with unknown trend	**Black Sea, Pontic**
1170 - Reefs	Annex I / Annex 5 to OM 1964/2007	No information available	Inadequate with unknown tendency	**Black Sea**
1180 - Submarine structures created by gas emissions	Annex I / Annex 5 to OM 1964/2007	No information available	Favorable with unknown trend	**Black Sea**
1210 - Annual vegetation along the shoreline	**Annex I / Annex 4**	**In the arranged areas, the surfaces are of 300-500 m2, and in the Danube Delta (Sf. Gheorghe, Sulina) they exceed 2-3 ha**	**Inadequate with unknown tendency**	**Pontic**

*)Cf. OM no. 2387/2011 amending OM no. 1964/2007

Source: NMRDI

For the 8 types of marine and coastal habitats, the techniques proposed to establish the requirements by which the conservation status can be defined are shown in Table II.3

Table II.37 Attributes and techniques for monitoring marine species and coastal and marine habitats

Generic attribute	Specific attribute	TECHNICAL
Area	Surface	For shallow areas: analysis of aerial photographs; remote sensing
		Collection of samples and videos with ROV / multibeam beam scans
Physical characteristics	Substrate: sediment type	Particle size analysis; chemical analyzes of sediments
	Topography / Morphology	Bathymetric mapping (multibeam beam scans)
	Water transparency	Measuring water transparency; chemistry data recorders; Dry discs
	Chemical composition of water (including salinity, temperature)	Water quality measurement; data recorders on the chemical composition of water
	Nutrient status	Water quality measurement; data recorders on the chemical composition of water(extent of biocenosis in the case of algae mats, chlorophyll)
Habitat structure	Subtypes present	Subtype identification; dredging sampling, Van Veen
	Edifying / characteristic species	Dredging sampling, Van Veen; underwater video recording with ROV; epibenthic trawling, at depths over 20 m
	Other rare / threatened species	Dredging sampling; Van Veen; underwater video recording with ROV; epibenthic trawling, at depths over 20 m
Spatial distribution	Spatial model of subtype distribution	Mapping using data collected through multibeam beam scans, ROV video recordings / aerial photography

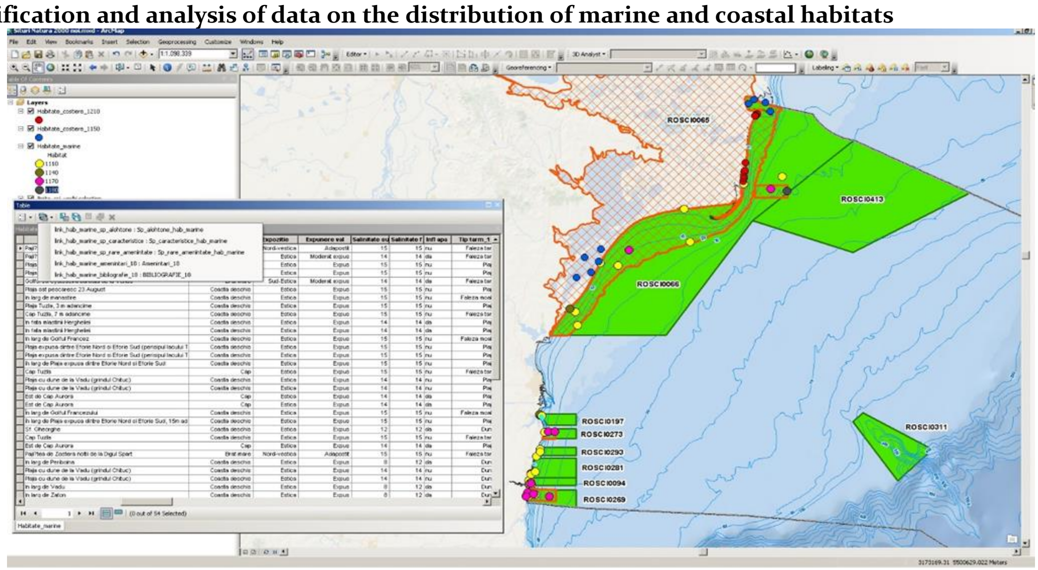
Pressures and threats	Distribution and intensity	Direct observations, GIS analysis

Source: NMRDI

Depending on the place where the observations are made, the monitoring activity of marine and coastal habitats is performed according to figure II.57 as follows:

- monitoring carried out at sea with a research vessel or vessel, including diving;
- ground monitoring for observations made from / on shore (vehicle, ATV).

Figure II.57 Verification and analysis of data on the distribution of marine and coastal habitats



Source: NMRDI

In total, during 2020, 17 expeditions were made to monitor marine and coastal habitats. The data and information collected during the expeditions will be used in conducting a new assessment of the conservation status of marine and coastal habitats underlying the next 2025 country report (the previous assessment was conducted in 2019

The state of marine ecosystems and living resources

RO 09
Romania indicator code: RO09 EEA indicator code: CSI 09
TITLE: SPECIES DIVERSITY
DEFINITION: The indicator describes the state and trends of biodiversity, more precisely the variation of biodiversity over time. in the context of relevant environmental policies, in particular the European Biodiversity Strategy; sustainable fishing is pursued until 2015 (setting the maximum production to ensure the sustainable use of fish resources).

Phytoplankton

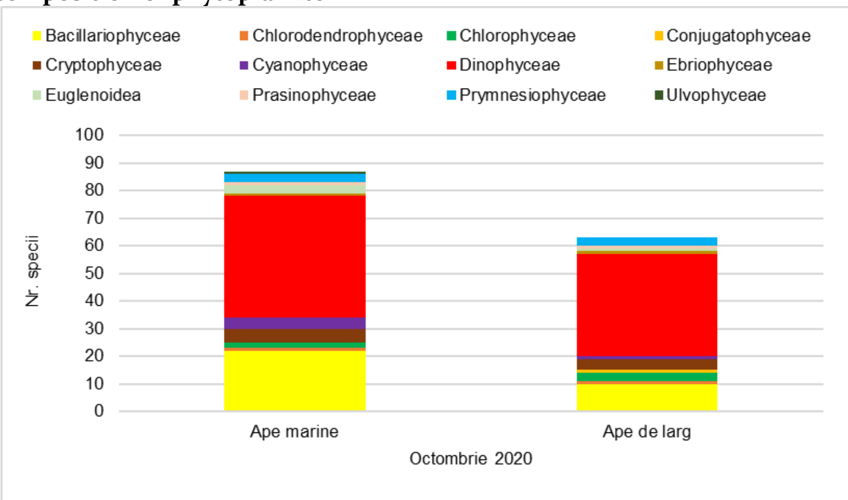
From the spatial distribution of the average values per decades of salinity from the available data World Ocean Data (ftp://ftp.nodc.noaa.gov/) and NMRDI (www.nodc.ro), but also from the monthly average values of chlorophyll a for period 07.2002-10.2013 (disc.sci.gsfc.nasa.gov/giovanni), in accordance with EC decision 848/2017, Romanian marine waters were classified into four water bodies:

- BLK_RO_RG_TT03 - waters with variable salinity (from baseline to 30 m isobath),
- BLK_RO_RG_CT - coastal waters (from baseline to 30m isobath),
- BLK_RO_RG_MT01 - marine waters (shelf) - over 30m isobath to 200m isobath,
- BLK_RO_RG_MT02 - offshore waters - over 200m isobath.

In the composition of phytoplankton were identified 93 species, with varieties and forms belonging to 12 taxonomic classes (Bacillariophyceae, Chlorodendrophyceae, Chlorophyceae, Conjugatophyceae, Cryptophyceae, Cyanophyceae, Dinophyceae, Ebriophyceae, Euglenoidea, Prasinophyceae, Prymnesiophyceae, Ulvophyceae) (figure II.58)

On the continental shelf of the Black Sea, in October 2020, the greatest diversity was found in marine waters (87 species) where dinoflagellates were dominant (with 44 species), followed by diatoms (with 22 species) and cryptophytes (with 5 species). In offshore waters, dinoflagellates maintain their dominance (with 37 species), followed by diatoms (with 10 species) and cryptophytes (with 4 species). The rest of the classes (Chlorodendrophyceae, Chlorophyceae, Conjugatophyceae, Cyanophyceae, Ebriophyceae, Euglenoidea, Prasinophyceae, Prymnesiophyceae, Ulvophyceae) were represented by fewer species (1-3 species).

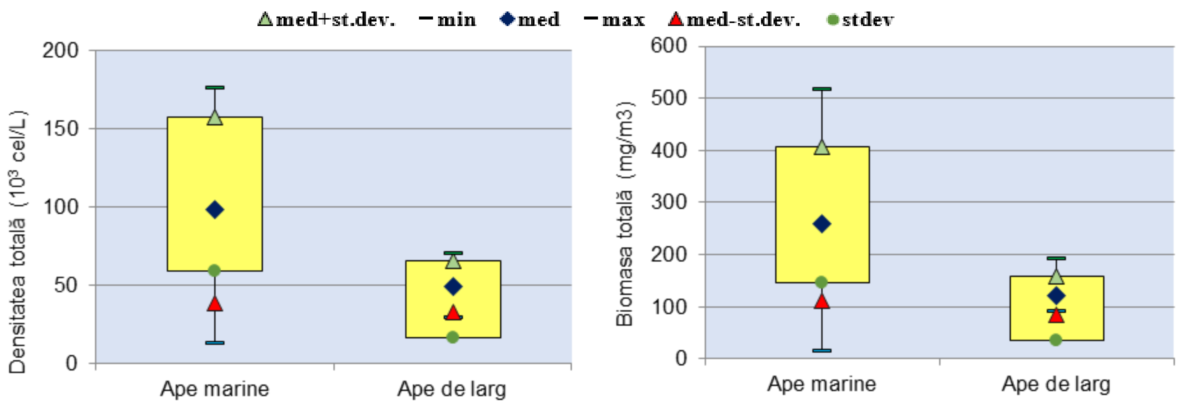
Figure II.58 Taxonomic composition of phytoplankton



Source: NMRDI

Phytoplankton abundances and biomass varied between $13.30 \cdot 10^3$ - $175.90 \cdot 10^3$ cel / L and 16.16 - 518.68 mg / m^3 (in marine waters) and between $29.40 \cdot 10^3$ and $70.80 \cdot 10^3$ cel / L and 91.27 and 192.09 mg / m^3 (in offshore waters) (figure II.59). The distribution of quantities by water typologies highlights maximum values recorded in marine waters, on CT13 and PO6 stations, respectively.

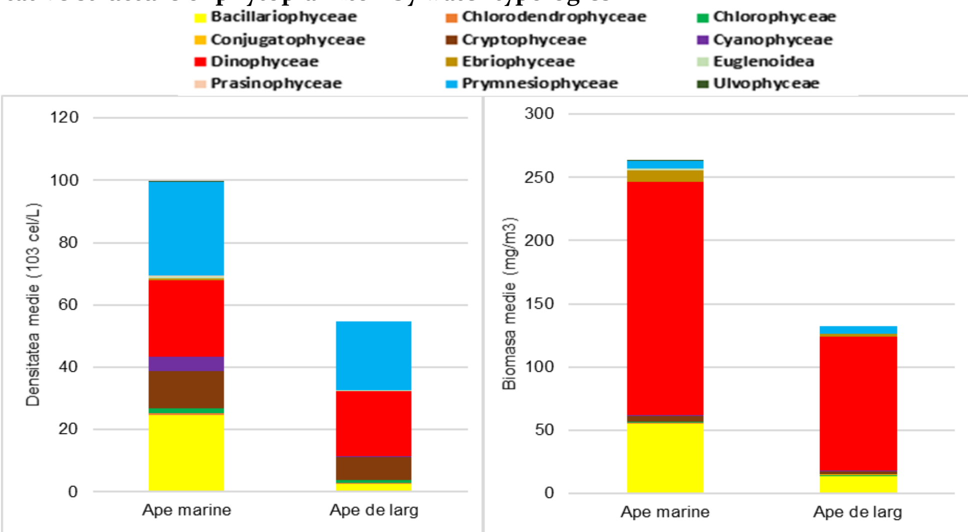
Figure II.59 Variation of phytoplankton densities and biomass



Source: NMRDI

Depending on the average biomass, dinoflagellates dominated the phytoplankton community in both water bodies, accounting for 70% in marine waters and 80% in offshore waters (Figure II.60). Among the dinoflagellates, species were noted such as: *Gyrodinium lachryma*, *Tripos fusus*, *T. furca*, *T. muelleri*, *Prorocentrum micans*, *P. scutellum*, *Protoceratium reticulatum*, *Protoperidiniumdepressum*, *P. steinii*, *Polykrikos kofoidii*, *Phalacroma rotundata*, *Dinophysis acuminata* și *Cochlodinium archimedes*.
Diatoms accounted for 21% in marine waters and 10% in offshore waters. Among the diatoms, the following species were noted: *Pseudosolenia calcar – aviscu* up to 20% (CT14 and MG19 stations) in marine waters and up to 12% (CT15 and MG21 stations) in offshore waters and *Proboscia alata* (up to 13% in marine waters and up to 3% in offshore waters).
The other classes (Chlorodendrophyceae, Chlorophyceae, Conjugatophyceae, Cryptophyceae, Cyanophyceae, Ebriophyceae, Euglenoidea, Prasinophyceae, Ulvophyceae) together represented 9% in marine waters and 10% in offshore waters.

Figure II.60 Quantitative structure of phytoplankton by water typologies



Source: NMRDI

October 2020 was characterized by a reduced development of the phytoplankton community (77.06 · 10^3 cel / L and 197.56 mg / m^3), compared to August 2019 (284.66 · 10^3 cel / L and 516.61 mg / m^3) and September 2018 (109.82 · 10^3 cel / L and 236.27 mg / m^3).

Assessment of the ecological status of water bodies based on the biomass element (mg / m³) in October 2020

In October 2020, phytoplankton biomass values for marine and offshore waters were good ecological condition, in all the analyzed stations (table II.38).

Table II.38 Ecological status of water bodies based on phytoplankton biomass element (mg / m3)

Water body	Profile	Target value (mg / m3)	Obtained value (90th percentile)	Ecological status
Marine waters				
BLK_RO_RG_MT01	Portița	800	468	
	Constanța	800	390	
	Mangalia	800	280	
Offshore waters				
BLK_RO_RG_MT02	Portița	250	133	
	Constanța	250	187	
	Mangalia	250	119	

		Good ecological status	Poor ecological status	

Source: NMRDI

Zooplankton

Microzooplankton

In 2020, the tintinide population in the microzooplankton component was assessed in June. In this sense, 70 samples were analyzed, from the om horizons and the maximum chlorophyll layer (DCM-deep chlorophyll maximum), located along the Romanian coast. In the laboratory, the samples were concentrated to a final volume of 10 ml by repeated sedimentation. The final volume was fully analyzed under the inverted microscope (Olympus XI 51) using magnification factors of 200x and 400x, respectively. During the analyzed period, the tintinide population was characterized by a number of 15 species belonging to 7 genera (table II.39).

Table II.39List of tintinide species identified in June 2020

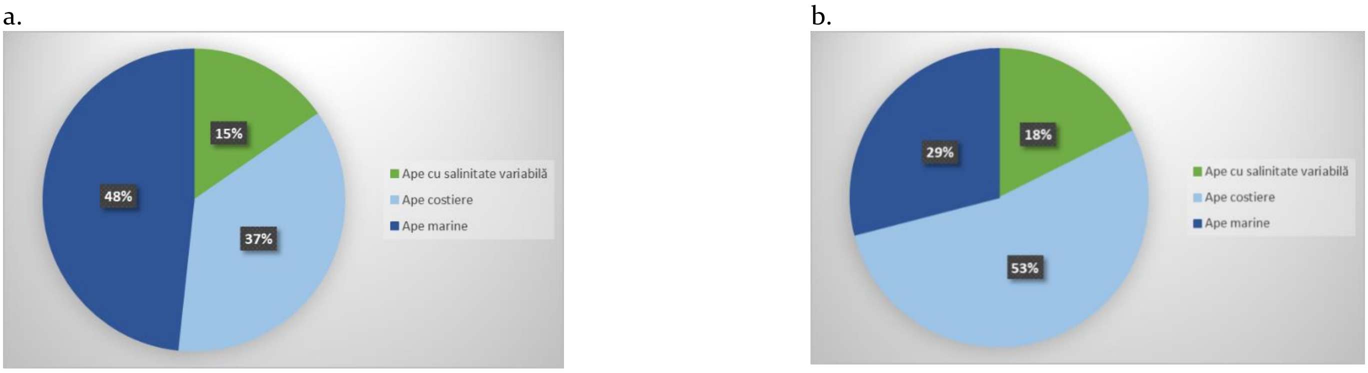
Ordin	Subordin	Familie	Gen	Specie	Ape cu salinitate variabilă	Ape costiere	Ape marine
				Tintinnopsis baltica		+	+
				Tintinnopsis beroidea	+	+	+
				Tintinnopsis campanula	+	+	+
				Tintinnopsis cylindrica	+	+	+
				Tintinnopsis lobiancoi	+	+	
				Tintinnopsis meunieri			+
				Tintinnopsis tocantinensis		+	
		Codonellidae	*Tintinnopsis*	*Tintinnopsis tubulosa*	+	+	+
		Codonellopsidae	*Stenosemella*	*Stenosemella ventricosa*	+	+	+
		Metacylididae	*Metacylis*	*Metacylis mediterranea*	+	+	+
		Ptychocylididae	*Favella*	*Favella ehrenbergii*	+	+	+
				Eutintinnus sp. 1		+	
			Eutintinnus	*Eutintinnus tubulosus*	+	+	+
		Tintinnidae	*Salpingella*	*Salpingella decurlata*		+	
Choreotrichida	Tintinnina	Tintinnidiidae	*Tintinnidium*	*Tintinnidium mucicola*	+	+	

Source: NMRDI

Waters with variable salinity were qualitatively characterized by 10 species of tintinids (table II.39). From a quantitative point of view, the tintinide population in these waters represents 15% and 18% of the density, respectively the total biomass of this component (figure II.61). The species with the highest quantitative representation in these waters is *Favella ehrenbergii* (density 12 ind / L, respectively biomass 0.467 µgC / L).

Figure II.61 Distribution of density (a.) respectively of biomass (b.) of the tintinide population, in June 2020

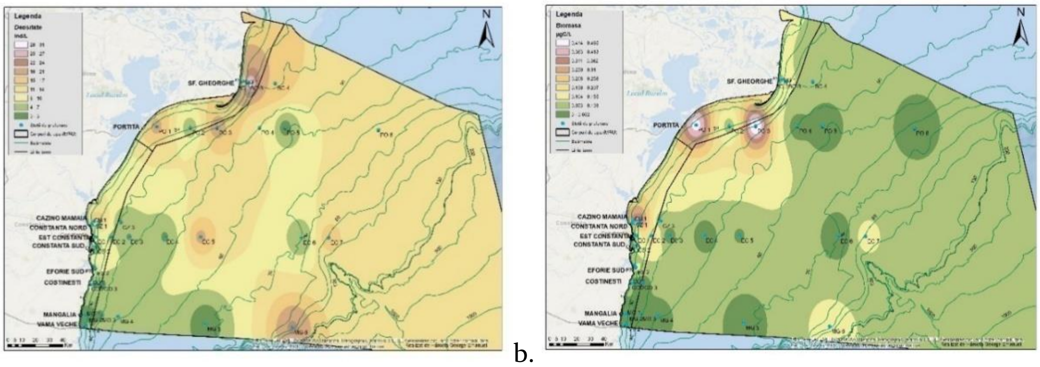
a. b.



Source: NMRDI

The coastal waters were the best represented qualitatively, being characterized by a diversity of 14 species of tintinids. The dominant species in terms of quantity is *Tintinnopsis campanula*, which has density and biomass values of 43 ind / L and 0.497 µgC / L respectively. The proven stations in which tintinides were not identified are MG5 and CO2. The species *Tintinnopsis meunieri, Tintinnopsis tocantinensis and Tintinnidium mucicola* have been identified exclusively in the om horizon.

Figure II.62 Quantitative distribution of the tintinide population (a. Density and b. Biomass)



a. b.

Source: NMRDI

Maximum abundance was recorded at station SG3 (31 ind / L) while maximum biomass was recorded at station CZ2 (0.467 µgC / L) (figure II.62). There is also a trend of increasing densities and biomass of tintinid populations, from south to north of the coast (Figure II.62) and a dominance of native species, as in the previous year.

Conclusions

In June 2020, the population of tintinids from the microzooplankton component was represented by 15 species belonging to the genera: *Tintinnopsis, Stenosemella, Metacylis, Favella, Eutintinnus, Salpingella, respectively Tintinnidium*. From a qualitative point of view, the coastal waters were the best represented, being characterized by 14 species. The species *Tintinnopsis meunieri, Tintinnopsis tocantinensis and Tintinnidium mucicola* were identified exclusively in the om horizon.

Following the quantitative analysis of the tintinid population on the Romanian coast, the highest density was found in marine waters (48%), and the lowest in waters with variable salinity (15%), while the highest biomass of tintinids was recorded in coastal waters (53%).

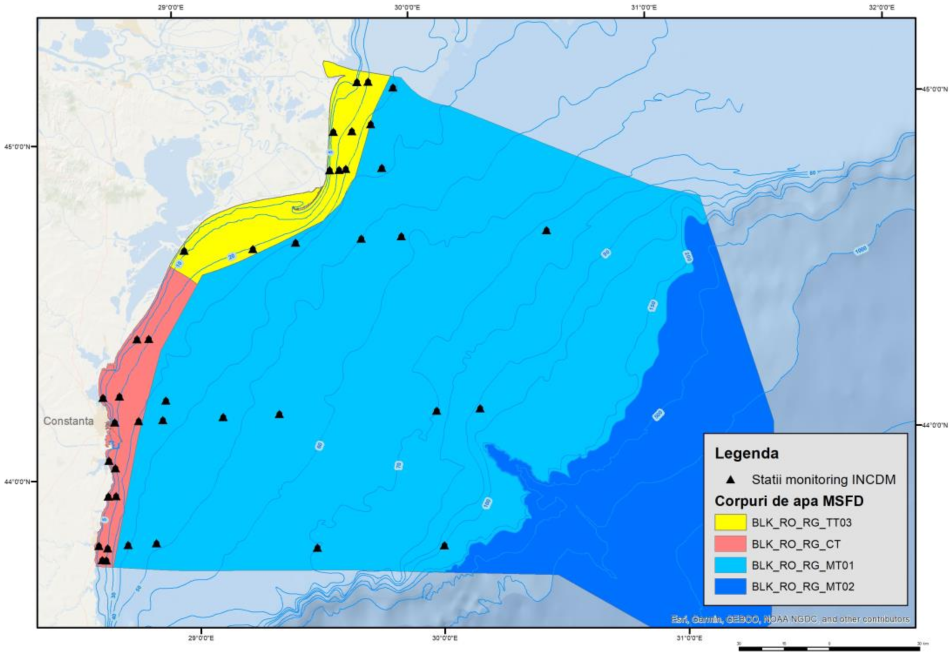
Following the analysis of the dominance of the species on each unit of water, it was observed that the species *Favella ehrenbergii* dominates waters with variable salinity,*Tintinnopsis campanula*is dominant in coastal waters, while the species *Metacylis mediterranea* dominates the marine waters. This situation indicates a dominance of indigenous species, to the detriment of non-indigenous ones, identified in recent years, on the Romanian coast.

The tendency of increasing the densities and biomasses of the tintinid populations, from the south to the north of the Romanian coast, is kept the same as last year.

Mesozooplankton

In order to identify the ecological status of the mesozooplankton populations on the Romanian Black Sea coast, in 2020, within the program for monitoring the state of the marine environment, a set of samples was taken and analyzed. Mesozooplankton samples were collected in June from the network of stations shown in Figure II.63, a network covering the three types of water bodies (with variable salinity, coastal and marine).

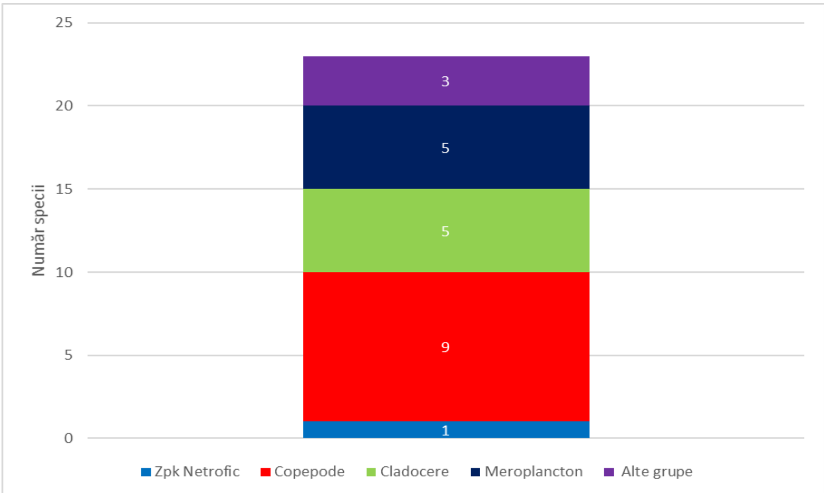
Figure II.63 NMRDI national monitoring network



Source: NMRDI

The qualitative composition of the mesozooplankton population in the summer of 2020 reached a total of 23 species. The dominance of copepods with nine species was noticed, followed by cladoceres and the meroplankton component represented by five species (figure II.64).

Figure II.64 Qualitative composition of mesozooplankton

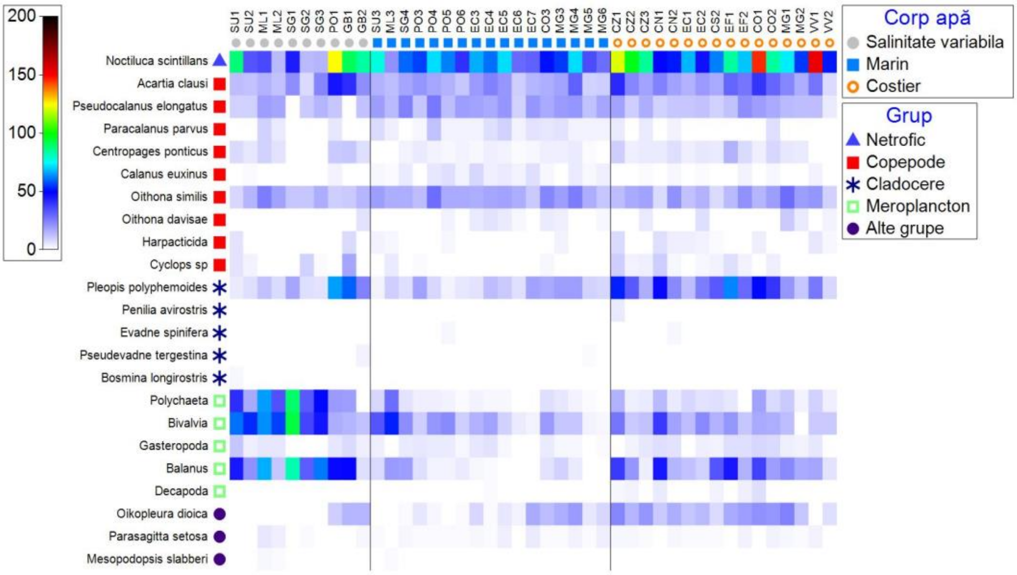


Source: NMRDI

Regarding the quantitative structure of mesozooplankton in the warm season, the highest average densities were recorded by the species *Noctiluca scintillans* -representative of the non-trophic component, with the maximum reached in coastal waters, stations CO1 and VV1. From the group of copepods, *Acartia clausi* recorded the highest values of density, with maximum development in stations PO1 and GB1, in waters with variable salinity. The *Pleopis polyphemoides* cladocer reached the highest density values in PO1 station, in waters with variable salinity and in EF1 station, coastal waters.

The meroplanktonic elements were better represented in the stations in the waters with variable salinity and coastal waters, in the marine waters registering lower values of the average density (figure II.65).

Figure II.65 Mesozooplankton abundance matrix



Source: NMRDI

Unlike waters with variable salinity, marine and coastal waters dominated the non-trophic component of the zooplankton community, with a contribution of 54.97% in marine waters and 58.51% in coastal waters (Table II.40).

Table II.40Contribution of mesozooplankton species for each body of water

Waters with variable salinity					
Species	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Bivalvia	44.81	11.88	1.51	20.1	20.1
Noctiluca scintillans	53.92	11.24	1.44	19.02	39.11
Balanus	41.99	9.87	1.75	16.7	55.81
Polychaeta	36.45	8.14	1.42	13.77	69.58
Acartia clausi	21.18	5.25	2.75	8.88	78.46
Marine waters					
Species	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Noctiluca scintillans	51.63	25.39	3.52	36.12	36.12
Oithona similis	17.67	9.69	4.93	13.79	49.91
Pseudocalanus elongatus	17.67	9.59	4.45	13.65	63.56
Acartia clausi	16.01	7.92	5.74	11.27	74.83
Coastal waters					
Species	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Noctiluca scintillans	80.73	26.26	4.66	36.72	36.72
Pleopis polyphemoides	30.25	8.32	2.64	11.64	48.36
Acartia clausi	23.29	7.43	4.47	10.39	58.75
Balanus	21.92	5.66	1.98	7.92	66.67
Oithona similis	15.72	5.29	2.58	7.4	74.07

Source: NMRDI

Table II.41The contribution of trophic and non-trophic zooplankton for each body of water

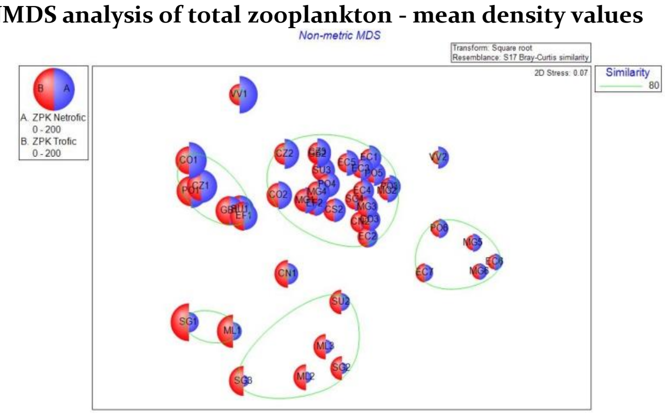
Waters with variable salinity					
Category	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Trophic zooplankton	89.08	50.45	3.88	71.27	71.27
Marine waters					
Category	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Zooplankton nontrophic	51.86	44.31	3.9	54.97	54.97
Trophic zooplankton	39.95	36.3	6.62	45.03	100

Coastal waters					
Category	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Zooplankton nontrophic	80.73	45.91	5.37	58.51	58.51
Trophic zooplankton	56.83	32.55	3.86	41.49	100

Source: NMRDI

The two-dimensional NMDS analysis for the average values of total zooplankton density (non-trophic and trophic) indicates an 80% similarity between the analyzed stations. A distinction is made between station VV1, where the highest density value was recorded for non-trophic zooplankton and VV2 where trophic zooplankton reached the lowest values of average density (figure II.66).

Figure II.66 Two-dimensional NMDS analysis of total zooplankton - mean density values



Source: NMRDI

The zooplankton trophic component was best represented by meroplankton (60.44%) and copepods in waters with variable salinity. In marine waters, copepods were best represented (59.75%), followed by the meroplankton component. In the marine waters, the dominance of copepods, meroplankton and cladocerans was noted (table II.42).

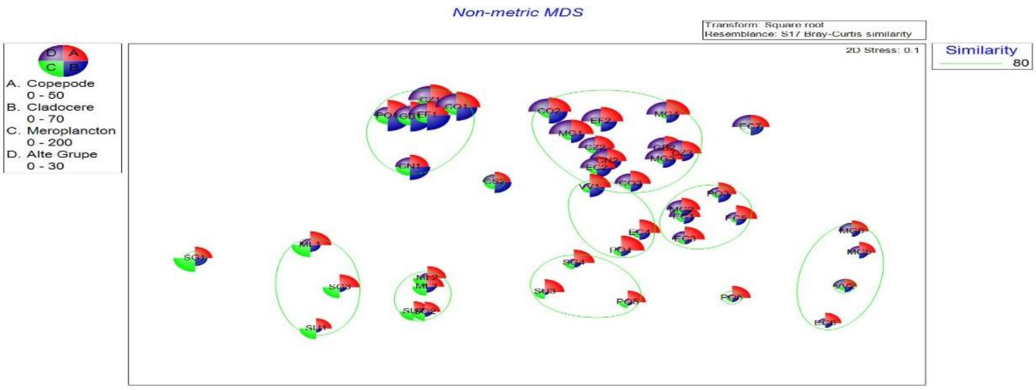
Table II.42The contribution of trophic zooplankton for each body of water

Waters with variable salinity					
Group	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Meroplankton	74.69	40.93	2.29	60.44	60.44
Copepods	30.78	19.15	4.39	28.27	88.71
Marine waters					
Group	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Copepods	31	42.19	6.06	59.75	59.75
Meroplankton	17.77	13.98	1.39	19.8	79.54
Coastal waters					
Group	Medium density	Sim average	Sim / SD	Contrib%	Cum.%
Copepods	32.71	25.49	4.13	34.34	34.34
Meroplankton	29.44	19.82	4.31	26.7	61.04
Cladocerans	30.26	18.71	2.91	25.21	86.25

Source: NMRDI

Two-dimensional NMDS analysis for mean trophic zooplankton density values indicates an 80% similarity between the analyzed stations. There are SG1 stations where the highest average density value for the meroplankton component was recorded, EC7 where the meroplankton reached the lowest values, PO6 where cladocerans, meroplankton and other groups were very poorly represented (**Error! Reference source not found.**II.67).

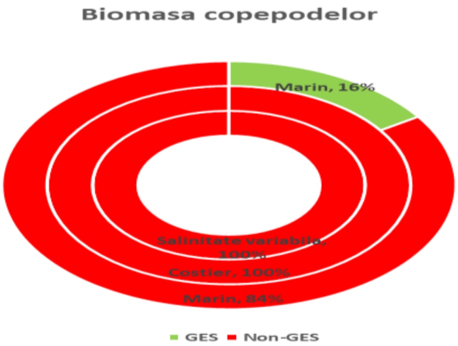
Figure II.67 Two-dimensional NMDS analysis of trophic zooplankton - mean density values



Source: NMRDI

Thus, in the case of the indicator "Biomass of copepods" no values were registered above the threshold of good ecological status, the poor ecological status being reached in proportion of 100% in waters with variable salinity and in coastal waters and 84% in marine waters (figure II. 68).

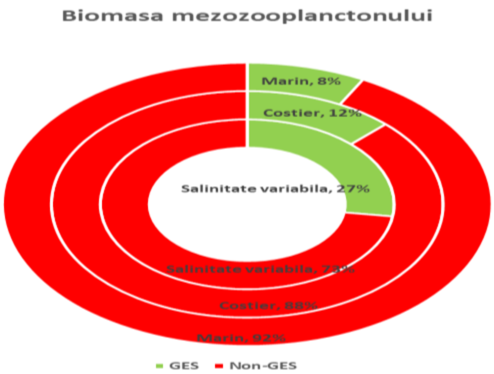
Figure II.68 Ecological status of water bodies based on the indicator "Biomass of copepods"



Source: NMRDI

In the case of the "Mesozooplankton biomass" indicator, good ecological status was not achieved in any of the three water bodies. In waters with variable salinity, the ecological status has been reached in a proportion of 73%, in coastal waters in a proportion of 88%, and in marine waters a percentage of 92% has been reached, which classifies the body of water in a poor ecological state.(figure II.69).

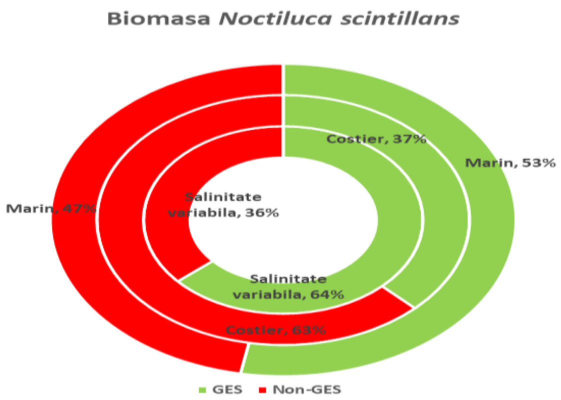
Figure II.69 Ecological status of water bodies based on the indicator "Mesozooplankton biomass"



Source: NMRDI

In the case of the indicator "Biomass *Noctiluca scintillans*", the good ecological status was reached in proportion of 64% in waters with variable salinity and 53% in marine waters (figure II.70). In coastal waters, the good ecological status for this indicator was not achieved, being registered a percentage of 63% for Non-GHG, framing coastal waters in poor ecological status.

Figure II.70 Ecological status of water bodies based on the indicator "Biomass Noctiluca scintillans"



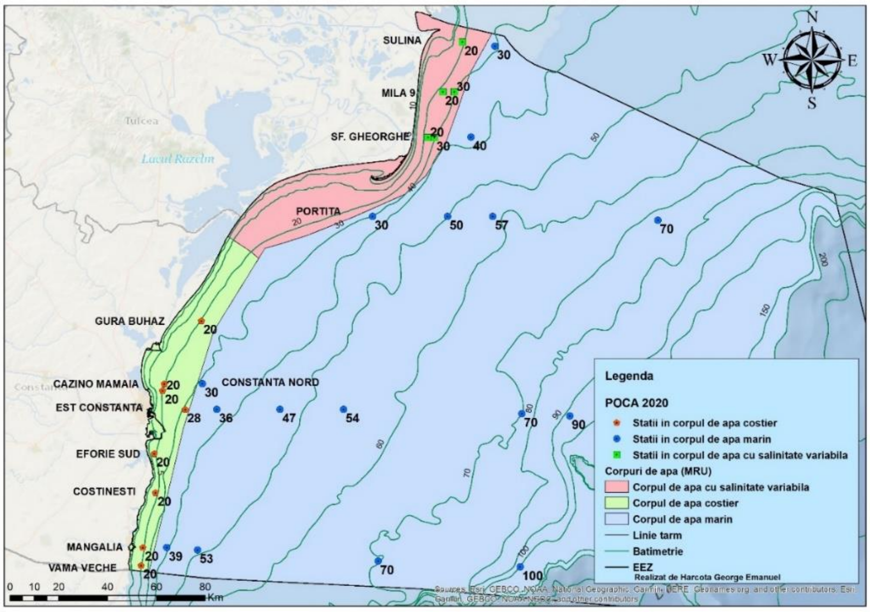
Source: NMRDI

Conclusions
From a qualitative point of view, mesozooplankton in 2020 was represented by a total number of 23 species, dominated by copepods, cladocerans and meroplankton.
In waters with variable salinity, Bivalvia contributed with 20.1%, followed by the mesoozooplanktonic neutrophic component, with 19.02%.
Noctiluca scintillans was the main contributor of the community in marine and coastal waters, but not in waters with variable salinity, where it dominated the Bivalvia.
In marine waters, *Noctiluca scintillans* reaches the largest contribution (36.12%), being followed by species from the group of copepods, *Oithona similis* and *Pseudocalanus elongatus* being representative.
In coastal waters, *Noctiluca scintillans* again reaches the largest contribution (36.72%), followed by the cladocerus *Pleopis polyphemoides* (11.64%).
The quantitative structure of the mesozooplankton community was characterized by the trophic component in waters with variable salinity. Unlike waters with variable salinity, marine and coastal waters dominated the non-trophic component of the zooplankton community, with a contribution of 54.97% in marine waters and 58.51% in coastal waters.
The zooplankton trophic component was best represented by meroplankton and copepods in waters with variable salinity. Copepods were also well represented in coastal waters, followed by the meroplankton component. In the marine waters, the dominance of copepods, meroplankton, but also of cladocerans was noticed again.
Analyzing the ecological status of water bodies, it was observed that in the hot season, the indicators "Biomass of copepods" and "Biomass of mesozooplankton" reached values that frame all three water bodies in poor ecological status.
For the indicator "*Noctiluca scintillans* biomass ", the good ecological status was reached in the waters with variable salinity and in the marine ones, the coastal waters being characterized by a bad ecological status.

Macrozooplankton

In order to determine the condition of the macrozooplankton populations, an expedition was carried out in June 2020, taking a number of 29 samples from the Romanian continental shelf(figure II.71). Four macrozooplankton species were identified in this expedition: the scyphozoan *Aurelia aurita* and the ctenophores *Pleurobrachia pileus, Mnemiopsis leidyi and Beroe ovata.*

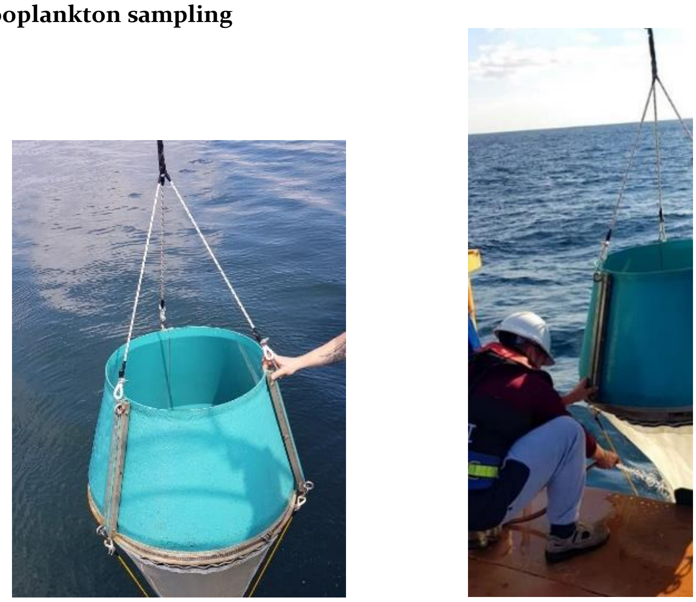
Figure II.71 Network of macrozooplankton sampling stations, June 2020



Source: NMRDI

For the Romanian coast, the sampling of macrozooplankton samples was performed with the Hansen type net with a diameter of 70 cm and the sieve eye of 300 µm (figure II.72). The biological material was obtained by towing the net vertically in the water mass (from 2 m above the seabed to the surface), at low speed (0.5-1 m / s), in order to prevent damage to gelatinous organisms or clogging the sieve. After collection, the fillet was lightly washed with seawater to remove organisms or mucus from them.

Figure II.72 Hansen net for macrozooplankton sampling



Source: NMRDI

In the case of small specimens, a checkered Petri dish filled with water is used, in which the bodies are suspended, to allow their measurement without the occurrence of body deformation.

The density and wet biomass of gelatinous organisms was expressed in ind./m³ and g / m³, respectively. The calculation of these parameters is performed according to the recommendations of the Gelatinous Plankton Monitoring Guide (Shiganova TA, 2015) (table II.43).

Table II.43 Formulas used to calculate the wet weight of organisms

Species	GU (mg)	Reference
Aurelia aurita	**GU** =0.053 · D 2.98	-
Pleurobrachia pileus	**GU** =0.682 L 2.52	Mutlu, 1994; Anninsky, 1994
Mnemiopsis leidyi	GU(L <45mm) (total length) = 3,100 · L ^ 2.22 GU(L≥45mm) (total length) = 3,800 · L ^ 2.22	Vinogradov et al., 2000
Beroe ovata	**GU** =0.85 L 2.47	Finenko et al., 2003; Anninsky et al., 2005

* **GU**- wet weight

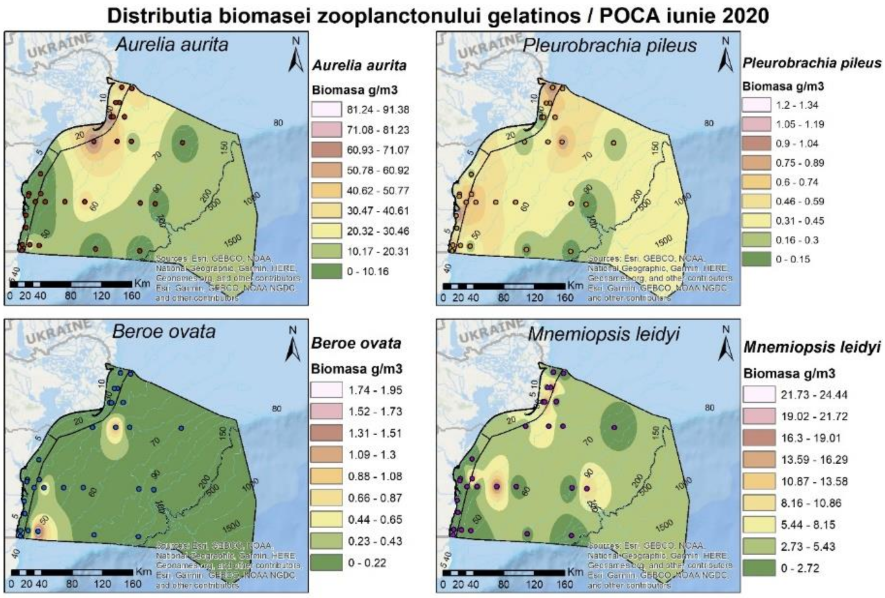
Source: NMRDI

In July, in all three areas analyzed (coastal, variable salinity and marine), the species Aurelia aurita was dominant in terms of biomass values, due to its large size. With a spread over the entire continental shelf, in coastal waters the species *Aurelia aurita* reached a maximum biomass of 0.78 g / m^3, followed by the species *Pleurobrachia pileus* with a biomass value of 0.68 g / m^3. The species *Mnemiopsis leidyi* and *Beroe ovata* were not found in the analyzed samples.

In waters with variable salinity, the highest value of biomass was reached by the species *Aurelia aurita* with 45.14 g / m^3, followed by the species *Mnemiopsis leidyi* with 9.51 g / m^3, and the lowest, *Pleurobrachia pileus* with the value of biomass of 2.10 g / m^3. The species *Beroe ovata* was absent in the analyzed samples in this area.

In marine waters, the species *Aurelia aurita* reached the maximum biomass value of 19.34 g / m^3, the species *Mnemiopsis leidyi* - 0.39 g / m^3, followed by *Pleurobrachia pileus* with 0.37 g / m^3. The lowest biomass value was recorded by *Beroe ovata* 0.25 g / m^3 (figure II.73 and table II.44).

Figure II.73 Distribution of biomass values of gelatinous zooplankton species



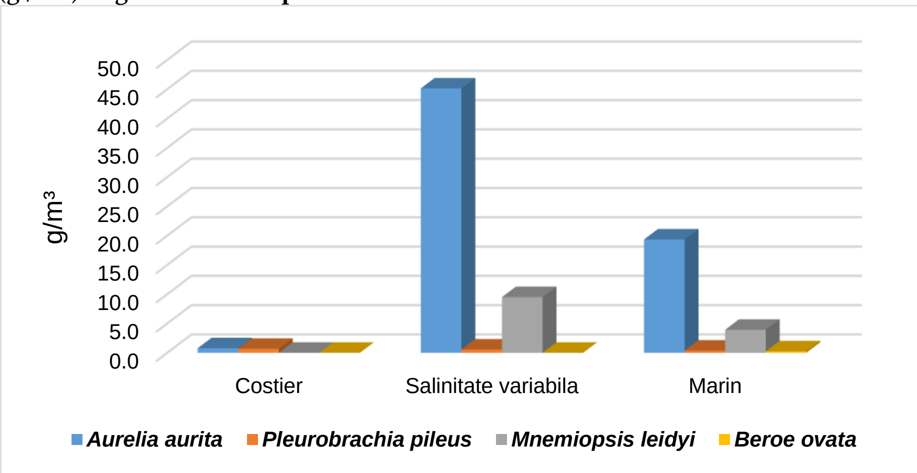
Source: NMRDI

Table II.44 Average biomass (g / m^3) of gelatinous zooplankton in the analyzed areas

Species / Body of water	Coastal waters	Waters with variable salinity	Marine waters
Aurelia aurita	0.78	45.14	19.34
Pleurobrachia pileus	0.68	0.55	0.37
Mnemiopsis leidyi	0.00	9.51	3.93
Beroe ovata	0.00	0.00	0.25

Source: NMRDI

Figure II.74 Biomass (g / m³) of gelatinous zooplankton



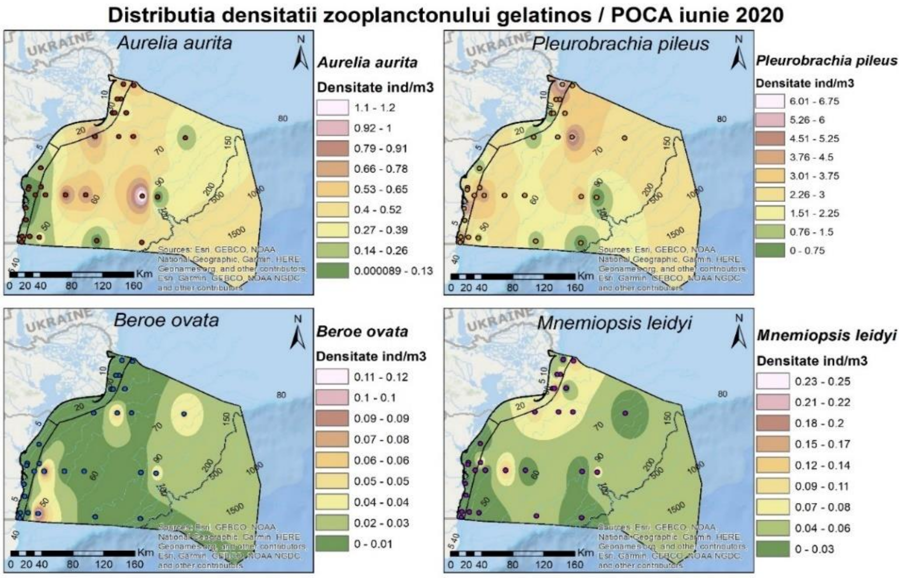
Source: NMRDI

In coastal waters, the species *Pleurobrachia pileus*, reached the maximum density value of 3.34 ind / m³, followed by the species *Aurelia aurita* registering 0.09 ind / m³. The species *Mnemiopsis leidyi* and *Beroe ovata* were not identified in the analyzed samples (figures II.74, II.75 and II.76 and table II.44).

In waters with variable salinity, the species *Pleurobrachia pileus* reached the maximum density value of 2.55 ind / m³, followed by *Aurelia aurita* with 0.49 ind / m³, and the lowest density value was 0.08 ind / m³ for *Mnemiopsis leidyi* (Figures II.74, II.75 and II.76 and Table II.45).

In marine waters, *Pleurobrachia pileus* reached a maximum density of 2.33 ind / m³, followed by *Aurelia aurita* - 0.45 ind / m³, *Mnemiopsis leidyi* - 0.04ind / m³ and *Beroe ovata* - 0.02 ind / m³ (figures II.74 and II.75).

Figure II.75 Distribution of gelatinous zooplankton species density values



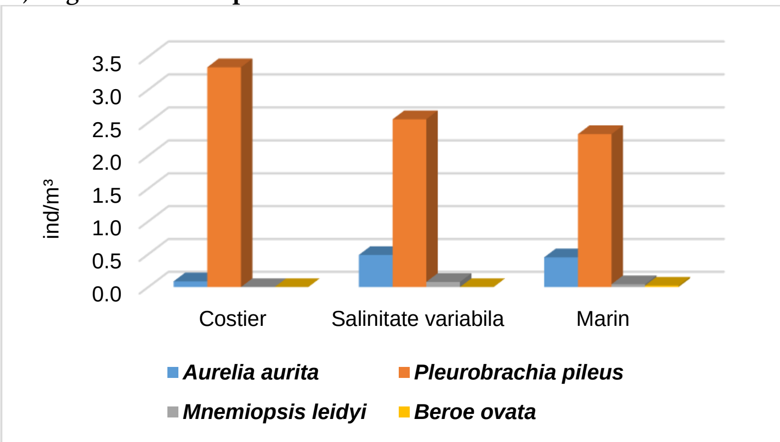
Source: NMRDI

Table II.45 Average density (ind / m³) of gelatinous zooplankton

Species / Body of water	Coastal waters	Waters with variable salinity	Marine waters
Aurelia aurita	0.09	0.49	0.45
Pleurobrachia pileus	3.34	2.55	2.33
Mnemiopsis leidyi	0.00	0.08	0.04
Beroe ovata	0.00	0.00	0.02

Source: NMRDI

Figure II.76 Density (ind / m³) of gelatinous zooplankton



Source: NMRDI

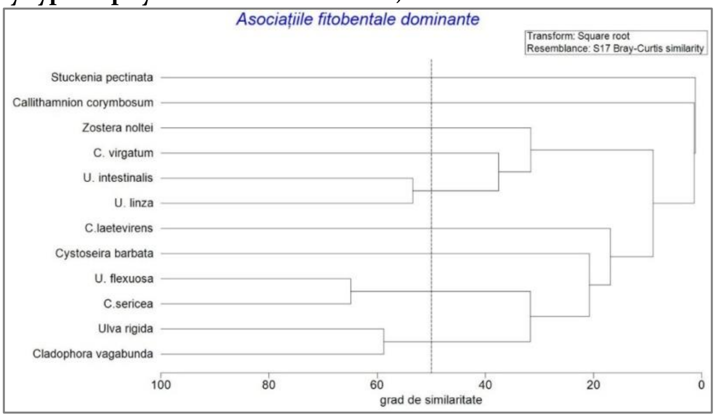
The low values and density of the ctenophore *Beroe ovata* directly influence the species *Mnemiopsis leidyi*, which spreads and records high values of biomass, this indicating a high consumption of zooplankton, eggs and fish larvae, the main food of this species. .

Conclusions
The gelatinous zooplankton community was represented in 2020 by four species: the the scyphozoan *Aurelia aurita* and the ctenophores *Pleurobrachia pileus, Mnemiopsis leidyi* and *Beroe ovata*.
In all three water bodies evaluated, the species *Aurelia aurita* was dominant in terms of biomass.
The spatial distribution of the density of the species *Pleurobrachia pileus* registered high values along the Romanian continental platform of the Black Sea, being dominant in terms of density values.
The ctenophore *Mnemiopsis leidyi* was present on the entire analyzed surface, and the high values of density were concentrated in the north of the Romanian continental shelf at depths between 20 and 40 m.
The ctenophore *Beroe ovata* was poorly represented in terms of density, being present only in the marine area.

Phytobenthos

In 2020, the phytobental communities were analyzed both qualitatively and quantitatively, based on 99 samples collected from the infralittoral area (coastal area from Năvodari to Vama Veche). The priority habitats were analyzed *Infralittoral rock* and *biogenic reefs and infralittoral muds*, with the related sub-types: the habitat with *Cystoseira* and the habitat with *Zostera*.
During the warm season, the dominance of the photophilic association *Ulva - Cladophora - Ceramium* was maintained, consisting exclusively of opportunistic species generating algal deposits (figure II.77).

Figure II.77 Bray-Curtis similarity by type of phytobental associations, 2020

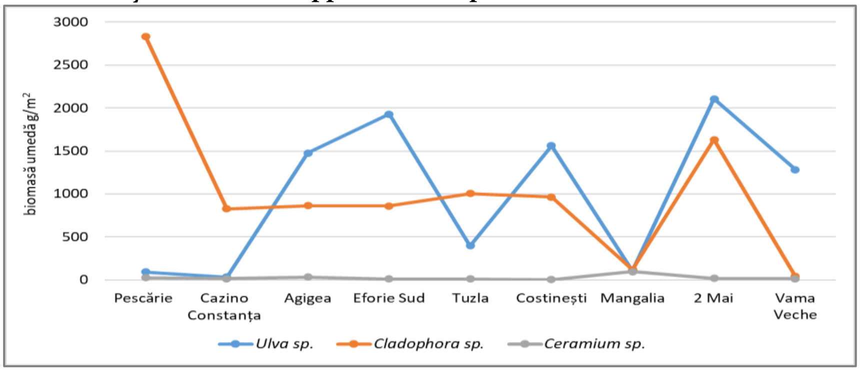


Source: NMRDI

The biomass maximums developed in 2020 by opportunistic species were higher compared to those of summer 2019, as follows:

- *Ulva* species presented a maximum of wet biomass on May 2 (2100 g / m2), within the association *Cystoseira barbata* - *Ulva rigida*, characteristic of the southern extremity of the Romanian coast;
- *Cladophora* species showed a more abundant quantitative development compared to summer 2019, with a maximum of biomass in the Fisheries area (2800 g / m2);
- among rhodophytes, the *Ceramium* species were the ones that developed more intensely in 2020, but the biomass values were very low compared to the other opportunistic species, with a maximum of 100 g / m² in Mangalia (figure II.78).

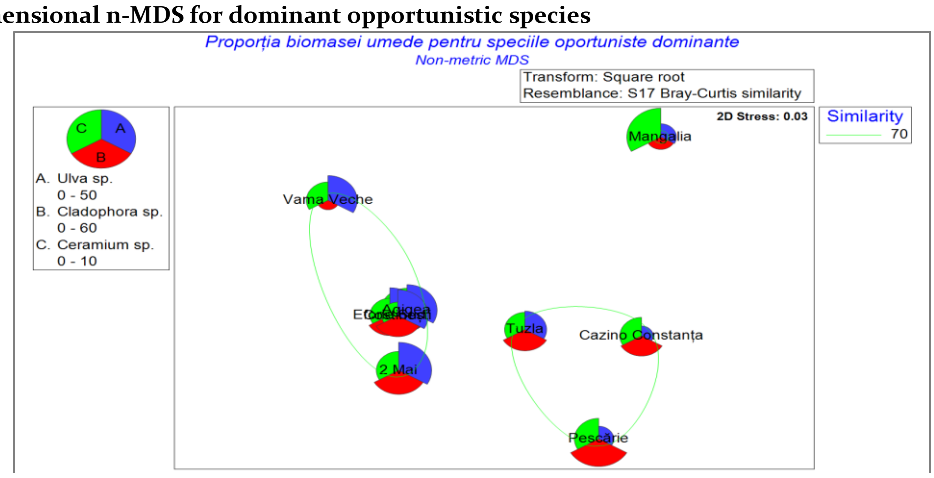
Figure II.78 Quantitative variability of dominant opportunistic species



Source: NMRDI

The constancy of these species was noticed at the level of all monitored stations in summer 2020, with similar biomass values. The Mangalia area stands out in this series of similarities, where the monitoring process focused on the two special habitats, namely the habitat with *Cystoseira* and the habitat with *Zostera*, and the opportunistic species presented here much lower biomass compared to other areas. Regarding the proportion of biomass of these species at the level of each station, there is a clear dominance of chlorophytes in most areas, except Mangalia station, where red algae of the genus *Ceramium* were dominant (figure II.79).

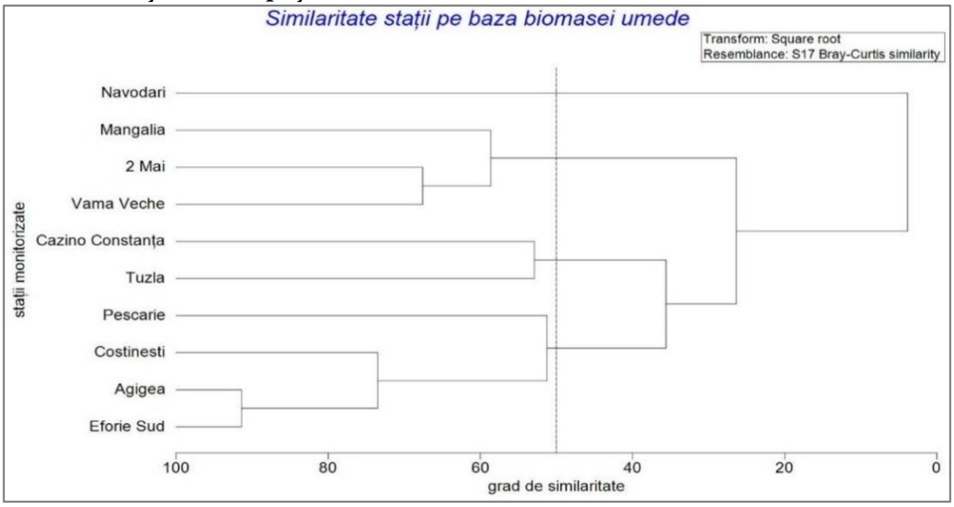
Figure II.79 two-dimensional n-MDS for dominant opportunistic species



Source: NMRDI

Regarding the degree of similarity between stations based on the type of dominant algal associations and wet biomass values, a high similarity was observed between Agigea, Eforie Sud and Costinești stations, as well as between Tuzla and Casino Constanța (figure II.80), due to the dominance of the photophilous association characteristic of the summer season *Ulva* - *Cladophora* - *Ceramium* and the uniformity of the algal structure in these areas. There is also a high similarity between the extreme southern areas of Mangalia - 2 Mai - Vama Veche, due to the dominance of the phytobental association *Cystoseira barbata* - *Ulva rigida*.

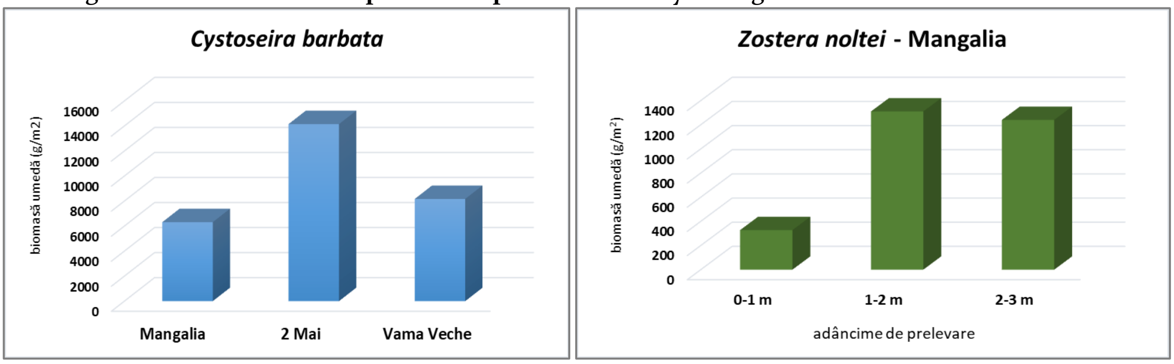
Figure II.80 Bray-Curtis similarity in macrophyte biomass



Source: NMRDI

Cystoseira barbata forms well-developed fields to the south of the coast, with high average biomasses, which varied in 2020 between 6300 and 14000 g / m² (maximum value recorded in the area of May 2) (figure II.81 a), slightly higher compared to 2019. Fanerogama marine *Zostera noltei* maintained its distribution area at Mangalia between 1 and 3 m deep, with average biomasses ranging between 330 -1300 g / m² (figure II.81b), slightly lower compared to 2019.

Figure II.81 Average biomass variation for perennial species with a key ecological role



a) *Cystoseira barbata* b) Zostera noltei

Source: NMRDI

For 2020, the ecological assessment of the two priority habitat types *Infralittoral rock* and *biogenic reefs* and *infralittoral sands* showed that they did not reach good ecological status. On the other hand, the special habitats, both the one with *Cystoseira* (part of the main habitat *Infralitoral rock and biogenic reefs*), and the one with *Zostera* (part of the main habitat *Infralittoral sands*) were in a good ecological state. It should be mentioned, however, that these habitats have a fragmentary distribution on the Romanian coast, retreating to the southern part of the coast, extremely sensitive to anthropogenic activities (Table II.46).

Table II.46 Ecological status of priority habitats and special habitats

Marine Reporting Unit	Habitat	GHG target value	Value achieved for 2020	Ecological status
BLK_RO_RG_CT Coastal waters	Infralittoral rock and biogenic reefs	EI ≥ 6	2.05	**non - GES**
	Infralittoral sands		4.85	**non-GES**
	Habitat with Zostera		7.92	**GES**
	Habitat with Cystoseira		7.79	**GES**

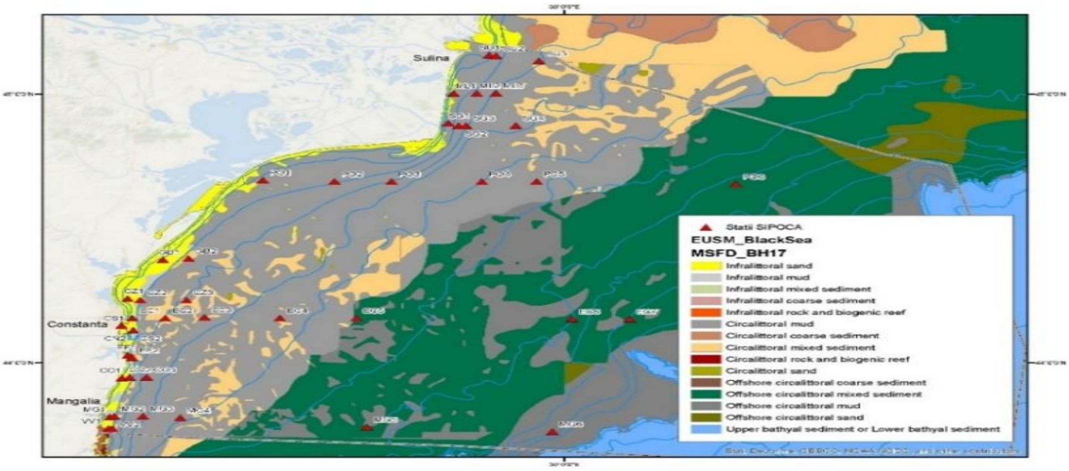
Source: NMRDI

Conclusions
During the summer season 2020, the clear dominance of green algae of the genera *Ulva and Cladophora* was noticed, the red algae having a much lower quantitative development.
Priority habitats *Infralittoral rock and biogenic reefs* and *infralittoral sands* did not reach good ecological status in 2020.
The two sub-types of habitats with a key ecological role, the habitat with *Cystoseira* and the habitat with *Zostera* were in a good ecological status (GHG) according to the DCSMM criteria.

Zoobenthos

In 2020, the macrozoobenthos was monitored on the entire Romanian continental shelf. From the monitoring network, which includes 43 stations (figure II.82), 22 stations were selected from which 56 samples were taken.

Figure II.82 Map of monitoring stations superimposed over the main habitat types according to DCSMM

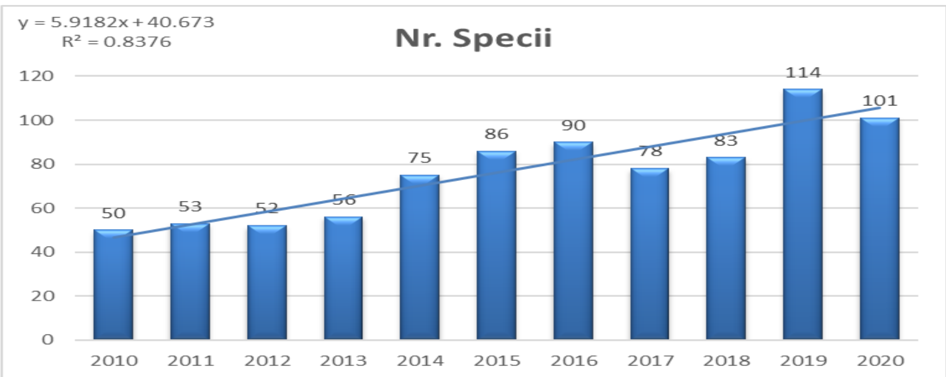


Source: NMRDI

Following the processing of the samples, 101 zoobenthhic species were identified, the number of species being close to the one registered in 2019, the highest in the period 2010-2020 (figure II.83).
The distribution of the species identified by the marine reporting units was as follows:

- 36 species in waters with variable salinity;
- 49 species in coastal waters;
- in marine waters, there are two circalitoral subunits: the circalitoral with variable environmental conditions depending on the season and the deep circalitoral.

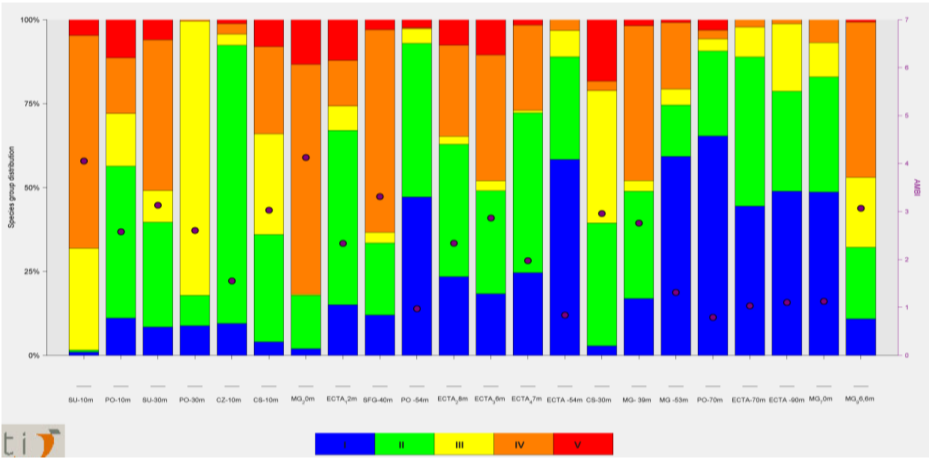
Figure II.83 Variation in the number of zoobenthic species identified during 2010-2020



Source: NMRDI

The distribution of macrozoobenthic species by ecological groups in the analyzed stations is as follows: in waters with variable salinity, both species indifferent to the content of organic matter and those tolerant to high concentrations of organic matter in sediments predominate, except for the SU1 station, where most species are opportunistic. The number of species sensitive to organic matter concentrations in sediments increased with depth, the largest proportions being found in the circalittoral community (30-54m depth) and in the *Modiolula - Terebellides* community on deep circalitoral mixed sediments. Also in this community are found many species indifferent to the concentrations of organic matter (figure II.84).

Figure II.84 Distribution by ecological groups of species identified in 2020



Source: NMRDI

The ecological status of macrozoobenthos was assessed by applying the M-AMBI index * (n) (Sigovini et al., 2013; Todorova et al., 2018; Abaza et al., 2018). In the northern stations, located in waters with variable salinity, the *Heteromastus-Alitta* community was in a good ecological state. However, the small number of samples taken (six samples taken from two stations) does not allow to state with certainty that the entire community in the area is in a good ecological condition (Table II.47).

Table II.47Ecological status of benthic communities in 2020

Marine reporting unit	Habitat *)	Station / Maximum depth	Threshold value	M-AMBI * (n)	EQR M-AMBI
Waters with variable salinity	ml	SU1-10m	M-AMBI * (n) ≥0.61 EQR≥0.68	0.96	1.06
	ml	PO1-10m		1.02	1.13
Coastal waters	MC	CO3-30m	M-AMBI * (n) ≥0.66 EQR≥0.68	0.89	0.91
	MC	MG2-20m		0.65	0.67
	us	CZ1-10m		1.01	1.04
	us	EC1-12m		0.95	0.98
	us	CO1-10m		0.78	0.81
	SMC	EC2-28m		1.05	1.08
Marine waters	MC	PO3-30m	M-AMBI * (n) ≥0.68 EQR≥0.68	0.55	0.55
	MC	PO5-54m		1.09	1.09
	MC	MG3-39m		0.93	0.93
	MC	MG4-53m		1.18	1.18
	SMC	SU3-30m		0.99	0.99
	SMC	SG4-40m		1.02	1.02
	SMC	EC3-36m		0.91	0.91
	SMC	EC4-47m		0.88	0.88
	SMC	EC5-54m		1.22	1.22
	mWS	MG6-100m	M-AMBI * (n) ≥0.64 EQR≥0.68	0.83	0.92
	SMCA	PO6-70m		1.04	1.16
	SMCA	EC6-70m		0.85	0.94
	SMCA	EC7-90m		0.88	0.98

	SMCA	MG5-70m		1.18	1.31

**)Infralittoral MI; NI-infralittoral sand; MC- circalitoral mud; SMC-mixed circulatory sediments; Deep circulatory MCA; SMCA-mixed deep circulatory sediments*

Source: NMRDI

There were 14 stations in the marine waters. Of these, nine stations were arranged in the ring road and five in the deep ring road. The ecological status of the benthic communities was poor only in the PO3 station. In all other stations, the value of the M-AMBI index * (n) exceeded the threshold value.

Conclusions

The evaluation of macrozoobenthic communities in 2020, based on 56 samples, resulted in the following conclusions:

- 101 species have been identified. The diversity in 2020 was comparable to that in 2019. The trend in the period 2010-2020 was increasing.
- Samples were taken and analyzed from six types of sedimentary habitats and from the three marine reporting units, according to DCSMM.
- The identified habitats were dominated by diverse communities consisting mainly of polychaetes, bivalves and crustaceans.
- The ecological status of macrozoobenthos was assessed by applying the M-AMBI index * (n). Following the evaluation, if we refer to the types of waters, we can say that the ecological status of the zoobenthic communities in all three marine reporting units is good. This statement should be treated with some caution in the case of waters with variable salinity, due to the small number of samples analyzed.
- If we analyze at the habitat level, 33% of the stations arranged in the habitat with circulatory muds were in a bad ecological state. If the principle of proportions is applied, less than 75% of the stations are in a good ecological state, which means that the whole community is in a bad ecological state.

Living marine resources

One of the main objectives in the management and conservation of marine and coastal ecosystems is to preserve the composition of the species and the natural abundance of the fish community. Studies conducted to analyze the composition of ichthyofauna in recent years have shown a slight increase in the number of species observed on the Romanian Black Sea coast (Table II.48).

Table II.48 Ecological indicators regarding the composition of ichthyofauna, period 2017-2020

	2017	2018	2019	2020
Species richness	36	43	44	46
Dominant species	9	7	7	6
Constant species	10	8	8	6
Rare species	4	7	8	10

Source: NMRDI

Although the number of species constantly observed in the analyzed samples decreased, the appearance of rare species had a slight upward trend. In 2020, a total of 46 species were identified (Table II.49).

Table II.49 Systematic distribution of ichthyofauna species, 2017-2020

The family	Species	Popular name (Romanian)
Acipenseridae	*Acipenser gueldenstaedti*	nisetru
	Acipenser stellatus	păstrugă
	Spindle spindle	morun
Atherinidae	*Atherina hepsetus*	aterina mare
Belonidae	*Belonebelone*	zărgan
Blenniidae	*Coryphoblennius galerita*	cocoșel de mare
Callionymidae	*Callionymus pusillus*	șoricel de mare
Carangidae	*Trachurus mediterraneus*	stavrid
Centracanthidae	*Spicara smaris*	smarid
Clupeidae	*Sprattus sprattus*	șprot
	Alosa immaculata	scrumbie de Dunăre

	Alosa tanaica	rizeafcă
	Clupeonella cultriventris	gingirică
Engraulidae	*Engraulis encrasicolus*	hamsie
Gadidae	*Merlangius merlangus*	bacaliar
	Gaidropsarus mediterraneus	galea
Gasterosteidae	*Gasterosteus aculeatus*	ghidrin
Gobiidae	*Neogobius melanostomus*	strunghil
	Mesogobius batrachocephalus	hanus
	Gobius niger	guvid negru
	Pomatoschistus marmoratus	guvid de nisip
Labridae	*Ctenolabrus rupestris*	lapina
Moronidae	*Dicentrarchus labrax*	lup de mare
Mugilidae	*Mugil cephalus*	laban
	Chelon auratus	chefal auriu
Mullidae	*Mullus barbatus*	barbun
Ophididae	*Ophidionrochei*	cordeluță
Pleuronectidae	*Platichthysflesus*	cambulă
Pomatomidae	*Pomatomus saltatrix*	lufar
Rajidae	*Rajaclavata*	vulpe de mare
	Dasyatis pastinaca	pisică de mare
Sciaenidae	*Umbrina cirrosa*	milacop
	Sciaena umbra	corb de mare
Scombridae	*Sardinian Sardinian*	pălămidă
Scophthalmidae	*Scophthalmus maeoticus*	calcan
Scorpaenidae	*Scorpaena porcus*	scorpie de mare
Serranidae	*Serranus cabrilla*	biban de mare
Soleidae	*Pegusa nasuta*	limbă de mare
Sparidae	*Boops boops*	gupă
Squalidae	*Squalus acanthias*	rechin
Syngnathinae	*Syngnathus variegatus*	ac de mare
	Syngnathus typhle	ac de mare
	Hippocampus guttulatus	căluț de mare
Trachinidae	*Trachinus draco*	dragon
Triglidae	*Chelidonichthys lucerna*	rândunica de mare
Uranoscopidae	*Uranoscopus scaber*	bou de mare

Source: NMRDI

The dominant species were: anchovy, buckthorn, horse mackerel, sprat, cod and groundnog, with slight variations from month to month. Using sampling tools and techniques as diverse as possible, the composition by species in the expeditions organized in 2020 was very diverse (figure II.85).

Figure II.85 Species caught in expeditions organized in 2020


Source: NMRDI

The direct effects of fishing on ichthyofauna can also have indirect implications for other species: it can eliminate the prey that fish species above the food chain, but also the birds and marine mammals, could consume, or it could eliminate predators that would otherwise control other populations of species, thus affecting competitive interactions and lead to the proliferation of non-target species (Maureaud et al., 2019); around 40% of the world's fish catches are unintentional, with some of the fish being thrown back into the sea, dead or seriously injured (Davies et al., 2009).

Marine mammals

To assess the condition of dolphin populations, in 2020, monitoring activities were carried out both at sea, on board ships, boats or on oil rigs, and from the shore of the sea and dams.
The surveillance activities took place between April and November, the covered area was from the sea shore to almost 100 m isobath (covered area approx. 24700 km2) and materialized with the inventory of dolphins stranded at the seaside, respectively live dolphins in the supervised area (Table II.50).

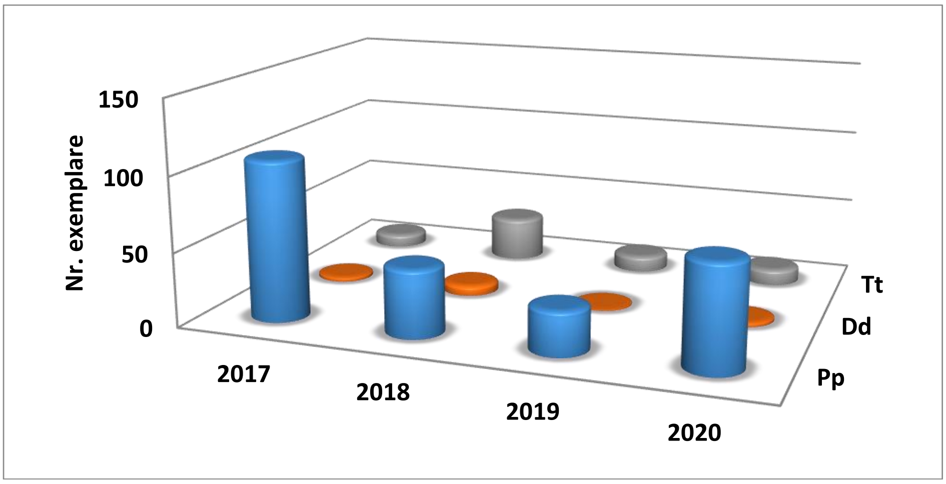
Table II.50 Observations on the distribution of dolphins in the Romanian marine sector in 2020

species	Observation mode	Number of individuals	Distribution comments
Tursiops truncatus	Failures	11	According to observations, the species has been reported to depths of 100 m. It is a common species in the Mediterranean Sea and Black Sea. Nectonic species, predominantly bentophagous, approaches the shore area, especially in spring. It is found in small groups of 4-10 individuals, above the continental slope, and groups larger than 25 specimens are common in large areas.
	Boat	68	
	Vessel	71	
	Oil platform	4	
	Shore	91	
Delphinus delphis	Failures	3	According to observations, the species has been reported to depths of 100 m, more often up to 70 m. It can form large flocks, crowding in places of concentration of fish. At the level of the entire Black Sea basin, it performs regular migrations, being related to the seasonal change of food. In winter, dolphins are kept off the coast of Georgia and the SW coast of Crimea, in the wintering grounds of anchovies, and in summer they move to the NW part of the sea, where sprat herds are camped.
	Boat	22	
	Vessel	105	
	Oil platform	3	
	Shore	0	
Phocoena phocoena	Failures	71	According to observations, the species has been reported to depths of 100 m. Species found in the Black Sea and the Sea of Azov. It lives alone or in small groups of 8-10 individuals, sometimes in larger concentrations, in which a clear separation by sex is observed. They swim along the coast and it is very difficult to get close to them and they never play in the bow of ships. In November and December they are found near the mouths of the Danube Delta. Scattered groups of Phocoena are found south of Constanța to Costinesti, at shallow depths, in the immediate vicinity of the coast
	Boat	47	
	Vessel	38	
	Oil platform	0	
	Shore	144	

Source: NMRDI

As can be seen in Figure II.86, the number of dolphins stranded in 2020 showed an increase after a gradual decline recorded after 2017. The resulting situation can be attributed to the pandemic when domestic and foreign demand for rapana (Rapana venosa) has been substantially reduced (for this reason, prey catches in 2020 have been about 50% lower than in 2019), which has led to greater pressure from net fishing catching turbot, also taking into account that from 2020, the turbot quota has been increased from 57 tonnes to 75 tonnes (Council Regulation EU / 2019/2236 of 16 December 2019 fixing for 2020 the possibilities for fishing for certain fish stocks and groups of fish stocks, applicable in the Mediterranean Sea and the Black Sea).

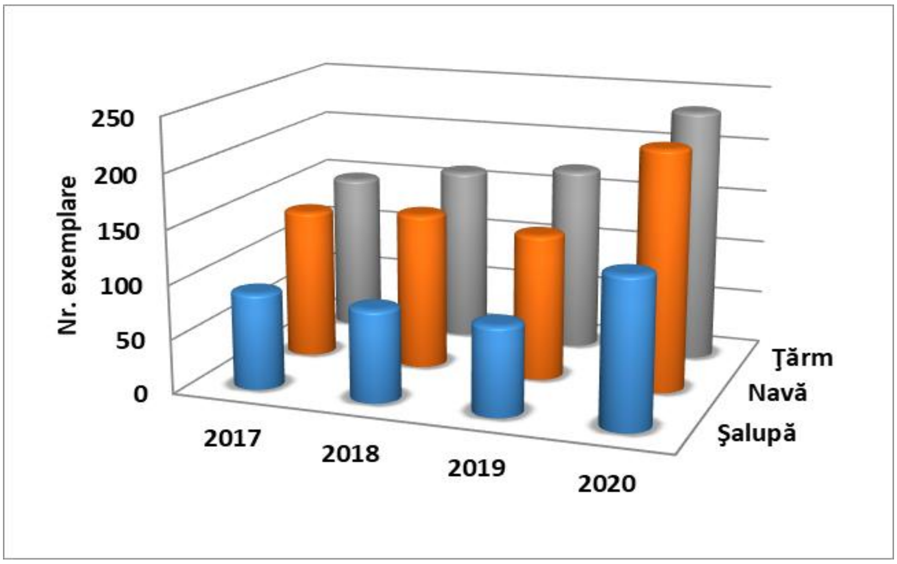
Figure II.86 Situation of failures registered in the period 2017 – 2020



Source: NMRDI

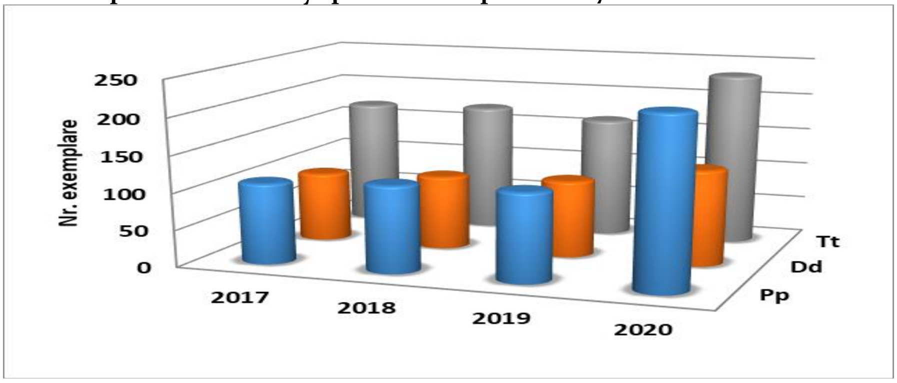
Regarding the situation of live dolphins recorded during monitoring activities, we can say during 2020 a number of dolphins was identified which in terms of value was higher than that recorded during the years 2017 - 2019, both in total year on type of monitoring (figure II.87), as well as by species (figure II.88).

Figure II.87 Situation of live dolphins recorded by types of monitoring in the period 2017-2020



Source: NMRDI

Figure II.88 Situation of live dolphins recorded by species in the period 2017-2020



Source: NMRDI

As it results from figures II.87 and II.88, the frequency of dolphins had higher values compared to the period 2017-2019, but as it is known it can be influenced by environmental conditions (indirectly the influence of natural factors on the state fishery resources) and anthropogenic activities (fishing, pollution, shipping, field operations, etc.).

On the other hand, the main source of food for dolphins is fish. For these reasons, the dynamics and frequency of dolphins are strictly dependent on the presence of food. Thus, for example, dolphins appear on the Romanian coast in March - April with the beginning of the migration of breeding Danube mackerel, but gradually, until August - September, with the migration of other fish species (anchovies, horse mackerel, lufar, barbun, etc.), the frequency of dolphins appearing on the Romanian coast is constantly increasing.

Table II.51Results of the assessment of the conservation status of dolphin species of community interest in Romania for the reporting period 2013-2019, including 2020

CETACEANS		
1349 Tursiops truncatus ponticus (Barabasch - Nikiforov, 1940) **Popular name: Large dolphin, Dolphin with thick snout, Alafin** **Biogeographical region: MBLS Habitats Directive: Annexes II and IV GEO 57/2007 (Law 49/2011): Annexes 3 and 4a; General assessment of the state of conservation in Romania: Inadequate with unknown trend**		
Parameter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km2)	N/A	24700 FV
Population	N/A	U1
The habitat of the species	N/A	FV
Perspectives	N/A	U1
1351 Phocoena phocoena relicta (Abel, 1905) **Popular name: Marsuin, Sea pig** **Biogeographical region: MBLS Habitats Directive: Annexes II and IV GEO 57/2007 (Law 49/2011): Annexes 3 and 4 ° General assessment of the conservation status in Romania: Unfavorable with unknown trend**		
Parameter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km2)	N/A	24700 FV
Population	N/A	U1
The habitat of the species	N/A	FV
Perspectives	N/A	U1
1350 Delphinus delphis ponticus (Barabasch-Nikiforov, 1953) **Popular name: Common dolphin Biogeographic region: MBLS** **Habitats Directive: Annex IV GEO 57/2007 (Law 49/2011): Annex 4a** **General assessment of the conservation status in Romania: Inadequate with unknown trend**		
Parameter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km2)	N/A	24700 FV
Population	N/A	U1
The habitat of the species	N/A	FV
Perspectives	N/A	U1

*) PV - favorable / U1 - inadequate

Source: NMRDI

Situation regarding pollution of the marine and coastal environment

During 2020, at the Constanța County Commissariat of the National Environmental Guard, 3 accidental pollutions with petroleum products were registered in the Constanța Port aquarium. Field inspections were carried out to identify the source of the pollution and to monitor the implementation of marine decontamination operations.

Table II.52 illustrates the numerical situation of accidental pollution registered at GNM CJ Constanta in the period 2015-2020.

Table II.52 Numerical situation of accidental pollution

Reference period	2015	2016	2017	2018	2019	2020
Nr. accidental pollution	3	4	4	6	8	3

Source: National Environmental Guard

The recorded accidental pollution was located, the causes of the pollution were established, and the type of pollutant, the category they belong to, the quantity, the evolution trends, as well as the measures applied at source were also identified.

As measures can be listed:

- sanctions applied in case of deliberate pollution;
- the establishment of the obligation to have on board anti-pollution materials, in sufficient quantities, as well as the effective control of its fulfillment, respectively the drastic sanctioning of those who do not respect it;
- the presentation of the notices of good functioning of the installations related to the loading-unloading operations of petroleum products at the port berths and the drastic sanctioning of the cases of violation of this obligation, including those of access to the berth with defective installations;
- careful monitoring of port operators;
- modernization of pollutant collection systems in the coastal area;
- the presence of units specializing in large-scale maritime disasters for intervention in cases of large-scale pollution in the port and coastal areas.

During the year 2020, regarding the total number of marine and coastal pollution events, there is a significant decrease compared to that recorded in previous years (3, compared to 8 in 2019).

It can be noted that in 2020 the events did not significantly influence the statistics, the share belonging to the first factor (**pollution of crude oil and petroleum products**). Among the most common causes of the analyzed events are: technical and technological failures, deficiencies during the operation of ships and attempts (materialized or not) to steal products / substances (in case of pollution with petroleum substances).

Table II.53 The situation of accidental pollution that led to the impact of environmental factors (air, water, soil) in the coastal area, in 2020

Year	No. total events	Nature and cause of the environmental accident / Total number			
		pollution of crude oil and petroleum products	**fire**	**sewage discharges from sewers**	**Industrial accidents**
2015	18	14	4	-	-
2016	7	6	-	-	-
2017	9	4	3	2	-
2018	6	6	-	-	-
2019	8	5	2	-	1
2020	3	3	-	-	-

Source: National Environmental Guard

In the coastal area of the Black Sea administered by the Danube Delta Biosphere Reserve Administration, inspection and control activities have been carried out permanently, paying special attention to plant and animal species whose conservation requires the designation of special conservation areas and special aquifauna protection. *-on newly formed islands in the vicinity of the wreck nest species mentioned by GEO no. 57/2007 on the regime of protected areas (e.g. Sterna Hirundo or Larus Melanocefalus)*

Eutrophication indicators

1. Nutrients

RO 21

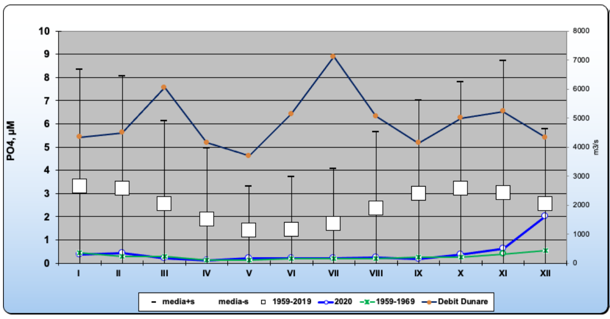
Romania indicator code: RO 21
EEA indicator code: CSI 21

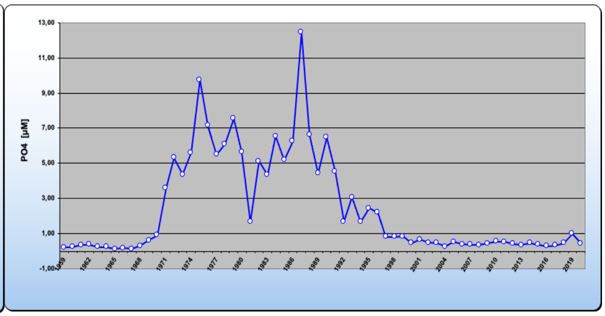
TITLE: NUTRIENTS IN TRANSITIONAL, COASTAL AND MARINE WATERS

DEFINITION: The indicator shows the annual trends of soluble nitrate and orthophosphate concentrations (in winter, expressed in micrograms / L) and the high N / P ratio, concentration levels (low, moderate, high) and oxidized nitrogen trends in winter (nitrate + nitrite) and the concentration of soluble orthophosphates (expressed in micromol / L) in Black Sea water.

Monthly averages of phosphate concentrations in 2020 were significantly lower *(t test, 95% confidence interval, p <0.0001, t = 7.9994 ,, df = 22, Dev.St. difference = 0.254)* compared to the multi-annual ones, 1959-2019, and, although still large, are statistically comparable to those of the reference period 1959-1969. The maximum deviation, 1.49 µM compared to the period 1959 -1969 was observed in December. The progressive growth is observed after October 3, 2021 when the sanding program of the beaches in Mamaia resumed.
Thus, extreme values of up to 5.95 µM (December 16, 2021) were observed, which led to a monthly average comparable to those of the period of intense eutrophication, 2.03 µM (figure II.89a).

Figure II.89 Comparative situation of multiannual (a) and annual (b) monthly averages of phosphate concentrations in seawater in Constanța between 1959 - 2019 and 2020





(a) (b)

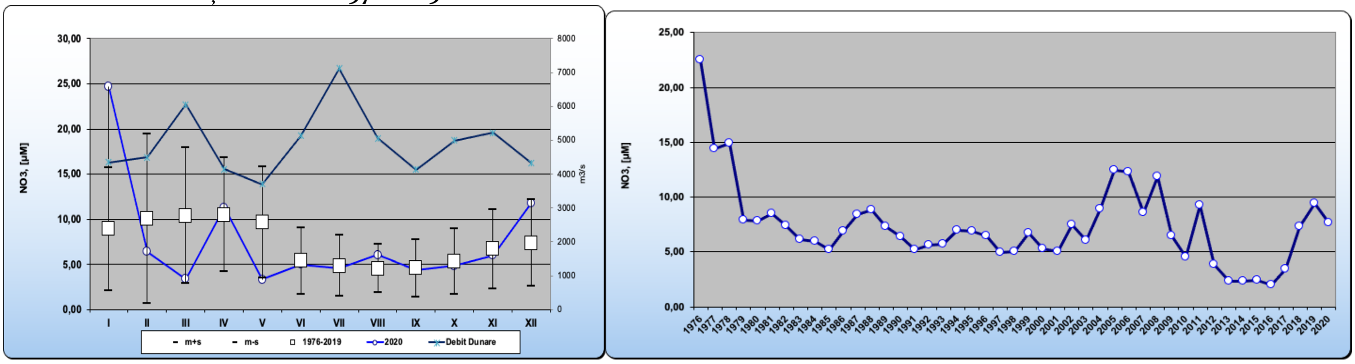
Source: NMRDI

In the period 1959-2020, the average annual values of phosphate concentrations ranged between 0.13 µM (1967) - 12.44 µM (1987) and their decrease was observed starting with 1987 (figure II.89b). The average value for 2020, 0.44 µM, exceeds the range characteristic of the reference period of the 1960s (multiannual average 1959-1969 0.28 µM ± 0.14 µM). It is observed, for the year 2020, the lack of good condition due to the high concentrations in January-February, October-December (figure II.89a).

Nitrates

The multiannual monthly averages 1976-2019 and the monthly ones from 2020 are comparable (*test t, 95% confidence interval, p = 0.8865, t = 0.1444,, df = 22, Dev.St. of the difference = 1.876*) as due to fairly high concentrations in 2020 (Figure II.90a). In the long run (annual averages 1976-2020), it is observed that, in 2020, the annual average of 7.63 µM will be reached (figure II.90b).

Figure II.90 Comparative situation of multiannual (a) and annual (b) monthly averages of nitrogen concentrations in seawater in Constanța between 1976-2019 and 2020



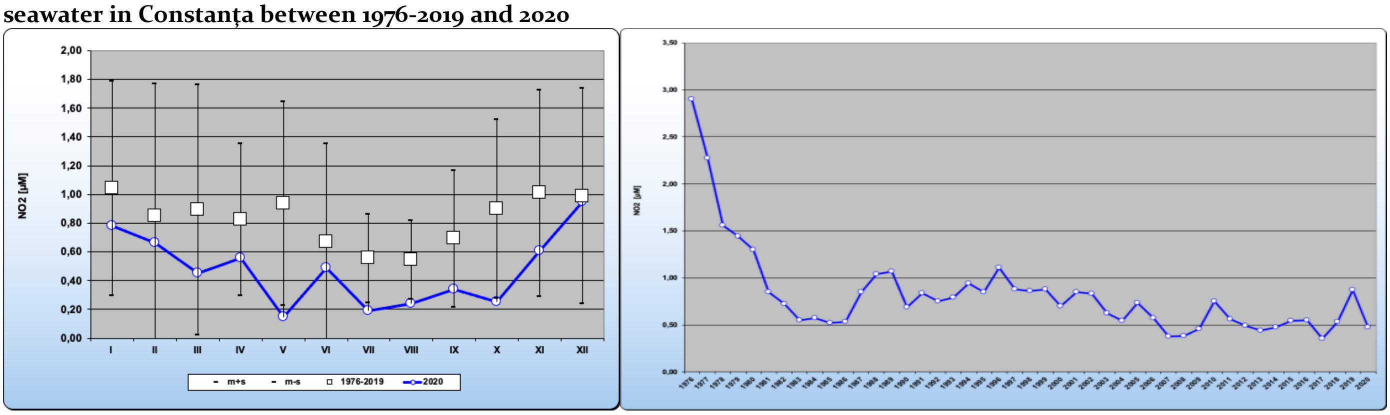
(a) (b)

Source: NMRDI

Nitrites

Multiannual monthly averages 1976-2019 and monthly averages from 2020 differ significantly (*t test, 95% confidence interval, p = 0.0006, t = 4.009, df = 22, Dev.St. difference = 0.008*) due to concentrations lower than in 2020 (figure II.91a). In the long term (1976-2020), the average of 0.87 µM is reached in 2020 (figure II.91b).

Figure II.91 Comparative situation of multiannual (a) and annual (b) monthly averages of nitrogen concentrations in seawater in Constanța between 1976-2019 and 2020



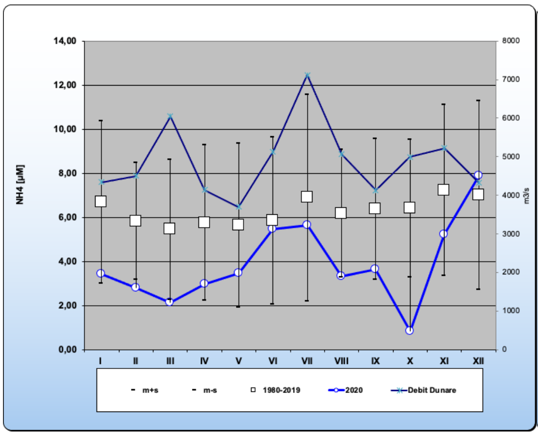
(a) (b)

Source: NMRDI

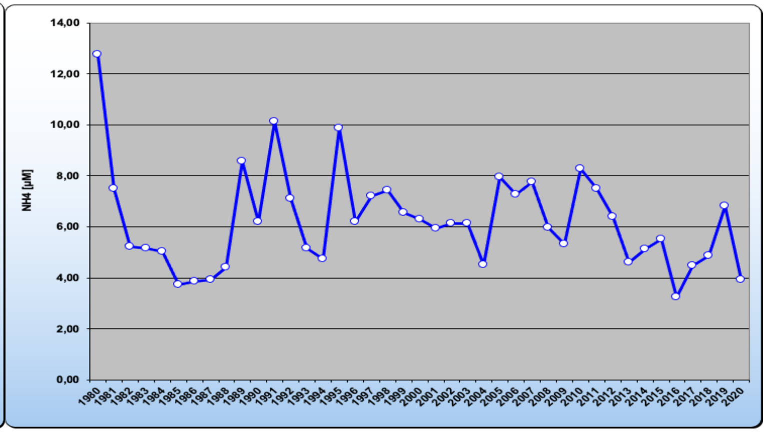
Ammonium

The multiannual monthly averages 1980-2019 and the monthly ones from 2020 differ significantly (test t, 95% confidence interval, p = 0.0004, t = 4.1921, df = 22, Dev.St. of the difference = 0.566) as a result of lower concentrations by 2020 (Figure II.92a). In the long term (1980-2020), the average annual concentration of 3.90 µM is observed in 2020 (figure II.92b).

Figure II.92 Comparative situation of multiannual monthly averages (a) and December (b) of ammonium concentrations in seawater in Constanta between 1980-2019 and 2020



(a)



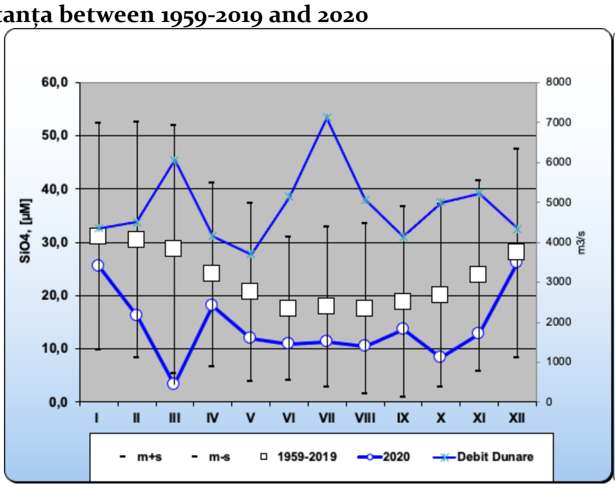
(b)

Source: NMRDI

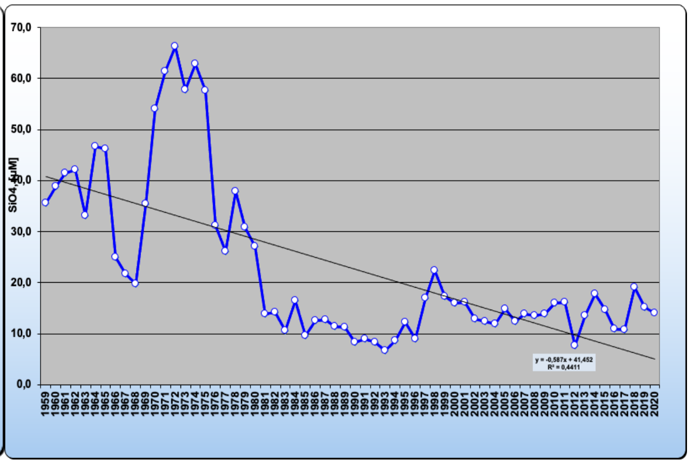
In Constanța, the 2020 monthly averages of **silicates**, (SiO_4) 4-, are **significantly lower** than the multiannual ones 1959-2019 (*t test, 95% confidence interval, p = 0.0011, t = 3.7686, df = 22, Dev.St. of the difference* = *2,421*) (figure II.93a).

The average annual concentrations of silicates in seawater in Constanța are between 6.7 µM (1993) - 66.3 µM (1972) and recorded in 2020 an average of 14.0 µM representing only 40% of the stock of silicates from the reference period 1959-1969 (figure II.93b).

Figure II.93 Comparative situation of multiannual (a) and annual (b) monthly averages of seawater silicate concentrations in Constanța between 1959-2019 and 2020



(a)



(b)

Source: NMRDI

Conclusions

In 2020, high values of nutrient concentrations were registered in the coastal waters of the Romanian coast. Thus, in the last quarter of the year, high concentrations of phosphates were observed, culminating in an extreme average in December 2020. The average annual concentration of nitrates continues to be high. Thus, the risk of not reaching the target values for the good ecological status of the coastal waters from the Romanian Black Sea coast regarding the Descriptor 5 - Eutrophication is observed.

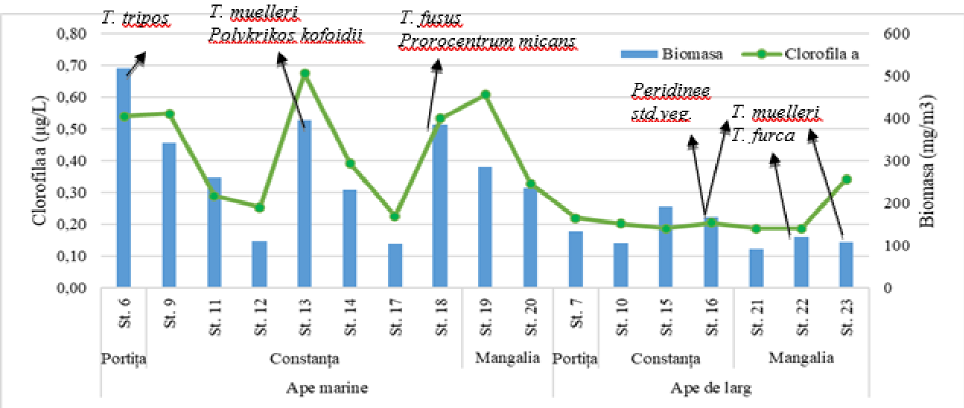
2. Chlorophyll “a”

RO 23
Romania indicator code: RO23 EEA indicator code: CSI 23
TITLE: CHLOROPHIL “a” FROM TRANSITIONAL, COASTAL AND MARINE WATERS
DEFINITION: The indicator describes: annual average summer concentrations (expressed in micrograms / L), classification of concentration levels (low, moderate, high), trends of average summer surface concentrations for chlorophyll a (expressed in micrograms / L). Chlorophyll "a" is the most common biochemical parameter determined in oceanography, being a unique indicator of plant biomass and marine productivity. During the summer, when the primary production is limited only by nutrients, the concentration of chlorophyll "a" is related to the stock of nutrients.

The chlorophyll “a” content determined in October 2020 in marine waters varied between 0.23 μg / L (CT17 station) and 0.68 μg / L (PO13 station). In offshore waters, the values were lower, between 0.19 μg / L (PO15 station) and 0.34 μg / L (MG23 station) (figure II.94).

The maximum values on each profile corresponded to the maximum biomass values recorded especially by dinoflagellates such as *Tripos tripos* (114.78 mg / m³), *T. muelleri* (57.39 mg / m³), *Polykrikos kofoidii* (54.96 mg / m³), *T. fusus* (57.12 mg / m³) and *Prorocentrum micans* (40.9 mg / m³).

Figure II.94 Variation of chlorophyll "a" (μg / L) at the water surface in October 2020



Source: NMRDI

Temperature and salinity

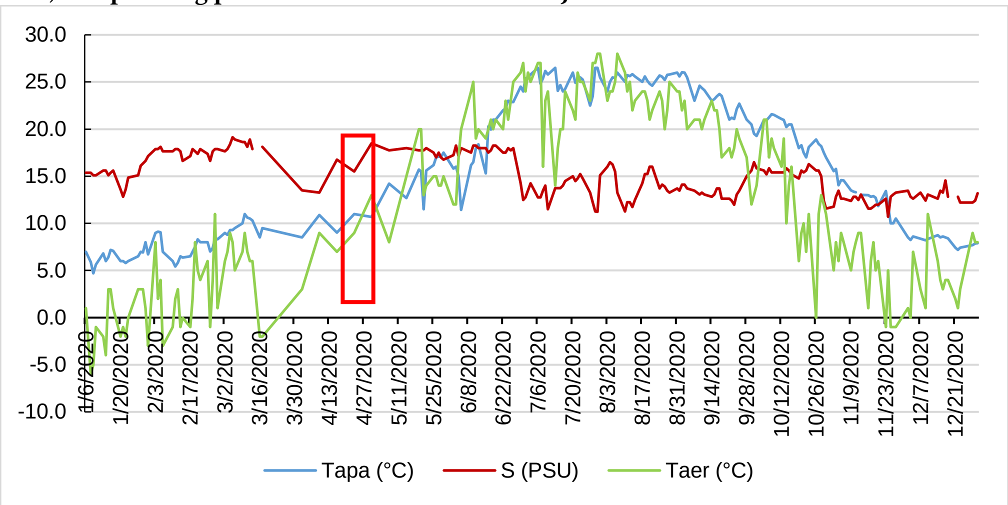
RO 51
Romania indicator code: RO 51 EEA indicator code: CLIM 13
TITLE: SEA WATER TEMPERATURE INCREASE
DEFINITION: This indicator can be defined by: the annual average of sea surface temperature anomalies; the trend of the annual average sea surface temperature.

Romanian coastal area - thermal regime

The sea water temperature, as the first parameter of the climatic influence, showed an important variability in the active layer, in 2020, due to the changes in the thermal balance and in the dynamics of the air masses at the high interface - atmosphere (figure II.95).

In the deep layers the vertical distribution is maintained due to the strong stratification and the geothermal flow. From the analysis of the data recorded at the Mamaia - Constanța station (N = 206) it is observed that in the Romanian Black Sea coastal area most of the average monthly air temperatures were positive, due to the influence of the sea on the moderate continental climate in this coastal area. the climatic peculiarities of 2020, declared “the warmest in the history of meteorological measurements”.

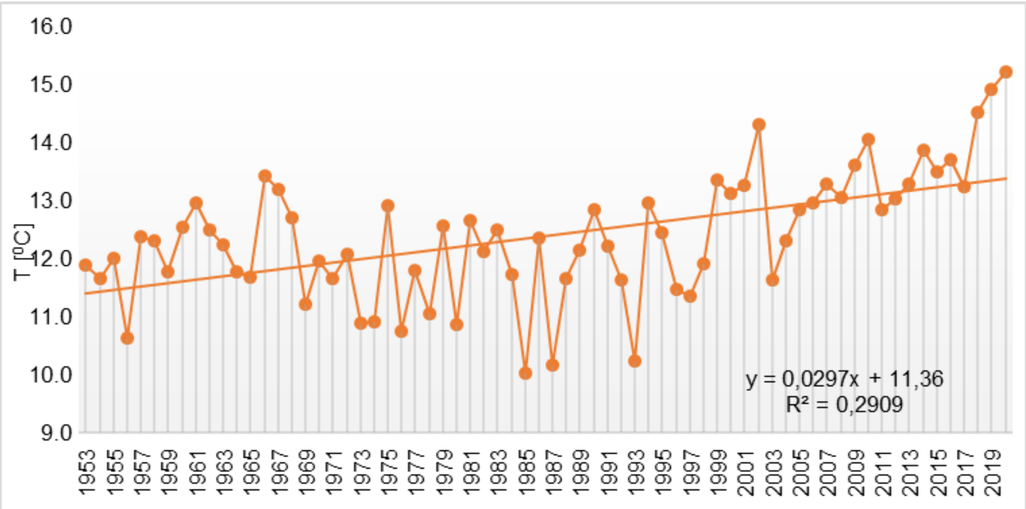
Figure II.95 Daily evolution of air temperature, sea water temperature and salinity at Constanța station, in 2020 (NMRDI data) / marked in red, an upwelling phenomenon that occurred in June 2020



Source: NMRDI

The maximum measured daily sea water temperature, of 26.5 ° C, was recorded in July (on 06, 13, 29, 30) due on the one hand to the freshwater feather of the Danube, but also to the evolution of the air temperature. (figure II.95). Compared to the reference period of the last 60 years, the year 2020 can be characterized as a special year from a thermal point of view, being evident a significant trend of increasing the positive temperature differences compared to the multiannual average, in the surface layer (figure II .96).

Figure II.96 Average multiannual sea water temperature in the period 1959-2020 Mamaia - Constanța

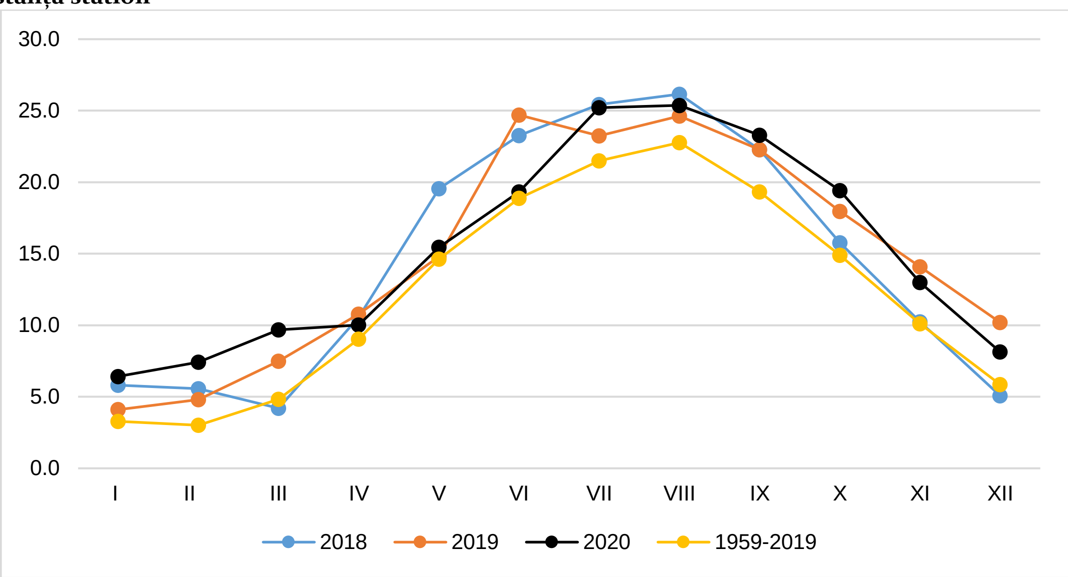


Source: NMRDI

The average seawater temperatures recorded in 2020 in Constanța exceeded the multiannual averages almost throughout the year (figure II.97), only the months of May and June were within normal limits.

Thus, the average sea water temperature in Constanța in 2020 (average tide 2020 = 15.2 ° C), compared to the average of the last 60 years of the analyzed period, was 2.86 ° C higher (average tide 1959 - 2019 = 12.34 ° C).

Figure II.97 Average monthly temperatures (2020, 2019, 2018) / multiannual monthly averages of sea water (1959-2019) at Mamaia - Constanța station

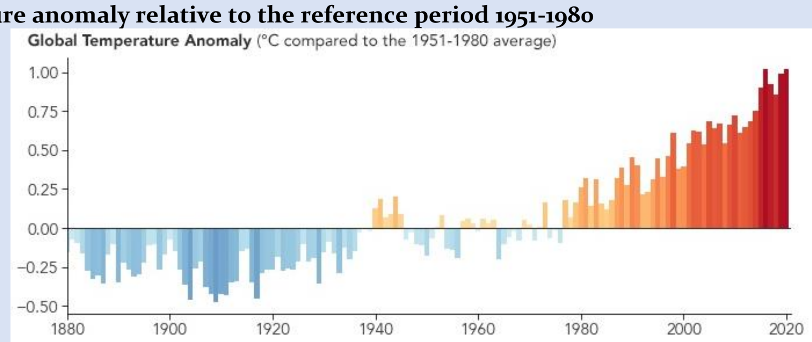


Source: NMRDI

Conclusions

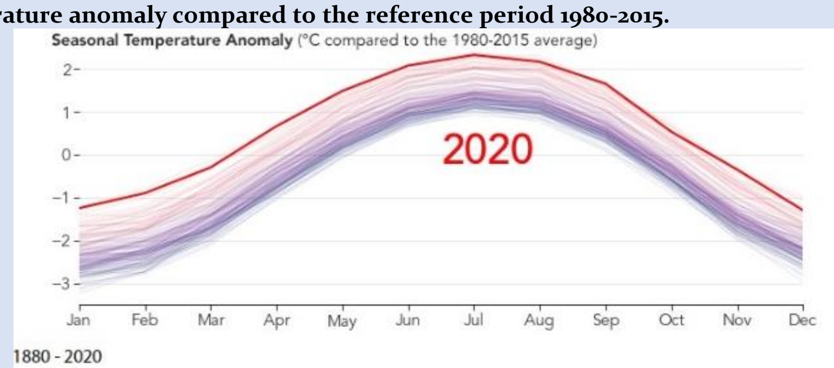
According to studies and analyzes conducted by the American Space Agency (NASA), the year 2020 was considered the warmest year recorded over time, in terms of surface temperature, with an average global temperature of 1.02 degrees Celsius higher than the 1951-1980 reference average, according to researchers at NASA's Goddard Institute for Space Studies (GISS) (Figures II.98 and II.99).

Figure II.98 Global temperature anomaly relative to the reference period 1951-1980



Source: https://earthobservatory.nasa.gov/images/147794/2020-tied-for-warmest-year-on-record

Figure II.99 Seasonal temperature anomaly compared to the reference period 1980-2015.



Source: https://earthobservatory.nasa.gov/images/147794/2020-tied-for-warmest-year-on-record

One of the most important indicators of the impact of human activities and the level of greenhouse gases is the trend of global temperature rise, with a direct effect on sea level rise.
A separate, independent analysis by the *National Oceanic and Atmospheric Administration* (NOAA) considered 2020 the second warmest year on record, after 2016, being the 44th consecutive year (since 1976), with global temperatures both at ground level. , as well as at the level of the planetary ocean, above the average of the 20th century.
Global climate change caused by the *greenhouse effect* is being felt in various aspects, influencing marine oceanographic and hydrological processes at different scales of the western Black Sea basin.
The degree of agitation of the sea, given by the frequency of exceeding the limit of waves higher than 1.25 m, is very weak at the level of 2020, with an average of 4.14%. In addition, the maximum degree of agitation of the sea, considered at the surface, based on the Beaufort scale, was 5 ÷ 6, the maximum observed height of the wave (3.0m) being recorded in November.
In 2020, the thermal regime of sea water was characterized by significant positive values in the coastal area. The average seawater temperature in Constanța of 15.2 ° C was 2.86 ° C higher than the multiannual reference temperature, recorded in Constanța, in the last 60 years (1959 - 2019), of 12.34 ° C .
For the northwestern Black Sea basin, the three characteristic water bodies: the quasi-homogeneous upper layer (SSQ), the seasonal thermocline and the cold intermediate layer (SIR) showed variability of the deep horizons, recorded within normal limits - the cold intermediate layer SIR in the warm season (June) reached depths greater than 25m.
According to the recorded data, during the warm season on 03.06.2020 a short-term upwelling phenomenon was registered, produced under the influence of the predominant wind action from the west and southwest directions, which produced a variation of temperature and salinity gradients, the water temperature dropped from 16°C to 11°C, and the salinity had a maximum of 18 PSU.

Sea level

RO 50

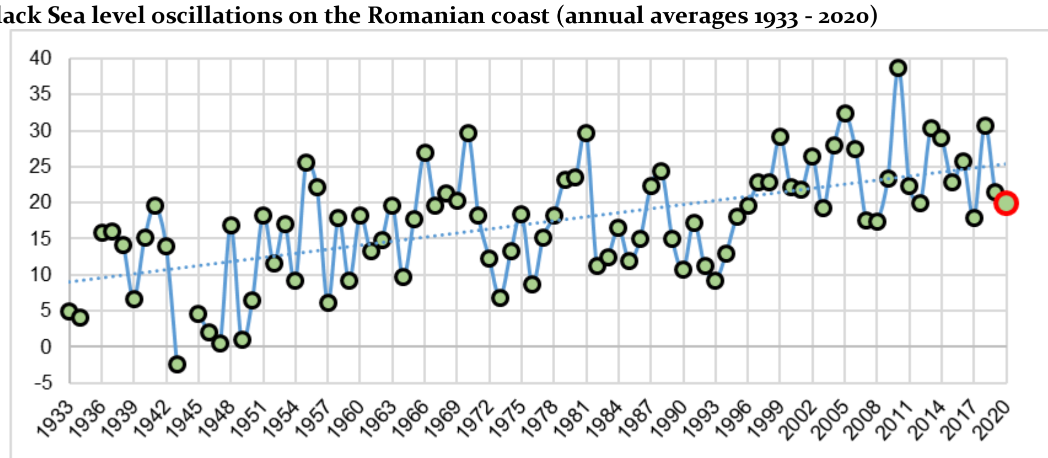
Romania indicator code: RO 50
EEA indicator code: CLIM 12

TITLE: GLOBAL, EUROPEAN AND NATIONAL SEA RISE

DEFINITION: The indicator reflects the change in the average sea level, the absolute evolution of the sea level using satellite data.

In the case of level variations on the Romanian coast, the predominant factors are meteorological and hydrological, as the tide governed by astronomical factors is too small to be taken into account. In the graph below you can see the records of the OTT type tide gauge from the Port of Constanța (figure II.100).

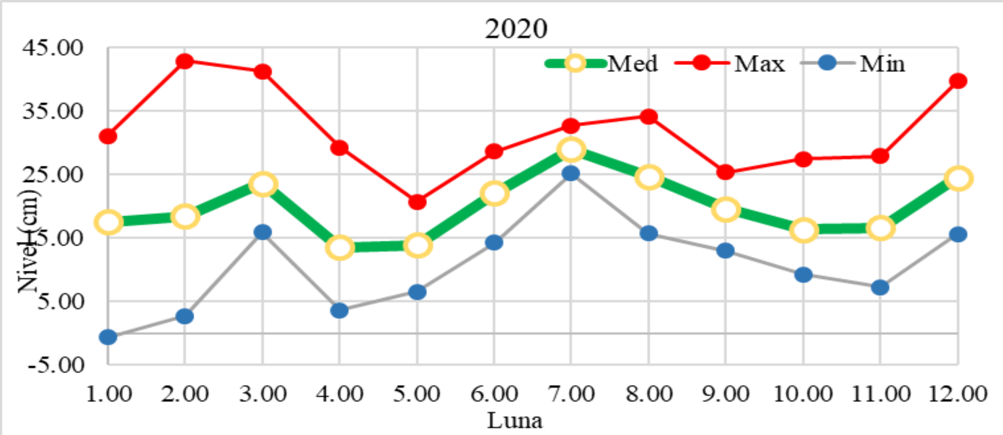
Figure II.100 Black Sea level oscillations on the Romanian coast (annual averages 1933 - 2020)



Source: NMRDI

Regarding the level for 2020 (figure II.101), it had an average value of 21.03 cm, which indicates an increase in the level compared to the multiannual average of 17.32cm (1933-2019). The maximum value recorded was 42.90 cm on February 6, and the minimum value was -0.60 cm on January 23.

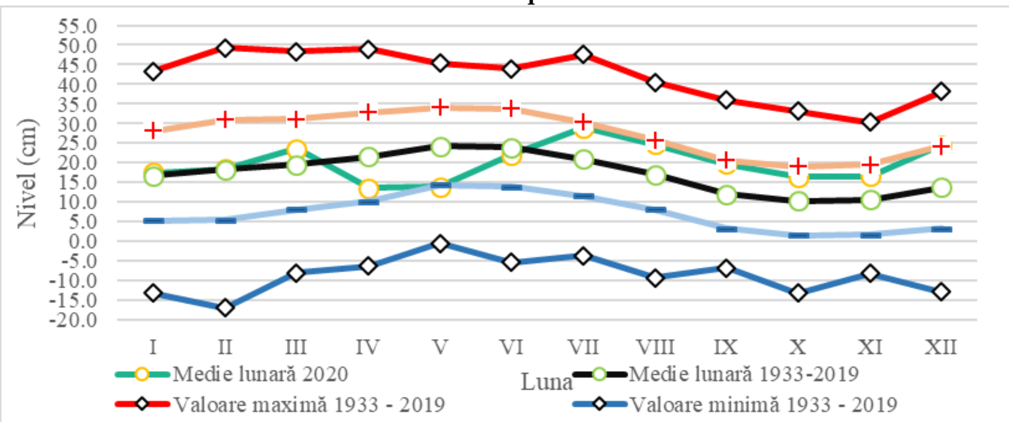
Figure II.101 Sea level fluctuations for 2020 (average maximum and minimum values)



Source: NMRDI

The long-term variation in sea level in Constanța is similar to the global variation, having the same rate of increase of 1.9 mm / year. It is specified that the annual average for 2020 of 20.03 cm is + 2.71 cm higher than the multiannual average of 1933 - 2019 (of 17.32 cm).

Figure II.102 Monthly, maximum and minimum averages for the period 1933 - 2019 together with the monthly average of 2020 and the upper and lower differences related to the mean square deviation



Source: NMRDI

In Figure II.102, the graphs show how the mean sea level values change over the data set by month. These changes may vary depending on the season.

Analyzing the monthly average of 2020, by comparison with the upper square mean deviation we can see how in July - December the average value is very close to this limit exceeding it only in December with a difference of 0.01 cm. The rest of the mean values are within the upper and lower limit of the square mean deviation. The values for April and May are approaching and equaling the lower limit of the square average battery. The average values of January and February for 2020 are very close to the multiannual average, thus contributing to a smaller variation of the multiannual average for these months.

Source: NMRDI

Conclusions

For the northern unit, the evolution of the coast is determined by the intensity of coastal processes, delimiting different sectors:

- sectors with accentuated erosion: South Sulina-Sf. Gheorghe (Câsla Vădanei), North Portița-Periboina-Edighiol sector, with annual rates calculated for the period 2011-2019 ranging between 5-10 m / year, except for sectors Sonda Canal, Gârla Împuțită, Zaton-Perisor where the values are higher .
- sectors in which the accumulation processes predominate, interspersed with sectors with relative balance: Sulina beach (5-13 m / year), south Perişor-south Periteşca (2-5 m / year), Chituc ridge (Vadu area) (3-7 m / an);
- narrow coastal cordons with specific, accentuated dynamics - arching and elongation to the southwest accompanied by a translational movement to the west (Musura Golf Island, Sahalin Peninsula).

In the southern unit (Cap Midia - Vama Veche) the mobility of the shore line registers a different evolution from the northern unit, with small, uneven rhythms, given the presence, mostly, of the Sarmatian submarine limestone platform and coastal protection works.

Based on the studies carried out, in the period 2015-2020 were determined the changes of the tourist beaches at the sea-dry interface, for the 5 sectors (Mamaia Sud, Tomis Nord, Tomis Centru, Tomis Sud and Eforie Nord), where measures were implemented short-term coastal protection, as follows:

- the geomorphological changes were determined, on average between the values of 5.08 m (South Tomis sector) and 18.34 m (Tomis Center sector).
- the maximum values for erosion were -16.83 m (CT2 landmark, Tomis Sud sector), and for accretion 35.17 m (CT1 landmark, Tomis Sud sector).
- the Tomis Centru beach sector registered only accretion, with values between 8.24m, CT7 profile and 34.14m, CT11 profile as well as the Eforie Nord sector with values between 4.60m, EF20 profile and 20.97m, EF21 profile .

The situation regarding the marine fish stock

RO 32

Romania indicator code: RO32
EEA indicator code: CSI 32

TITLE: STATE OF MARINE FISH STOCKS DIVERSITY OF SPECIES

DEFINITION: The indicator targets the estimated quantity of fish for the main fish species in the Romanian Black Sea sector. The indicator monitors the proportion of fish stocks overfished in the total number of commercial stocks, by fishing areas in the Romanian Black Sea sector.

The Romanian fishing area is between Sulina and Vama Veche; the shoreline extends over a distance of 243 km and can be divided into two geographical and geomorphological sectors:

- ***the northern sector*** (approx. 158 km in length) stretches between the secondary delta of the Chilia arm and Constanța, composed mainly of alluvial sediment;
- ***the southern sector*** (approx. 85 km in length) stretches between Constanța and Vama Veche, characterized by promontories with high, active cliffs, separated by large areas with accumulation beaches, often housing coastal lakes.

The distance from the shore to the boundary of the continental shelf (depth 200 m) varies from 100 to 200 km in the northern sector, to 50 km in the southern. The submarine slope of the continental shelf is very low in the north, with a depth of 10 m near the mouth of the Danube, while in the southern sector the depth of 10 m is reached 1.5 km from the shore. The shallow waters, less than 20 m, from the northern part are included in the perimeter of the Danube Delta Biosphere Reserve.

The industrial fishing activity in 2020 was carried out in two ways:

- ***active gear fishing***, performed with coastal trawlers, at depths greater than 20 m;
- ***fixed gear fishing,*** practiced along the coast, in 12 fishing points, located between Sulina-Vama Veche, at a shallow depth, 2-11 m / talian, but also at depths of 20-60 m / nets and longlines.

Evolution of status indicators:

- **stock biomass** for the main fish species (Table II.54) indicates:

- the biomass of the **sprat** population was estimated at about 92398 tonnes, lower than the value obtained in the previous year, but generally shows a natural fluctuation, for a species with a short life cycle;
- the biomass of the **whiting** population was estimated at about 10714 tonnes, a value about 50% lower than in the last three years;
- the biomass of the **turbot** population was estimated at about 2400 tons, close in value to the estimates from 2018 and 2019;

- the biomass of the **shark** population was estimated at about 2150 tons, almost equal to the estimated value for 2019;

- the biomass of the **rapana venosa** population was estimated at about 15000 tons, a value equal to the previous year.

Table II.54 Value of stocks (tonnes) for the main fish species in the Romanian Black Sea sector

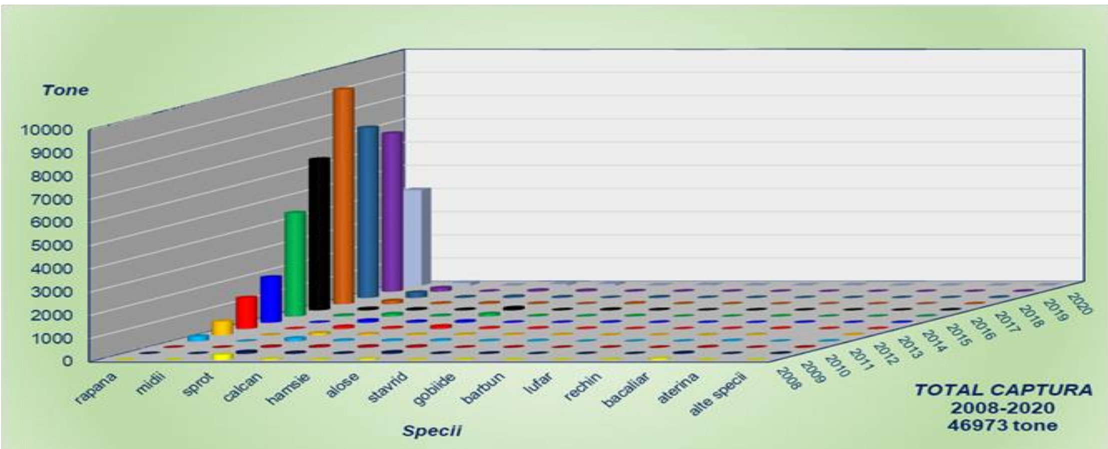
Species (tone)	2015	2016	2017	2018	2019	2020
Sprat	48903	114653	23269	42599	124000	**92398**
Whiting	7112	6928	20911	23171	20000	**10714**
Round gobies	300	300	300	300	300	**300**
Turbot	999	2117	1523	2065	2700	**2400**
Shark	1657	1550	1223	5556	2000	**2150**
Rapana venosa	**13000**	**14000**	**17500**	**17500**	**15000**	**15000**

Source: NMRDI

- **population structure** in the last three years, it indicates the presence in the catch of a large number of species (24), of which the baseline were both small species (anchovy, horse mackerel, goby, bluefish) and larger species (turbot and alose). Dominance in catches belonged mainly to *Scophthalmus maeoticus* - turbot (31.25 - 33.14%), followed by traditional species: *Engraulis encrasicolus* - anchovy (18.02-32.14%), *Trachurus mediterraneus* - horse mackerel (12.05-16.86%), *Sprattus sprattus* - sprat (2.23-18.60%), *Gobiidae*- gobies (4.07-5.36%), *Pomatomus saltatrix* - bluefish (0.58 -6, 70%), *Mullus barbatus - plaice* (2.41-5.36%), *Alosae* - mackerel (2.91–12.05%) and other species with catch values below 1%, and in 2018- 2019, catches of molluscs increasing significantly, by collecting in large quantities rapana (*Rapana venosa*) and mussels (*Mytilus galloprovincialis*). Starting in 2020, rapana catches have entered a downward trend of almost 40% compared to 2019 catches, this was due to the Covid 19 pandemic which reduced the demand for this species by closing the Horeca industry and limiting exports to major factories processing of rapana in Bulgaria, which has also led to a significant decrease in fishing effort.

The main species caught in 2020 were: rapana (4116 t), mussels (117 t), anchovy (72 t), sprat (5 t), horse mackerel (27 t), bluefish (15 t), turbot (70 t) and flounder (12 t) (figure II.103). Along with these species, the species also appeared in catches: aterine (1 t), gobies (12 t) and mackerel (8 t).

Figure II.103 Structure of catches (t) of the main species of fish caught in the Romanian marine sector, in the period 2008 - 2020



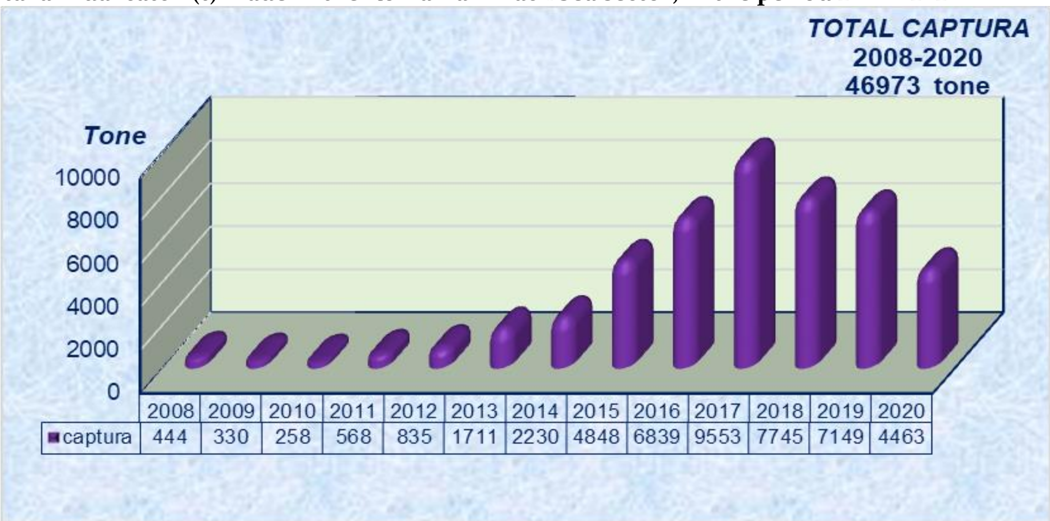
Source: NMRDI

►***Evolution of pressure indicators***

- ***fishing effort*** The reduction trend reported since 2000 continues. Thus, in 2020, 4 vessels (24-40 m) activated in active fishing, using in fishing: 8 beam trawls, 150 turbot nets and 1 hydraulic dredger, 1 vessel (18- 24 m), using: 2 beam trawls and 200 turbot nets, respectively 21 vessels (12-18 m), using: 44 beam trawls, 1,770 turbot nets, 50 mackerel nets and 4 pelagic trawls. In stationary fishing, with fixed gear, practiced along the Romanian coast, activated a number of 104 boats, respectively 11 boats (under 6 m) and 93 boats (6-12 m), being used: 1 pelagic trawl, 31 talians , 14 beam trawls, 85 cage harvesting rapana, 1,637 turbot nets, 449 mackerel nets, 66 gobies nets, 2 beach nets, 36 gobies longlines, 26 capers and 41 vaults.
- ***the total level of catches*** and the efficiency of fishing, which fluctuated from year to year, was mainly due to both the reduction of fishing effort (decrease in the number of coastal trawlers and, implicitly, of the staff engaged in fishing), the influence of hydroclimatic conditions on fish populations, the increase in production costs, as well as the Covid pandemic 19 which reduced demand by closing the Horeca industry and limiting exports.

In the period 2005 - 2013, the total level of catches made fluctuated, ranging between 1,940 t / 2005 and 258 t / 2010 respectively, 1,390 t / 2006, 435 t / 2007, 177 t / 2008, 331 t / 2009 and 258 t / 2010, slightly increasing in 2011/568 t; 2012/835 t and 2013/1712 t. In the last six years, catches have had an increasing trend, respectively: 2,231 t / 2014, 4,847 t / 2015, 6,839 t / 2016, 9,553 t / 2017, 7745 t / 2018 and 7149 t / 2019 (figure II.104). In 2020, the total catch registered a decrease of approximately 40% compared to 2019, with a value of catches of 4463 tons, of which over 90% was represented by the species Rapana venosa.

Figure II.104 Total annual catch (t) made in the Romanian Black Sea sector, in the period 2008 - 2020



Source: NMRDI

►***Evolution of impact indicators***

- ***the percentage of species whose stocks are outside safe limits*** was close to that of previous years, being almost 90%. Exceeding the safety limits is not only due to the exploitation in the Romanian marine sector, most fish species having a cross-border distribution, which requires a management at regional level;
- ***the percentage of complementary species in Romanian catches*** continues to be at a level similar to that of recent years, at over 20%;
- ***changes in structure by size classes (length, weight, age),*** compared to previous years, in 2020, for the species that appeared in the catches, the biological parameters remained at similar values.

Anthropogenic pressures on the marine and coastal environment

RO 33

Romania indicator code: RO33
EEA indicator code: CSI 33

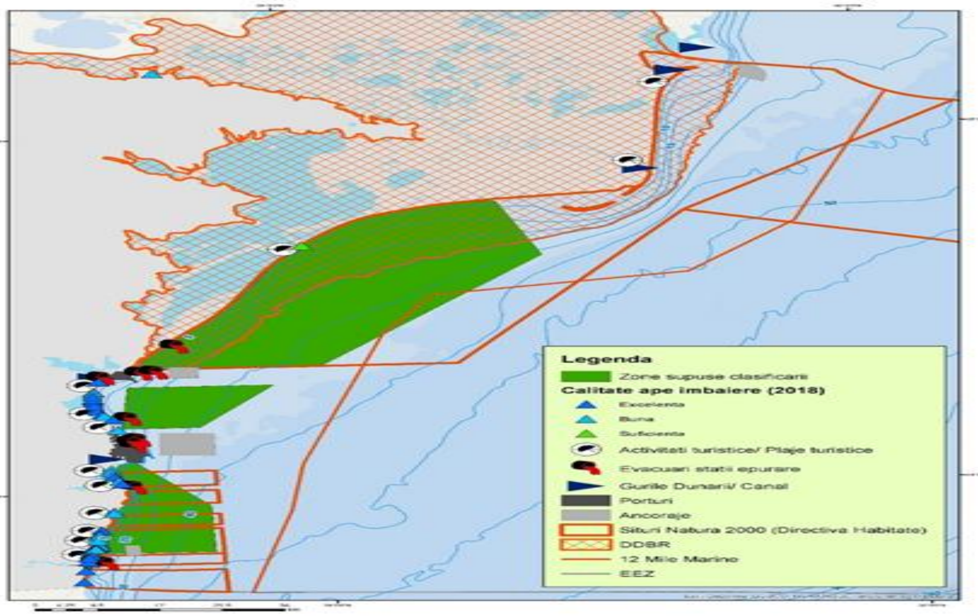
TITLE: AQUACULTURE PRODUCTION

DEFINITION: The indicator monitors aquaculture production as well as nutrient discharges, thus measuring the pressures exerted by aquaculture on the marine environment. It is a simple and easily accessible indicator but used alone has limited importance and relevance due to various production practices and local conditions.

Following the numerous interventions made by NMRDI (through the Demonstration Center of Aquaculture), in the period 2019 - 2020, with the support of GFCM, under the National Sanitary-Veterinary Authority (NSVA), the National Agency for Fisheries and Aquaculture (NAFA), Ministry of Environment, Waters and Forests (MEWF), as well as the Institute of Diagnosis and Animal Health (IDAH), *the "Interministerial Agreement for the classification of areas for the production and relocation of live bivalve molluscs"* was launched, which took into account the three areas mentioned above.

NMRDI elaborated, thus, within the Aquaculture Center, "Documentary, *field and hydrodynamic survey in order to establish and microbiological classification of the production and relocation areas of live bivalve molluscs in the Romanian Black Sea sector according to Regulation (EC) no. 627/2019* ", an essential framework document, mandatory according to the provisions of the Guide for the application of Regulation 854/2004, which was sent to NSVA, in order to effectively start the sampling and subsequent classification procedures. During the "*Shore Survey*", a second mandatory document in the microbiological classification process, the team of the Aquaculture Center of NMRDI, confirmed through field expeditions the existence and condition of potential sources of contamination previously identified in the Documentary Survey. The results were made available to NSVA, which made the microbiological classification of the production and relocation areas of live bivalve molluscs in the Romanian Black Sea sector.
The microbiological study was completed in the fall of 2020, ANSVSA classifying all 3 areas of production and relocation of live bivalve mollusks in the Romanian Black Sea sector (Chituc - Perișor, Baia Mamaia and Agigea - Mangalia) in class A, which opened important opportunities for bivalve aquaculture on our coast (figure II.105).

Figure II.105 Production and relocation areas of live bivalve molluscs in the Romanian Black Sea sector (green), and their overlap with the Natura 2000 network (map A. Spinu)



Source: NMRDI

Recently, several economic operators in the country have expressed interest in the alternative growth of rainbow trout - Oncorhynchus mykiss (Walbaum, 1792) - in seawater during the cold period of the year (in floating ponds, located in the open sea), in order to improve the quality of meat by salmonisation, NMRDI is currently undertaking tests of the growth rate and the optimal size of the introduction of the brood into seawater (Figure II.106).

Figure II.106 Experimental test of growth rate and age / optimal size for transfer of trout-rainbow brood in seawater (original photo V. Niță & M. Nenciu)

Source: NMRDI

Fishing fleet capacity

RO 34
Romania indicator code: RO 34 EEA indicator code: CSI 34
TITLE: FISHING FLEET CAPACITY
DEFINITION: Fishing capacity, defined in terms of tonnage and engine power and sometimes number of vessels, is one of the key factors determining the mortality of fish caused by the fleet. The average size of vessels is an important parameter for assessing the pressure exerted by fishing activity. Larger vessels generally cause a greater fishing pressure than the smaller ones, mainly due to the fishing gear used, the level of activity and the geographical coverage that these vessels can achieve.

The management of fishing capacity aims to achieve a lasting balance between the fishing capacity of the fleets and the fishing opportunities over time. Thus, CPUE (catch per unit of fishing effort) resulting in fishing in the Romanian coastal area was achieved by:

a.*boats <6 m:*

- ***talian***: 475.22 kg / talian: 339.44 kg / month, respectively 88 kg / day and 76.64 kg / hour, at a fishing effort of 5 talians, 7 months, 27 days, 31 hours, and a catch of 2,376.10 kg;
- ***mackerel net:*** 156.25 kg / boat, 9.05 kg / net; 125 kg / month; 48.07 kg / day; 16.02 kg / hour; at an effort of 4 boats, 69 nets, 5 months, 13 days, 39 hours and a catch of 625 kg;
- ***manual collection of the rapana***: 11,819.5 kg / boat, 9455.6 kg / diver; 2626.55 kg / month; 170.06 kg / day; 41.21 kg / hour, at an effort obtained by 4 boats, 5 people, 18 months, 278 days, 1147 hours and a catch of 47,278 kg;
- ***gobies cages***: 146.5 kg / boat; 5.86 kg / cage; 58.6 kg / month; 16.27 kg / day; 5.74 kg / hour; at an effort of 2 boats, 50 cages, 5 months, 18 days, 51 hours and a catch of 293 kg.

b. *boats 6 - 12 m*:

- ***talian***: 3661.32 kg / boat, 3661.32 kg / talian: 1178.35 kg / month, respectively 155.56 kg / day, 146.03 kg / hour at a fishing effort of 28 boats, 28 talians , 87 months, 659 days, 702 hours and a catch of 102,517 kg;
- ***turbot net***: 1179.48 kg / boat; 24.08 kg / dry; 286.68 kg / month, 176.41 kg / day; 35.99 kg / hour, at an effort made by 35 boats, 1,714 nets, 144 months, 234 days, 1147 hours and a catch of 41,282 kg;

- ***mackerel net*** / ***gobies***: 394 kg / boat; 27.32 kg / dry; 201.19 kg / month; 54.34 kg / day; 25.55 kg / hour; at an effort of 24 boats, 346 nets, 47 months, 174 days, 370 hours and a catch of 9,456 kg;
- ***beach net***: 324.5 kg / boat; 324.5 kg / net; 81.12 kg / month; 29.5 kg / day; 7.54 kg / hour, at an effort made by 1 boat, 1 net, 4 months, 11 days, 43 hours and a catch of 324.5 kg;
- ***beam trawl***: 47,912.77 kg / boat; 23,956.38 kg / beam trawl; 11,056.79 kg / month; 1,454.57 kg / day; 223.42 kg / trawl, 221.36 kg / hour; at an effort obtained by: 9 boats, 18 trawls, 39 months, 279 days, 1,930 trawls, 1,948 hours and a catch of 431,215 kg;
- ***manual collection of the rapana***: 62,762.07 kg / boat; 16,897.48 kg / om; 19,101.5 kg / month; 3,040.37 kg / day; 542.38 kg / hour; at an effort made by 14 boats, 52 people, 46 months, 289 days, 1,620 hours and a catch of 878,669 kg;
- ***rapana harvesting cages***: 1,038.33 kg / boat; 41.53 kg / cage; 623 kg / month; 141.59 kg / day; 51.06 kg / hour; at an effort of 3 boats, 75 cages, 5 months, 22 days, 61 hours and a catch of 3,115 kg;
- ***gobies cages***: 204.71 kg / boat; 8.12 kg / cage; 81.28 kg / month; 21.42 kg / day; 9.85 kg / hour; at an effort of 27 boats, 680 cages, 68 months, 258 days, 561 hours and a catch of 5,527.43 kg;
- ***voltes***: 20.5 kg / boat; 12.47 kg / volt; 20.5 kg / month; 9.89 kg / day; 1.46 kg / hour, at an effort of 14 boats, 23 laps, 14 months, 29 days, 196 hours and a catch of 287 kg;
- ***capers***: 105.75 kg / boat; 67.98 kg / caper; 31.725 kg / month; 9.19 kg / day; 1.87 kg / hour, at an effort of 18 boats, 28 sailors, 60 months, 207 days, 1013 hours and a catch of 1,903.5 kg.
- ***pelagic trawl***: 1,208 kg / vessel, 1,208 kg / pelagic trawl; 604 kg / month; 103.54 kg / day; 18.97 kg / trawl, 18.97 kg / hour, at an effort obtained by 3 vessels, 3 pelagic trawls, 6 months, 35 days, 191 trawls, 191 hours and a catch of 3,624 kg.

c. boats 12 - 18 m:

- ***beam trawl***: 96,984.04 kg / vessel; 48,492.02 kg / beam trawl; 18,685 kg / month; 2,298.71 kg / day; 275.07 kg / trawl, 262.22 kg / hour, at an effort obtained by: 21 vessels, 42 trawlers, 109 months, 886 days, 7,404 trawls, 7,767 hours and a catch of 2,036,665 kg;
- ***pelagic trawl***: 3,630.15 kg / vessel, 3,630.15 kg / pelagic trawl; 1,815.07 kg / month; 223.39 kg / day; 33.189 kg / trawl, 32.963 kg / hour, at an effort obtained by 8 vessels, 8 pelagic trawls, 16 months, 130 days, 875 trawls, 881 hours and a catch of 29,041.2 kg;
- ***turbot nets***: 1,522.04 kg / ship; 12.62 kg / dry; 464.35 kg / month; 271.25 kg / day; 52.28 kg / hour, at an effort of 18 vessels, 2,170 gillnets, 59 months, 101 days, 524 hours and a catch of 27,396.8 kg.

d. boats 18 - 24 m:

- ***beam trawl***: 120,295kg / ship, 120,295kg / trawl beam; 24,059 kg / month; 2,358.72 kg / day; 260.94 kg / trawl, 240.59 kg / hour, at an effort obtained by a vessel, 2 beam trawls, 5 months, 51 days, 461 trawls, 500 hours and a catch of 120,295 kg;
- ***turbot nets***: 2,105 kg / vessel; 10.52 kg / bucket; 526.25 kg / month; 421 kg / day; 58.47 kg / hour, at an effort made by 1 vessel, 200 gillnets, 4 months, 5 days, 36 hours and a catch of 2,105 kg;
- ***pelagic trawl***: 1,950 kg / vessel, 1,950 kg pelagic trawl; 975 kg / month; 216.66 kg / day; 27.08 kg / trawl, 27.08 kg / hour, at an effort obtained by 1 vessel, 1 pelagic trawl, 2 months, 9 days, 72 trawls, 72 hours and a catch of 1,950 kg.

e. boats 24 - 40 m:

- ***turbot nets***: 764.0 kg / vessel; 8,731 kg / dry; 305.6 kg / month; 254.66 kg / day; 49.29 kg / hour, at an effort of 2 vessels, 175 gillnets, 5 months, 6 days, 31 hours and a catch of 1,528 kg;
- ***beam trawl***: 178,857.75 kg / ship; 89,428.87 kg / beam trawl; 28,617.24 kg / month; 2,827.79 kg / day; 338.74 kg / trawl, 338.74 kg / hour, at an effort obtained by: 4 vessels, 8 beam trawls, 25 months, 253 days, 2,112 trawls, 2,112 hours and a catch of 715,431 kg.

Table II.55 Total number of active boats / ships in 2020

Length classes boats / ship	Total boats / ships assets	The technique of fishing	Length average (m)	Age average (years)	Total GT	Total kW	No. people
<6 m	11	p	5.11	12.73	7.32	80.53	25
6-12 m	68	p	7.7	21.97	131.55	668.92	164
6-12 m	25	PMP	9.06	13.04	161.17	868.74	94

12 - 18 m	21	PMP	14.85	9.86	695.31	3,051.13	84
18-24 m	1	PMP	20.2	21	70	184.00	4
> 24 m	4	PMP	25.75	31	476	1,217.25	16
TOTAL	**138**		**1282.69**	**2521.55**	**1503.4**	**6,151.33**	**387**

PG * - vessels / boats that fish only with stationary gear (nets, talian, cages, longlines, etc.)
PMP * - vessels / boats that fish with both stationary and towed gear (trawl, net, dredges, etc.)

Source: NMRDI

Table II.56 Total number of inactive boats / ships in 2020

Length classes boats / ships	Total boats / ships inactive	Length average (m)	Age average	Total GT	Total kW
<6 m	7	5.31	17.57	8.83	94.55
6-12 m	38	7.86	18.53	69.77	112.71
TOTAL	**45**	**13.17**	**36.1**	**78.6**	**207.26**

Source: NMRDI

Measures to address critical issues:

- nationally
  - conservation of the biological diversity of marine ecosystems and protection of endangered species;
  - the use of selective fishing gear and techniques - non-destructive, cost-effective, which respects the environment and protects living marine resources;
  - development of mariculture and diversification of mariculture products.
- regionally
  - development of programs / projects to assess the state of fish stocks and to monitor the environmental conditions and biological factors that influence them;
  - creation of a regional fisheries database;
  - addressing rigorous action to combat illegal fishing.

CHAPTER III
SOIL

DISTRIBUTION OF LAND BY QUALITY CLASSES

The quality of agricultural land includes both soil fertility and the manifestation of other environmental factors compared to plants. From this point of view, the agricultural lands are grouped in 5 quality classes, differentiated according to the average credit rating (class I - 81-100 points ... class V - 1-20 points). The quality classes of the lands give their suitability for agricultural uses.

Table III.1. and figure III.1 show the classification of agricultural lands in quality classes according to the average credit rating on the country, without the application of pedo-amelioration measures.

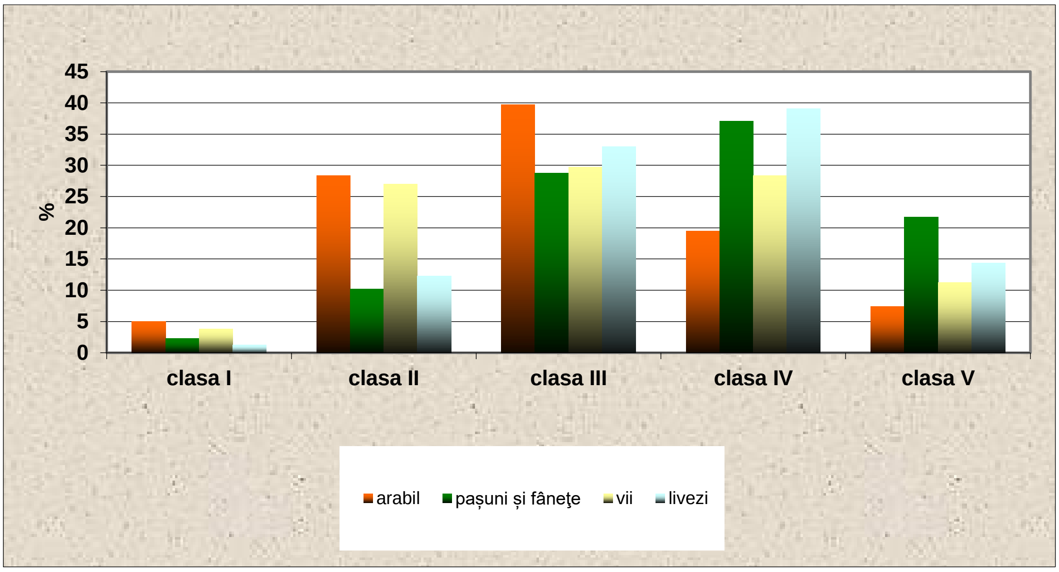
Table III.1 Classification of agricultural lands in quality classes according to the credit rating by country in 20201

Use	Total Mapped Area		Of which, by quality classes:				
	Ha	% of Total Agricul tural	Cls. I Ha % of Total Use	Cls. II Ha % of Total Use	Cls. III Ha % of Total Use	Cls. IV Ha % of Total Use	Cls. V Ha % of Total Use
Arable	9282417.72	63.72	464832.15 5.01	2635089.77 28.39	3686787.20 39.72	1808749.39 19.49	686959.21 7.40
Pastures + Hayfields	4795344.80	32.92	110648.04 2.31	488466.77 10.19	1379175.94 28.76	1777020.76 37.06	1040033.29 21.69
Vineyard	248329.26	1.70	9448.43 3.80	67043.61 27.00	73815.47 29.72	70426.08 28.36	27595.67 11.27
Orchards	241651.19	1.66	2954.34 1.22	29739.17 12.31	79693.95 32.98	94509.05 39.11	34754.68 14.38
Total Agricultural	14567742.97 (*)	100					

1) Source: RIPA

2) (*) The total agricultural area from the cadastral records on 31.12.2014: 14630072 ha

Figure III.1 Classification of agricultural lands in quality classes according to the credit rating by country (ha /% of total use) in 2020



Source:RIPA

LAND AFFECTED BY VARIOUS LIMITING FACTORS

RO 55
Romania indicator code: RO 55 EEA indicator code: CLIM 27
TITLE: **SOIL ORGANIC CARBON**
DEFINITION: Variation of organic carbon content in fertile soil.

From the inventory executed by RIPA in collaboration with 37 OSPA, in 1994-1998, for 41 counties, and with other research units, on about 12 million ha of agricultural land, of which on approximately 7.5 million ha of arable land (about 80% of the arable area), soil quality is affected to a greater or lesser extent by one or more restrictions.

Table III.2 Area of agricultural land affected by various limiting factors (restrictions) of productive capacity

Name of the factor	Affected area 1 thousand ha	
	Total	Arable
Drought	7100	
Periodic excess of moisture in the soil	3781	
Water erosion of the soil	6300	2100
Landslides	702	
Wind erosion	378	273
Excessive skeleton from the ground surface	300	52
Soil salting,	614	
of which with high alkalinity	223	135
Secondary soil compaction due to improper work ("plow sole")	6500	6500
Primary soil compaction	2060	2060
Crust formation	2300	2300
Low-extremely low reserve of humus in the soil	7485	4525
Strong and moderate acidity	3424	1867
Poor and very poor supply with mobile phosphorus	6330	3401
Poor and very poor supply of mobile potassium	787	312
Poor nitrogen supply	5110	3061
Microelement deficiencies (zinc)	1500	1500
Physico-chemical and chemical pollution of the soil, of which:	900	
- pollution with particles carried by the wind	363	
- destruction of the soil by various excavations	24	
Land cover with solid waste and residues	18	

Source: RIPA The same area may be affected by one or more restrictive factors

Soil salting it is felt on about 0.6 million ha, with some aggravation tendencies in the irrigated or drained and irrationally exploited perimeters, or in other areas with secondary salting potential, which amounts to another 0.6 million ha.

Damage to the structure and secondary compaction of the soil ("plow sole") is manifested on about 6.5 million ha; primary compaction is present on about 2 million ha of arable land, and the tendency of crust formation at the soil surface, on about 2.3 million ha.

Agrochemical state, analyzed on 66% of the agricultural fund, it has the following unfavorable characteristics:

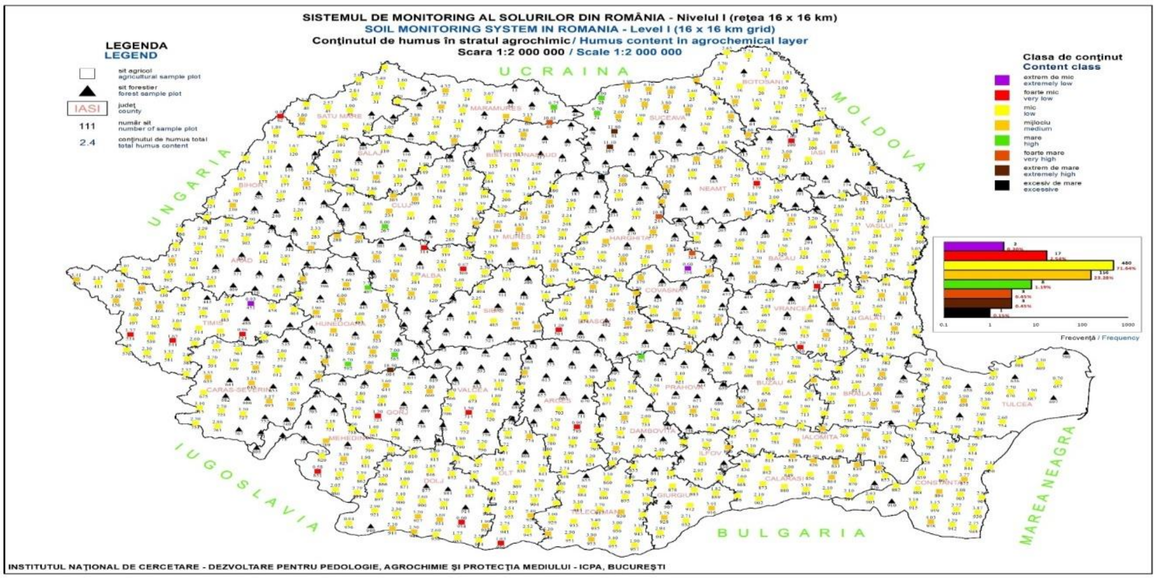
- strong and moderate soil acidity on about 3.4 million ha of agricultural land and moderate-strong alkalinity on about 0.2 million ha of agricultural land.
- poor to very poor supply of the soil with mobile phosphorus, on about 6.3 million ha of agricultural land;
- poor soil supply with mobile potassium, on about 0.8 million ha of agricultural land;
- poor soil supply with nitrogen, on approximately 5.1 million ha of agricultural land;
- extremely low to low supply of humus soil on almost 7.5 million ha of agricultural land;

- deficiencies of microelements on significant areas, especially zinc deficiencies, strongly felt in the cultivation of corn on about 1.5 million ha.

The humus content (H,%) determined in the agrochemical layer of the agricultural monitoring sites in the 16 x 16 km network at national level (2002-2011), showed values in the extremely small - excessively high range, the highest share returning to soils with low humus content (71.6%), followed by soils with medium content (23%) (Figure III.2):

Physico-chemical and chemical pollution of the soil affects about 0.9 million ha; Particularly strong aggressive effects on the soil are caused by pollution with heavy metals (especially Cu, Pb, Zn, Cd) and sulfur dioxide, identified especially in the critical areas of Baia Mare, Zlatna, Copșa Mică. In total, wind-borne pollution affects 0.363 million ha. Although, in recent years, a number of industrial units have been closed and others have reduced their activity, soil pollution remains high in the heavily affected areas. Oil and salt water pollution from oil, refining and transport operations is present on about 50,000 ha.

Figure III.2 Spatial distribution of humus content values in the agrochemical layer of agricultural sites monitoring network 16x16 km



Soil damage through various excavations affects about 24,000 ha, which is the most serious form of soil damage, encountered in the case of open pit mining, such as in the Oltenia mining basin. The quality of land affected by this type of pollution has decreased by 1-3 grades, so that some of these areas have become virtually unproductive.

Soil cover with solid waste and residues determined the removal from the agricultural circuit of about 18,000 ha of agricultural land.

The mentioned data are also highlighted by the results of the re-inventory of the lands affected by different processes (2002-2008) presented in summary in table III.3.

Table III.3 General situation of soils in Romania affected by different processes

General name of processes	Code	Area (ha) and degree of damage					
		weak	**moderate**	**strong**	**very**	**excessive**	**Total**
I. Processes of diverse soil pollution caused by industrial and agricultural activities	1. Pollution by up-to-date excavation works (mining open mining, gravel pits, quarries, etc.)	2	16	255	519	23640	**24432**
	2. Landfills, dumps, tailings ponds, floating tailings dumps, landfills, etc.	247	63	236	320	5773	**6639**

	3. Inorganic wastes and residues (minerals, inorganic materials, including metals, salts, acids, bases) from industry (including extractive industry)	10	217	207	50	360	**844**
	5. Radioactive materials	-	500	-	-	66	**566**
	6. Organic wastes and residues from light and food industry and other industries	13	19	12	17	287	**348**
	7.Waste, agricultural and forestry residues	37	65	90	642	306	**1140**
	8. Animal manure	2883	993	363	265	469	**4973**
	9. Human droppings		689	11		33	**733**
	17. Pesticides	1058	650	224	77	67	**2076**
	18. Contaminating pathogens	-	505	-	-	117	**617**
	19. Salt water (from oil extraction)	952	497	408	205	592	**2654**
	20. Petroleum products	-	473	248	5	25	**751**
	TOTAL I	**5,202**	**4,687**	**2,054**	**2,100**	**31,735**	**45,773**
II. Soils affected by slope and other processes	**10.** Surface erosion, landslides	944,763	1,013,854	749420	454150	210729	**3372916**
	15. Primary and / or secondary compaction	543371	544556	251268	125555	88526	**1553276**
	16. Contamination by sediments deposited following the erosion process (clogging)	4088	2389	4808	1178	836	**13299**
	TOTAL II	**1492222**	**1560799**	**1005496**	**580883**	**300091**	**4939491**
III. Soils affected by natural processes and / or anthropogenic	**11.** Salted soils (saline and / or alkaline)	264163	80639	52488	36867	50678	**484835**
	12. Acid soils	1766295	1926886	716794	186023	18132	**4614130**
	13. Excess of water	640738	1075063	420208	199479	185785	**2521273**
	14. Excess or deficiency of nutrients and organic matter	8358147	11604450	7549319	3306533	1373196	**32191645**
	TOTAL III	**11029343**	**14687038**	**8738809**	**3728902**	**1627791**	**39811883**
	Grand total	**12742504**	**16352013**	**9775795**	**4329915**	**1961232**	**451614952)**

Source: National Research and Development Institute for Pedology, Agrochemistry and Environmental Protection (RIPA) and the County Offices of Pedological and Agrochemical Studies (COPAS)
2) The same surface can be affected by several processes

SITES CONTAMINATED BY ANTHROPOGENIC PROCESSES

RO 15

Romania indicator code: RO 15
EEA indicator code: CSI 15

TITLE: **PROGRESS IN THE MANAGEMENT OF POTENTIALLY CONTAMINATED AND CONTAMINATED SITES**

DEFINITION: Management of potentially contaminated and contaminated sites - a system of measures and procedures aimed at preventing and minimizing any adverse effects of contaminants on human health and the environment, taking into account the following steps: identification, inventory, preliminary investigation and / or detailed investigation and assessing the risk of the potentially contaminated site to the environment and remedying the contaminated sites.

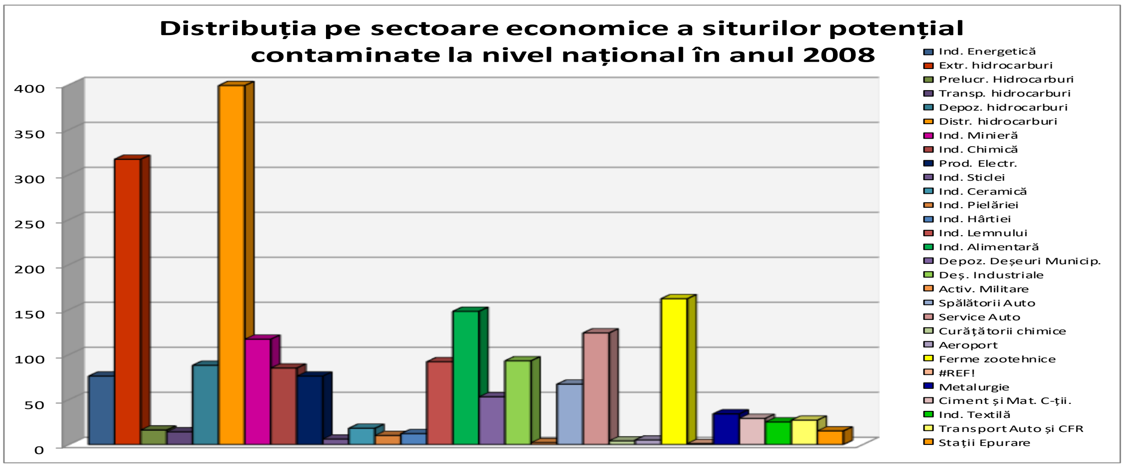
The management of potentially contaminated and contaminated sites aims to minimize any adverse effects of pollutants on human health and the environment.

A preliminary national inventory of potentially contaminated sites was prepared in 2008 based on the answers to the questionnaires provided by Annexes 1 and 2 of GD 1408/2007 on how to investigate and assess soil and subsoil pollution. According to this inventory, in Romania there were a number of 1628 potentially contaminated sites distributed by economic sectors as follows:

- 151 potentially contaminated sites in the mining and metallurgical industry;
- 834 potentially contaminated sites in the oil industry;
- 85 potentially contaminated sites in the chemical industry;

558 potentially contaminated sites from other activities (industry-specific activities: energy, electrical and electronics, glass, ceramics, textiles and leather, pulp and paper, wood, cement, machine building, food, military activities, specific land transport activities, airports , specific agricultural and zootechnical activities) (figure III.3).

Figure III.3 Distribution by economic sectors of potentially contaminated sites at national level in 2008

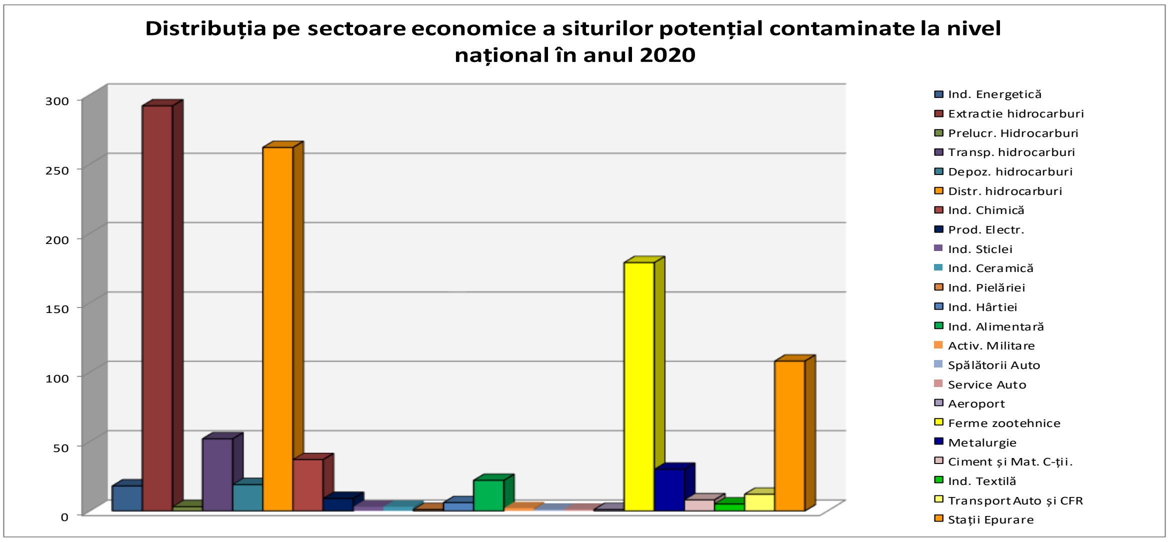


Source: NEPA

In 2015 it was published in the Official Gazette, GD no. 683/2015, which approved the National Strategy and the National plan for the management of Contaminated Sites in Romania, based on the updated national inventory by the National Environmental Protection Agency.

The synthetic situation at the level of 2020 of the sites where anthropogenic activities with soil impact have been / are carried out, based on the information communicated by the subordinated and centralized institutions at national level is represented graphically in figure III.4.

Figure III.4 Distribution by economic sectors of potentially contaminated sites at national level in 2020



Source: NEPA

Through the dynamics of the number of potentially contaminated sites and contaminated sites in 2015-2020, the investment needs and funding priorities for the potentially contaminated sites and contaminated sites sector for the 2014-2020 funding period estimated in the National Strategy and National Plan for Contaminated Sites Management in Romania has changed depending on the evolution of the implementation stage of the provisions of Law 74.

The National Strategy takes into account the provisions of existing EU directives related to the protection of the environment and human health, such as the Directive of the European Parliament and of the Council (2000/60 / EC) establishing a framework for Community action in the field of water policy. 83 / EEC) on the quality of water intended for human consumption, European Council Directive (80/68 / EEC) on the protection of groundwater against pollution caused by certain dangerous substances, European Council Directive 79/409 / EEC on the conservation of wild birds, Council Directive (92/43 / EEC) on the conservation of natural habitats and of wild fauna and flora An EU directive on soil protection is not in force, but there is a common general approach to issues related to soil contamination.This approach is based on the assessment and management of the risk associated with soil pollutants, the concept being called "Risk-Based Land Management" (RBLM).

Accidental pollution

In 2020, at the level of the entire country, 176 environmental incidents were reported (figure III.5).

For the period 2012-2020, the distribution by main environmental factors of environmental incidents is shown in Table III.4.

Table III.4 Distribution by main environmental factors of environmental incidents

Environmental factors / Years	2012	2013	2014	2015	2016	2017	2018	2019	2020
Air	115	27	24	34	24	38	44	47	43
Water	46	53	49	58	53	73	56	53	65
Water/Soil	3	3	5	10	3	5	11	8	2
Air/Soil	0	0	0	0	5	4	3	4	12
Air / Water	0	0	0	0	2	0	0	2	0
Soil	343	359	345	297	82	73	52	44	52

Source: NEPA

In 2020, 176 events were registered, 11.38% more than in 2019 (158 events), 6.02% more than in 2018 (166 events), 10.65% less than in 2017 (197 events) and 1.73% more than in 2016 (173 events).

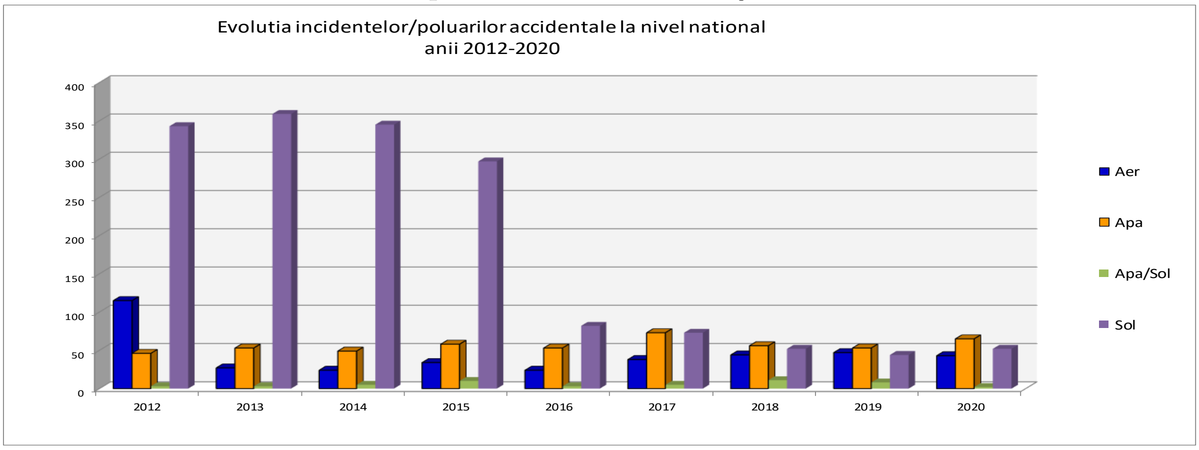
Over 90% of the environmental events recorded at national level in 2020 were caused by:

- the activities of extraction / exploitation of hydrocarbon deposits and transport of petroleum products, the causes being: age, degradation, cracking of pipelines;
- untreated or insufficiently treated domestic / technological and industrial wastewater discharges / discharges with or without fish mortality;
- vegetation fires, household waste landfills and industrial hall fires.

No major impact on environmental or human health factors was reported for environmental events in 2020.

The evolution of environmental incidents at national level for 2020 and the period 2012 - 2020 as well as the evolution of pollution depending on the affected environmental factors is presented graphically below.

Figure III.5 Evolution of accidental incidents / pollution at national level, years 2012-2020



Source: NEPA

USE AND CONSUMPTION OF FERTILIZERS

RO 25

Romania indicator code: RO 25
EEA indicator code: CSI 25

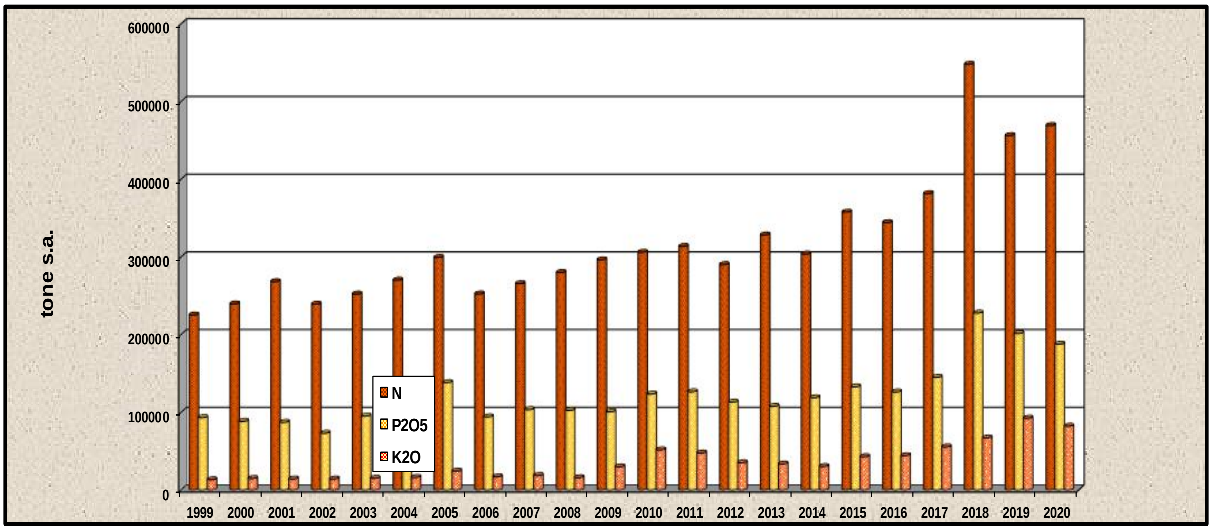
TITLE: **CRUDE BALANCE OF NUTRIENTS**

DEFINITION: The indicator estimates the excess nitrogen on agricultural land. This is done by calculating the balance between the total amount of nitrogen entering the agricultural system and the total amount of nitrogen leaving the system, per hectare of agricultural land.

Table III.5 Use of chemical fertilizers in Romanian agriculture in the period 1999-2020 (*Source: NIS)*

Year	Chemical fertilizers used (tons of active substance)				N + P2O5 + K2O (kg.ha-1)		Fertilized area, ha
	N	**P2O5**	**K2O**	**Total**	**Arable**	**Agricultural**	
1999	225000	93000	13000	331000	35.4	22.5	3640900
2000	239300	88300	14600	342200	36.5	23.0	3724578
2001	268000	87000	14000	369000	39.3	24.8	-
2002	239000	73000	14000	326000	34.7	22.0	-
2003	252000	95000	15000	362000	38.5	25.6	-
2004	270000	94000	16000	380000	40.3	25.8	-
2005	299135	138137	24060	461392	49.0	31.3	5737529
2006	252201	93946	16837	363000	38.5	24.7	5388348
2007	265487	103324	18405	387000	41.1	26.3	6422910
2008	279886	102430	15661	397977	42.3	27.1	6762707
2009	296055	100546	29606	426207	45.3	29	5889264
2010	305756	123330	51500	480586	51.0	32.7	7092256
2011	313333	126249	47362	486944	51.8	33.3	6893863
2012	289983	113045	34974	438002	46.8	30.0	6340780
2013	328088	107543	33324	468955	49.9	32.1	5965817
2014	303562	118574	30103	452239	48.2	30.9	6676089
2015	357352	132657	42693	532702	56.7	36.41	6574741
2016	344000	126000	44000	514000	54.7	35.13	6491498
2017	381342	144869	44259	581470	61.89	39.74	7272565
2018	547694	227605	66894	842193	89.8	57.7	6740184
2019	455964	201329	92258	749551	79.78	51.23	7373689
2020	468891	187577	81985	738453	78.60	50.48	7522224

Figure III.6 The use of chemical fertilizers in Romanian agriculture in the period 1999-2020



Source: NIS

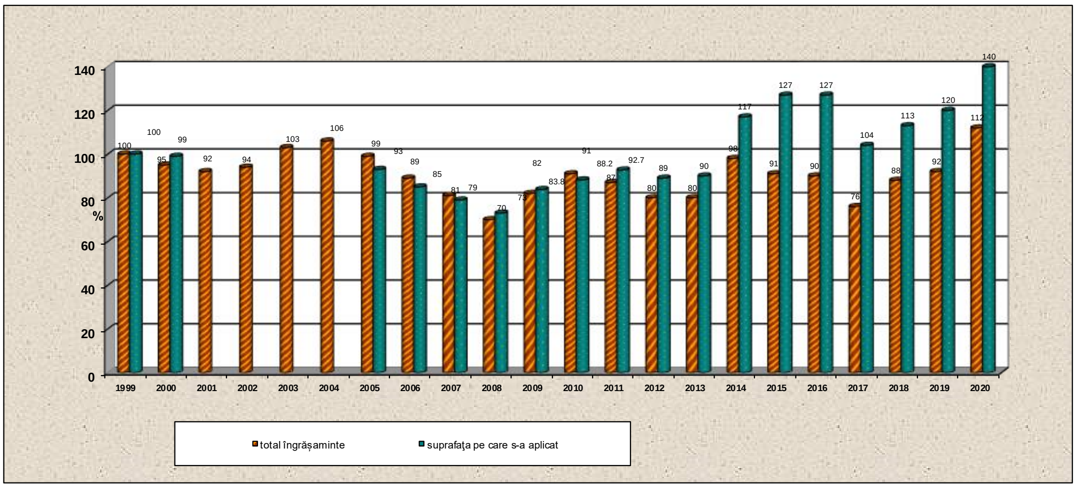
The amount of natural fertilizers (table III.6) applied in 2020, compared to the one used in 1999, increased by about 12%, and the area on which natural fertilizers were applied increased by 40% compared to 1999 and 20% compared to 2019, and the average amount applied in 2020 was 19.6 t / ha.

Table III.6 Quantity of natural fertilizers applied in the period 1999-20201

Year	Total fertilizers		The area on which it was applied		Share of applied area compared to the arable area	The average amount per ha			
						on the applied area		**on the agricultural area**	
	t	%	Ha	%	%	t / ha	%	t / ha	%
1999	16,685,312	100	680,016	100	6.90	24,537	100	1,129	100
2000	15,812,625	95	674,200	99	6.80	23,454	96	1,068	95
2001	15,327,000	92	-	-	-	-	-	1,032	91
2002	15,746,000	94	-	-	-	-	-	1,061	94
2003	17,262,000	103	-	-	-	-	-	1,173	104
2004	17,749,000	106	-	-	-	-	-	1,200	106
2005	16,570,000	99	632,947	93	6.78	26,179	107	1,124	100
2006	14,900,000	89	575,790	85	6.10	25,877	105	1,011	90
2007	13,498,000	81	536929	79	5.69	25,139	102	0.916	81
2008	11,725,220	70	494,412	73	5.25	23,715	97	0.797	71
2009	13,748,307	82	569,531	83.8	6.05	24,140	98	0.935	83
2010	15,231,715	91	600,052	88.2	6.37	25.38	103	1.04	92
2011	14,510,194	87	630293	92.7	6.70	23.02	94	0.99	88
2012	13.292.61713.2	80	605694	89	6.48	21.95	89.5	0.91	81
2013	82,877	80	613563	90	6.53	21.65	88.2	0.91	81
2014	16,261,702	98	795031	117	8.47	20.45	83.3	1.11	98
2015	15,212,325	91	864218	127	9.20	17.60	71.7	1.04	92
2016	14,927,000	90	862330	127	9.18	17.31	70.5	1.02	90
2017	12,625,073	76	708,364	104	7.54	17.8	72.5	0.86	76
2018	14,617,549	88	771,814	113	8.52	18.9	77.02	1.05	88
2019	15,323,344	92	816,713	120	8.69	18.8	76.6	1.05	93
2020	18,680,226	112	952,337	140	10.14	19.6	79.88	1.28	113

Source: NIS

Figure III.7 Quantity of natural fertilizers applied in the period 1999-2020



Source: NIS

CONSUMPTION OF PLANT PROTECTION PRODUCTS

In order to reduce the consumption of plant protection products, the National Action Plan on reducing the risks associated with the use of plant protection products, approved by Government Decision no. 135 of 12.03.2019, aims at protecting human health and the environment through objectives, measures and schedules.

The reduction of the consumption of plant protection products is achieved through measures to promote the integrated management of harmful organisms, the use of sustainable agricultural practices and the protection of specific areas.

Table III.7 Situation of consumption of plant protection products in the period 2000-2020

Specification	2000	2005	2010	2011	2012	2013	2014	2015	2017	2018	2019	2020
Arable area, thousands of ha	***9381.1***	***9420.2***	***9405***	***9352.3***	***9352.3***	***9392.3***	***9392.3***	***9395.3***	***9395.3***	***9376917***	***9425,564 ******	***9425,564******
Pesticide consumption												
Total (tsa), of which:	***8,341.64***	***6,790,4433***	***7,545,894***	***6,582,935***	***6,366,074***	***6566378***	***6723793***	***6608037***	***6,859,307***	***5,037,509***	***5,346,540***	***5265007***
- insecticides	**1,343.05**	**9689147**	**2,061,336**	**993324**	**827801**	**822953**	**635076**	**716,308**	**1,001,430**	**613616**	**582,794**	**632530**
- fungicides	**3,959.16**	**3,304,7896**	**2,066,323**	**1,989,229**	**1905005**	**1987348**	**2293286**	**2,246,188**	**2,282,330**	**1,860,468**	**1,711,491**	**1813857**
- herbicides	**3,039.43**	**2,513,254**	**3,418,235**	**3,600,382**	**3633268**	**3756077**	**3795431**	**3,645,541**	**3,575,547**	**2,563,425**	**3,052,255**	**2818620**
Growth regulators	-	**0.357**	-	-	-	-	-	-	-	-	-	
Various products	-	**3128**	-	-	-	-	-	-	-	-	-	
What goes on 1 ha of arable land												

Total (kg)	0.89	0.72	0.80	0.70	0.68	0.865	0.72	0.7	0.73	0.54	0.567	0.559
- insecticides	0.14	0.10	0.22	0.11	0.09	0.108	0.07	0.076	0.106	0.069	0.062	0.067
- fungicides	0.42	0.35	0.22	0.21	0.20	0.262	0.244	0.239	0.243	0.198	0.182	0.192
- herbicides	0.33	0.27	0.36	0.38	0.39	0.495	0.404	0.388	0.381	0.273	0.323	0.299

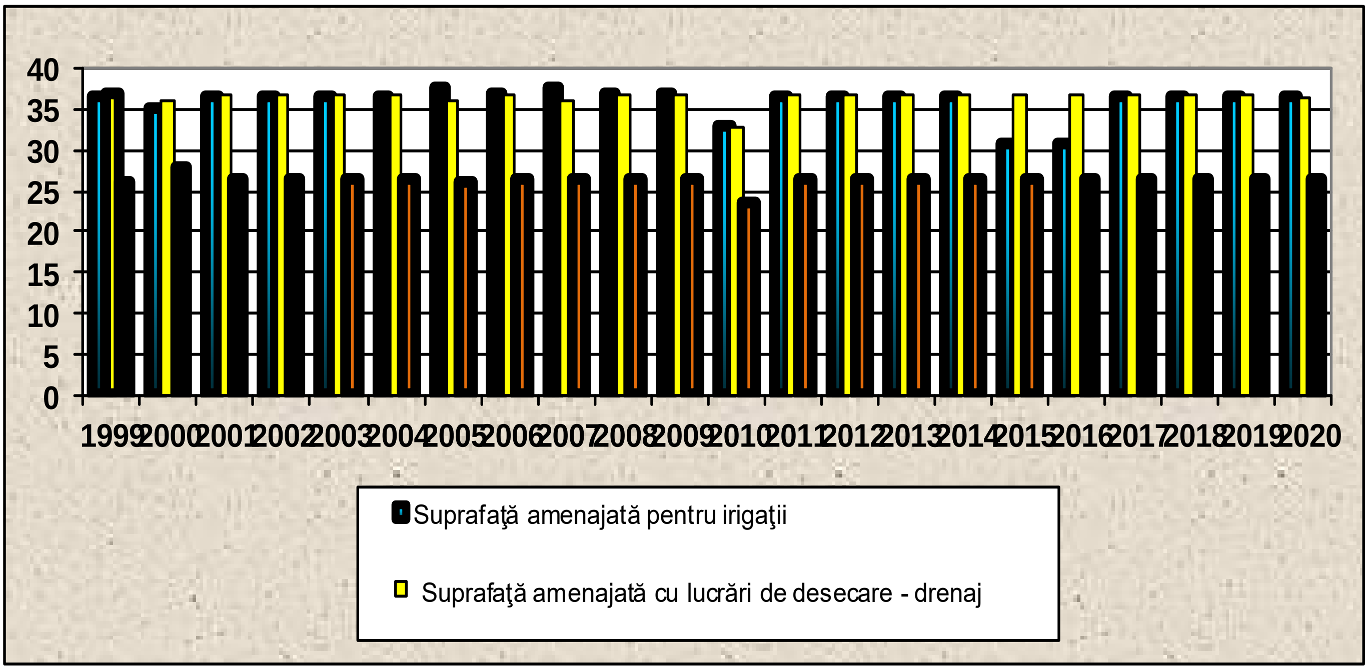
Source: MARD, NIS
**) NIS data available June 2019;*
***) NIS updated data 28.04.2020;*
****) research conducted by MARD (for 2018 * data available on June 15, 2019, for year 2018 ** updated data 2020).*

EVOLUTION OF LAND IMPROVEMENT AREAS

Climate change in recent years in Romania reflected by changes in temperature and rainfall affect a significant part of the country's agricultural area, especially areas in the south, southeast and east.
Agriculture is very vulnerable to the impact of climate change given that the associated risks are not evenly distributed. There are regional differences both in the probability of occurrence of extreme phenomena such as drought and episodes of heavy rainfall, and in the vulnerability, resilience and adaptive capacity of rural communities to climate change.
The purpose of land improvement works is to ensure an adequate level of soil moisture, which allows or stimulates plant growth and to ensure the protection of land from floods, landslides and erosion.

Figure III.8 Evolution of land improvement arrangements on agricultural land (%) in the period 1999-2020

Source: NIS, NALI



AREA FOR ECOLOGICAL AGRICULTURE

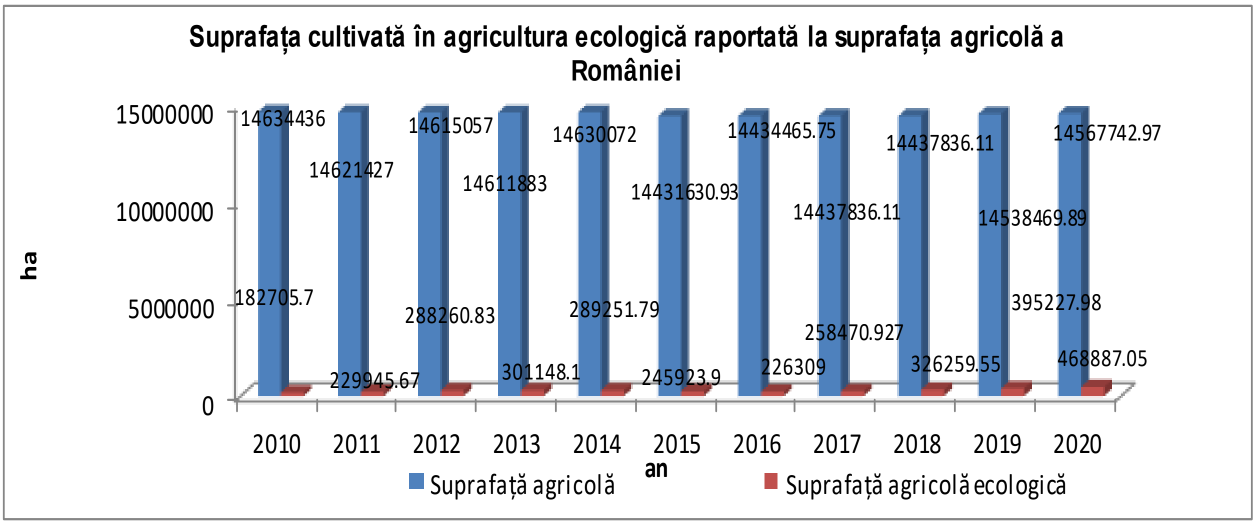
RO 26
Romania indicator code: RO 26 EEA indicator code: CSI 26
TITLE: **AREA FOR ECOLOGICAL AGRICULTURE**
DEFINITION: The indicator measures the share of area devoted to organic farming (the sum of current organic farming areas and areas undergoing transformation) as a proportion of the total agricultural area.

Organic agriculture is a sector for which Romania has great potential for development, being an essential tool on the road to environmental improvement, through soil conservation, water quality improvement, biodiversity and nature protection.

The European and national legal framework governing the organic production sector must aim at achieving the objective of ensuring fair competition and the proper functioning of the internal market for organic products, as well as maintaining and justifying consumer confidence in products labeled as organic.

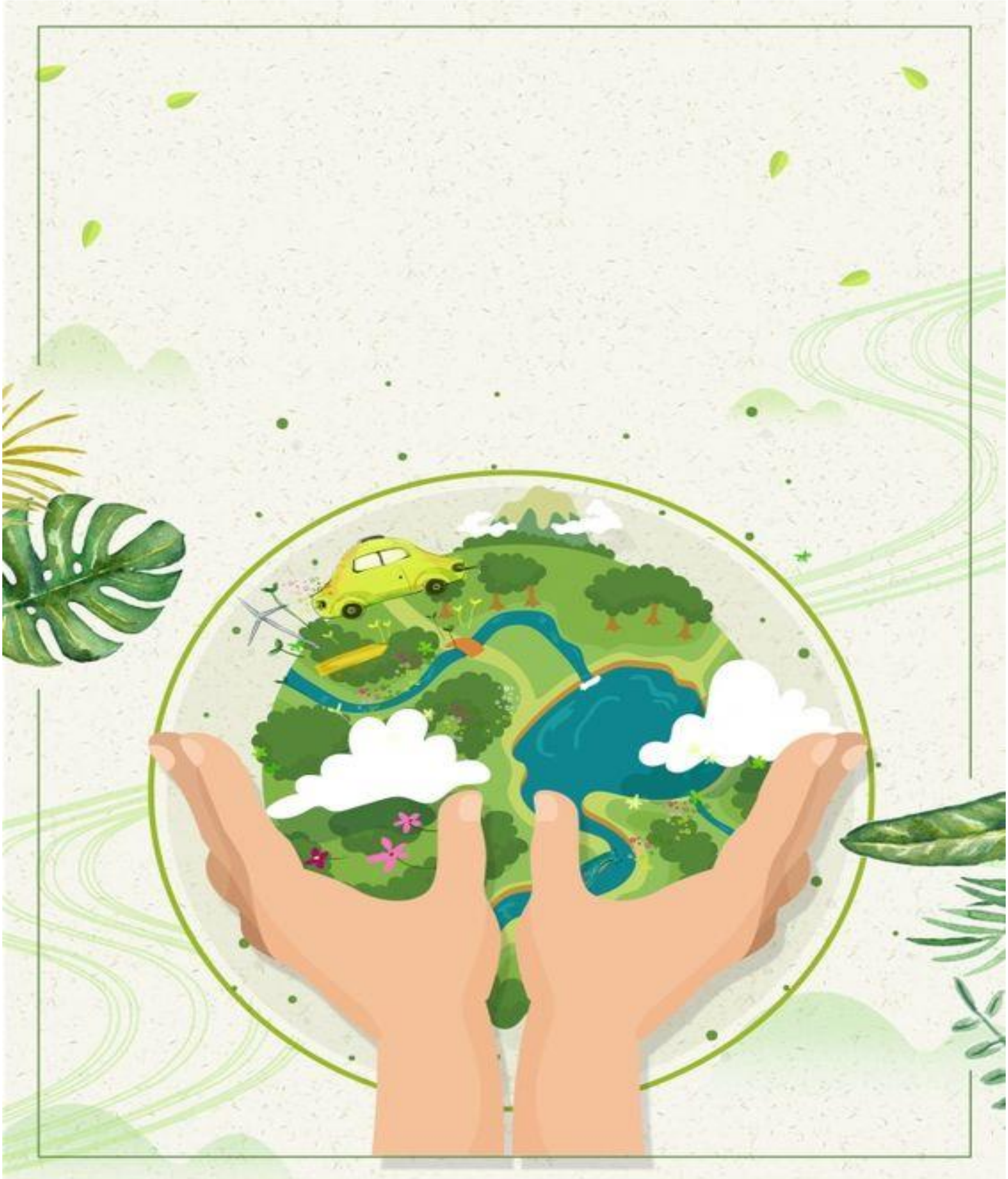
Ministry of Agriculture and Rural Development (MARD) is the competent authority for the organic agriculture sector in Romania, in accordance with the provisions of art. 27 of Regulation (EC) no. 834/2007.

Figure III.9 The cultivated area in organic agriculture related to the agricultural area of Romania



Source: RIPA, MARD

Chapter IV
LAND USE



DISTRIBUTION OF LAND BY COVERAGE / USE CATEGORIES

Table IV.1 and Figure IV.1 show that in 2014 the main share, as in previous years, was held by agricultural land (61.37%), followed by forests and other land with forest vegetation (28, 24%). Other lands occupy 10.4% of the country's surface (waters, ponds, yards, constructions, roads, unproductive lands).

Table IV.2 shows the distribution of agricultural land by type of use in 2014.

The surface of the arable lands occupies 65.2% of the total agricultural surface, and the rest is distributed between pastures (20.8%), hayfields (11.1%), vineyards (1.5%) and orchards (1.4%).

According to the property structure at the end of 2014, private agricultural property amounted to 93.64% of the total agricultural area and consisted of: private property of the state, territorial administrative units, legal entities and individuals.

As a result of the increase of the demographic index, in the last 65 years, the arable area per inhabitant decreased from 0.707 ha in 1930 to 0.511 ha in 2014, practically the resources within this use being exhausted.

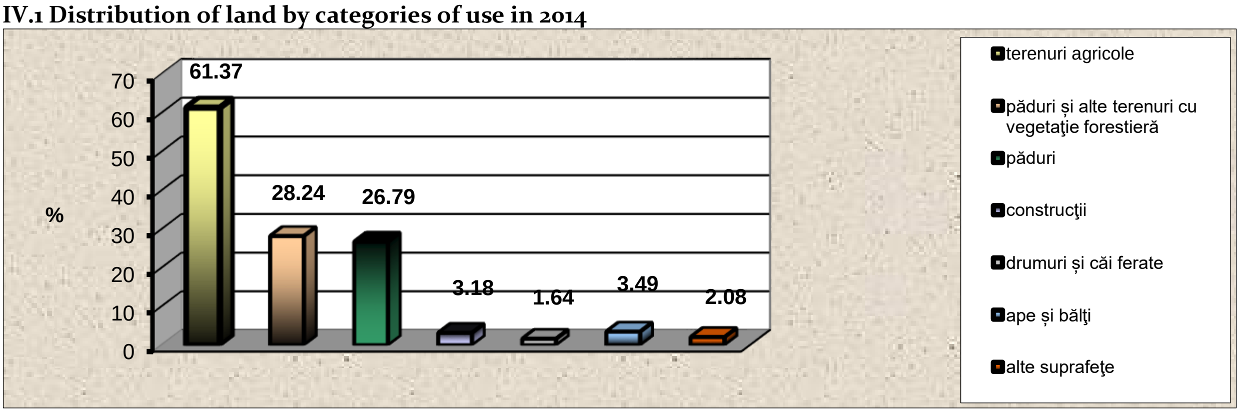
Table IV.1 Distribution of land by categories of use in 20141)

Category of use	Area,	
	mii ha	%
Agricultural land	14630.1	61.37
Forests and other lands with forest vegetation, of which:	6734.0	28.24
Forests	6387.0	26.79
Constructions	758.3	3.18
Roads and railways	389.8	1.64
Waters and puddles	831.5	3.49
Other areas 2	495.4	2.08
Total	23.839.1	100

1) According to the Statistical Yearbook of Romania, 2016: Until the completion of the action of cadastre of the country's surface, by the National Agency for Cadastre and Real Estate Advertising, the official data series remain with the values for 2014 (according to the specifications of the Statistical Yearbook of Romania - 2016).

2) Unproductive land

Figure IV.1 Distribution of land by categories of use in 2014



Source: Statistical Yearbook of Romania, year 2016

Table IV.2 Distribution of agricultural land by types of use in 20141

Type of use	Area	
	mii ha	%
Agricultural total	14,630.1	100
Arable	9395.3	65.2
Pastures	3272.2	20.8

Meadows	1556.3	11.1
Vineyard	209.4	1.5
Orchards	196.9	1.40
Of which private property	13699.7	93.64

Source: Statistical Yearbook of Romania, 2016

1) According to the Statistical Yearbook of Romania, 2016: Until the completion of the action of cadastre of the country's surface, by the National Agency for Cadastre and Real Estate Advertising, the official data series remain with the values for 2014 (according to the specifications of the Statistical Yearbook of Romania - 2016)

THE IMPACT OF LAND USE CHANGE ON AGRICULTURAL LAND

Changes in agricultural land use in the last 5 years are shown in Table IV.3.

For 2015 and 2016, respectively, NIS will publish information for this chapter so that in the following we will illustrate the situation until 2014.

Table IV.3 Distribution of land by categories of use in the period 2010 - 2014

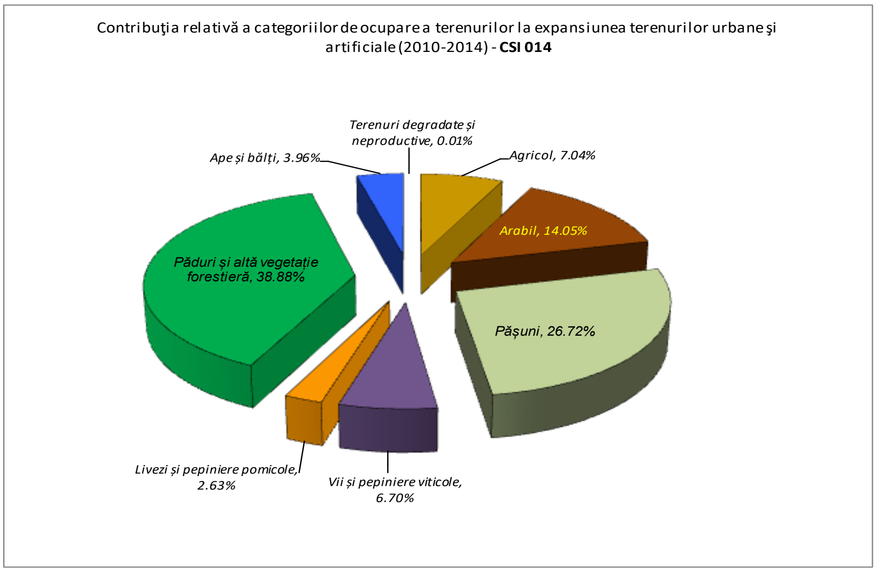
The manner of use of the land fund	Hectares per year				
	2010	**2011**	**2012**	**2013**	**2014**
Agricultural	14634436	14621427	14615057	14611883	14630072
Arable	9404008	9379489	9392262	9389254	9395303
Pastures	3288725	3279251	3270610	3273961	3272165
Meadows	1529561	1554680	1544957	1541854	1556246
Vineyards and wine nurseries	213571	211347	210475	210270	209417
Orchards and fruit nurseries	198571	196660	196753	196544	196941
Non-agricultural land, total	9204635	9217644	9224014	9227188	9208999
Forests and other forest vegetation	6758097	6759140	6746906	6742056	6734003
Busy with water, puddles	833949	822202	836856	835997	831495
Busy with construction	728261	749386	752361	758303	758285
Communications and railways	388903	388194	388262	389895	389795
Degraded and unproductive land	495425	498722	499629	500937	495421

Source: NIS, TEMPO-Online Database

From the data processing, in figures IV.3 and IV.4, there is an increase of the pressure on the areas occupied by forests and pastures, due to the expansion of the urban area to the detriment of the extra-urban area that led to deforestation and the reduction of hayfields. expansion as surface. Also, the areas occupied by forests have been reduced by massive felling over the capacity to restore forests.

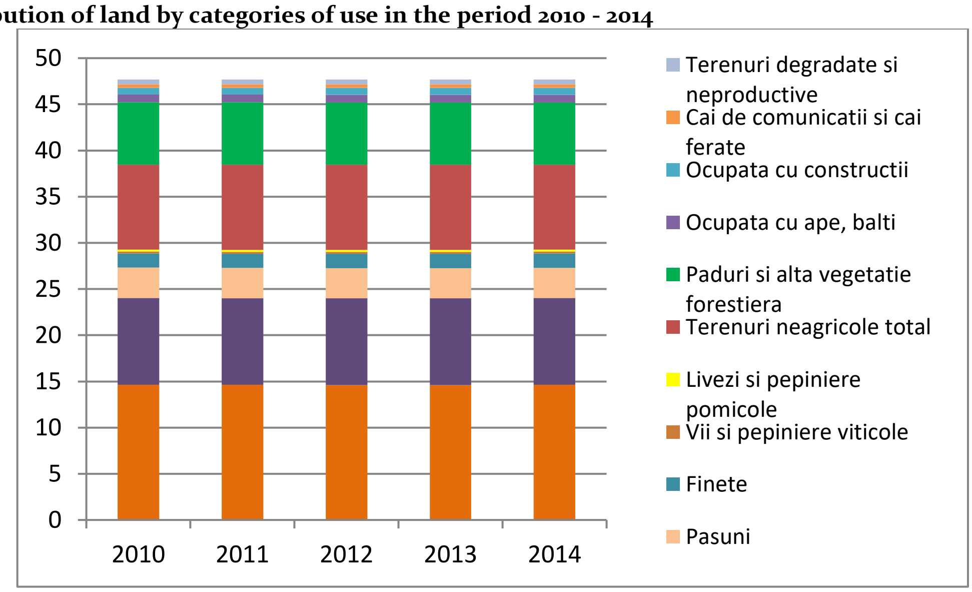
With regard to arable land, the pressure on it has increased as a result of the migration of labor from the agricultural sector to other Community countries and through the degradation and lack of investment in the irrigation system. In the vineyards and nurseries sector, the pressure was caused by the aging of vineyards and their non-replacement of young crops.

Figure IV.2 The relative contribution of land use categories to the expansion of urban and artificial lands (2010-2014) - CIS 014



Source: NIS, TEMPO-Online Database

Figure IV.3 Distribution of land by categories of use in the period 2010 - 2014



Source: NIS, TEMPO-Online Database

THE IMPACT OF LAND USE CHANGE ON HABITATS

RO 44

Romania indicator code: RO 44
EEA indicator code: SEBI 13

TITLE: **FRAGMENTATION OF NATURAL AND SEMI-NATURAL AREAS**

DEFINITION: The indicator shows differences in the average of natural and semi-natural surfaces, based on terrain maps made by interpreting satellite images.
The indicator is intended to address the issue of ecosystem integrity by providing a "measure" of land disintegration on the entire surface of Romania.

Land use change can cause habitat fragmentation and thus affect the distribution of species occupying a certain area.

Land conversion for the purpose of urban expansion, development of transport infrastructure, industrial development, agriculture, tourism is the main cause of fragmentation of natural and semi-natural habitats. It is currently estimated that about 6.5% of the country's land is used for housing construction. The chaotic construction, without respecting a coherent and consistent urban strategy leads to the unwise use of the areas intended for constructions and their extension to the detriment of the natural ones.

Uncontrolled urban development and population transfer from rural areas, accompanied by the destruction of ecosystems in urban areas (reduction of green spaces, construction on green spaces, cutting of trees, destruction of nests, etc.) and insufficient measures for proper collection and treatment of waste and wastewater have considerable negative effects on biodiversity.

DETERMINANT FACTORS OF LAND USE CHANGE

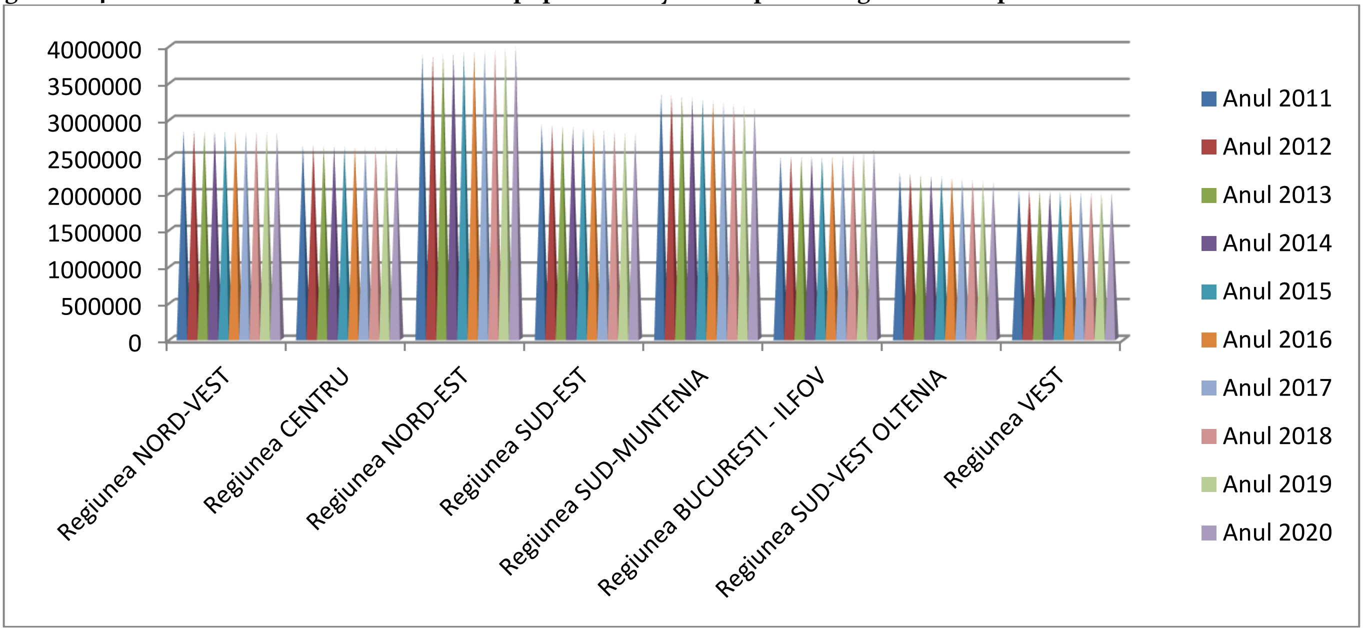
CHANGE OF POPULATION DENSITY

Table IV.4 Numerical distribution of the total population by development regions in the period 2011 - 2020

National population by development regions	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NORTH-WEST region	2850614	2847763	2844387	2841110	2838651	2836241	2836219	2835510	2833789	2832940
CENTER region	2648936	2646270	2643673	2641067	2638707	2636047	2634748	2633402	2631033	2628881
NORTH-EAST region	3883093	3879911	3885934	3899889	3918985	3929282	3939938	3958248	3979271	3999777
SOUTH-EAST region	2931355	2921160	2912373	2900677	2887747	2873851	2859897	2844235	2828048	2812450
SOUTH-MUNTENIA region	3353951	3337516	3320102	3300634	3282123	3262847	3242876	3219020	3194237	3167385
BUCHAREST - ILFOV region	2491806	2498698	2500564	2498984	2487485	2498318	2510877	2536859	2571442	2605519
SOUTH-WEST OLTENIA region	2277990	2264978	2251542	2237651	2223112	2207918	2194235	2179006	2163319	2146177
WEST region	2042854	2037445	2032403	2026166	2021443	2016294	2012053	2007273	2003368	1998689

Sources: NIS, TEMPO-Online Database

Figure IV.4 Numerical distribution of the total population by development regions in the period 2011 - 2020



Sources:NIS, TEMPO-Online Database

URBAN EXPANSION

Continued and rapid urban expansion threatens Europe's ecological, social and economic balance, says a new report from the European Environment Agency (EEA). This occurs when the rate of conversion of land use exceeds the rate of population growth. More than a quarter of the European Union's territory has already been urbanized, the report said. Europeans are living longer and more and more people are living alone, creating a greater demand for housing.

Land occupancy

RO 14
Romania indicator code: RO 14 EEA indicator code: CSI 14
TITLE: **LAND OCCUPANCY**
DEFINITION: The indicator shows the quantitative change of the occupation of agricultural, forested, semi-natural and natural lands by the expansion of urban and artificial lands. It includes waterproofed construction areas and urban infrastructure, as well as urban green spaces, sports and human recreation complexes.

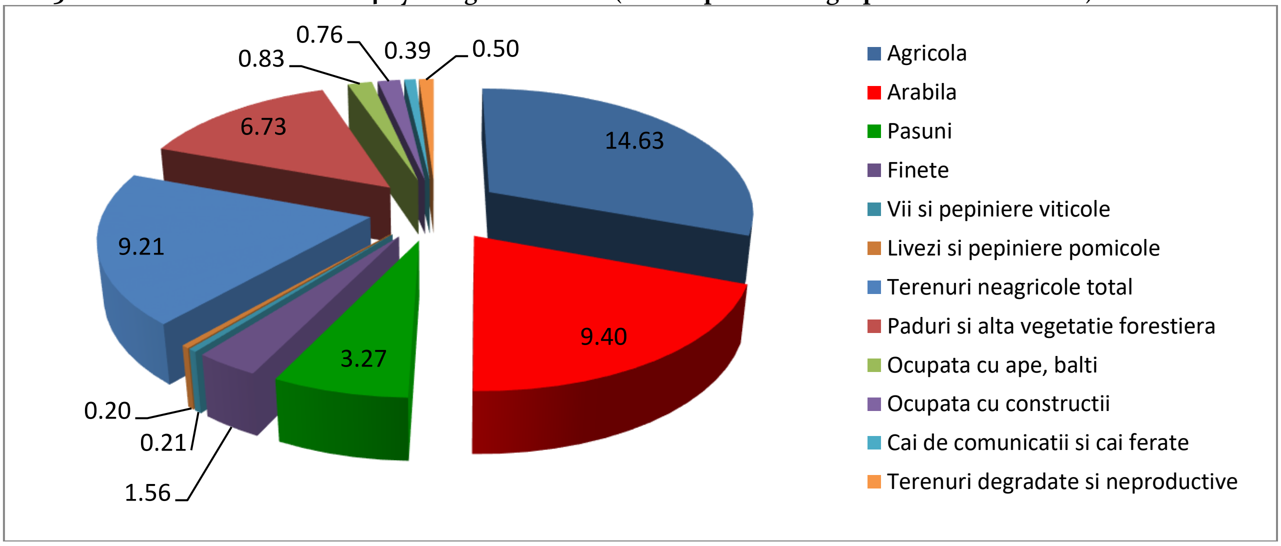
Table IV.5 Distribution of land in 2014 by categories of use

Land fund area by use mode	ha
Agricultural	14630072
Arable	9395303
Pastures	3272165
Meadows	1556246
Vineyards and wine nurseries	209417
Orchards and fruit nurseries	196941
Non-agricultural land, total	9208999
Forests and other forest vegetation	6734003
Busy with water, puddles	831495

Busy with construction	758285
Communications and railways	389795
Degraded and unproductive land	495421

Sources: NIS, TEMPO-Online Databasehttp://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=AGR101A

Figure IV.5 Distribution of land in 2014 by categories of use (data expressed in graph in millions of ha)



Source: NIS

Land use through transport infrastructure

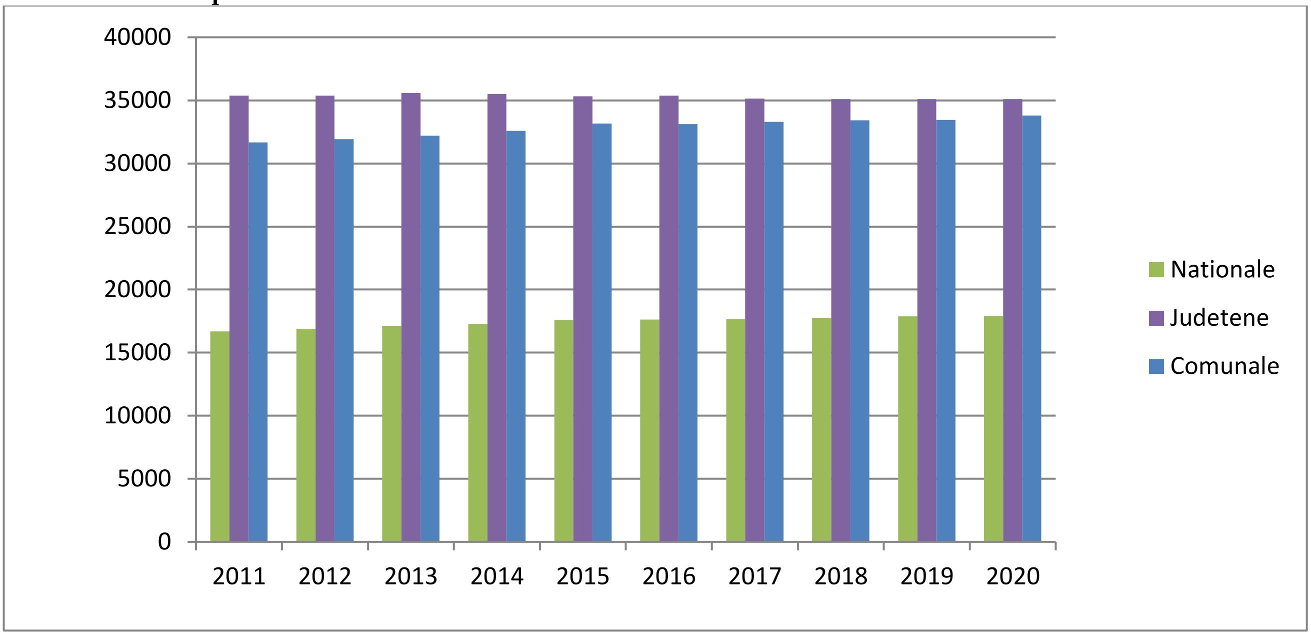
RO 68
Romania indicator code: RO 68 EEA indicator code: TERM 08
TITLE: **LAND OCCUPANCY THROUGH TRANSPORT INFRASTRUCTURE**
DEFINITION: The indicator shows the land occupied by the transport infrastructure.

Table IV.6 Road transport infrastructure in Romania between 2011 and 2020

Road categories	Length kilometers per year									
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
National	16690	16887	17110	17272	17606	17612	17654	17740	17873	17913
County	35374	35380	35587	35505	35316	35361	35149	35085	35083	35085
Communal	31674	31918	32190	32585	33158	33107	33296	33409	33435	33793

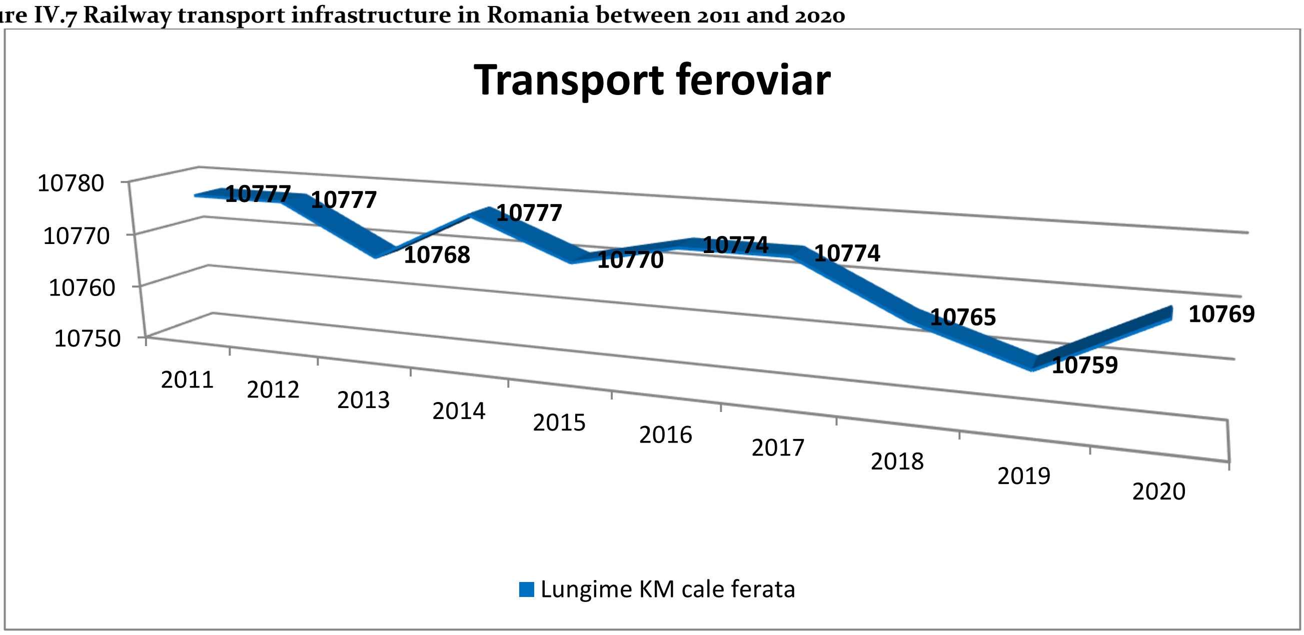
Sources: NIS, TEMPO-Online Database

Figure IV.6 Road transport infrastructure in Romania between 2011 and 2020



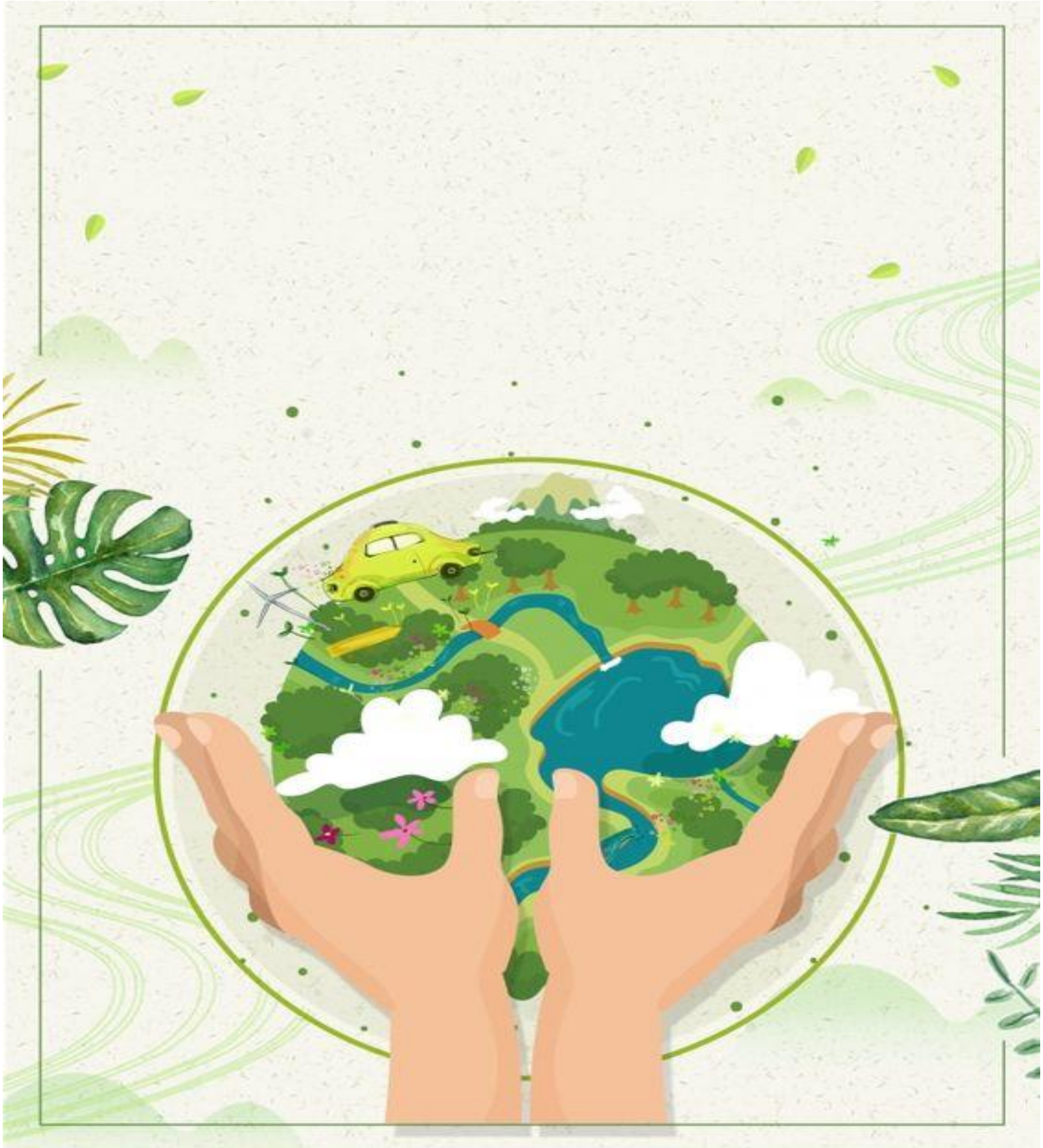
Sources: NIS, TEMPO-Online Database

Figure IV.7 Railway transport infrastructure in Romania between 2011 and 2020



Source: NIS, TEMPO-Online Database

INDICATORS REPORT 2020
Chapter V
NATURE PROTECTION AND BIODIVERSITY



Trends in the conservation status of ecosystems and habitats

RO 40
Romania indicator code: RO 40 EEA indicator code: SEBI 005
TITLE: **HABITATS OF EUROPEAN INTEREST IN ROMANIA**
DEFINITION:The indicator shows the changes in the conservation status of habitats of European interest.

The indicator shows the evolution of the conservation status of habitats of European interest (listed in Annex I of the Habitats Directive) and is based on data collected / monitored in accordance with the reporting obligations set out in Article 17 of the Habitats Directive. The conservation status of species and habitats of Community interest is assessed at national and biogeographical level, compared to a 3-level scale,known as of "traffic lights",so:

- **Favorable state of conservation: green indicator**- any pressure or threat that influences the habitat is not significant and the habitat is viable in the long term;
- **Unsuitable state of preservation: orange indicator**- used for situations where a change in existing administration or policy is needed, but the danger of extinction is not so great;
- **Totally inadequate condition: red indicator**- serious threats and pressures influence the maintenance of the habitat.

The "unfavorable" category has been divided into two classes to allow for the improvement or subsequent deterioration:

- U1 - Unfavorably inadequate
- U2 - Unfavorably bad.

Romania prepared and submitted to the European Commission, in 2013, the first report on the conservation status of habitats of community interest.

The monitoring data on the conservation status of habitats of Community interest for the period 2012-2018, based on Article 17 of the Habitats Directive, will be updated in the ongoing project of the Ministry of Environment, Waters and Forests *"Completing the level of knowledge of biodiversity by implementing the system for monitoring the conservation status of species and habitats of community interest in Romania and reporting based on Article 17 of the Habitats Directive 92/43 / EEC*".

This report presents the results of the monitoring of the conservation status of habitats of Community interest, from 2007-2012, provided by experts from the Project "*Monitoring the conservation status of species and habitats in Romania based on Article 17 of the Habitats Directive*", implemented by the Institute of Biology of the Romanian Academy, Bucharest, completed in 2013, project implemented in partnership with the Ministry of Environment, Waters and Forests - Biodiversity Directorate and financed by the Sectoral Operational Program - Environment (SOP-Environment), priority axis 4.

There were identified the following major habitat classes:

- Coastal habitats with halophilous vegetation;
- coastal sand dunes and continental dunes;
- freshwater habitats;
- temperate meadows and bushes;
- natural and semi-natural grass formations;
- swamps and peat bogs;
- rocky habitats and caves;
- forests.

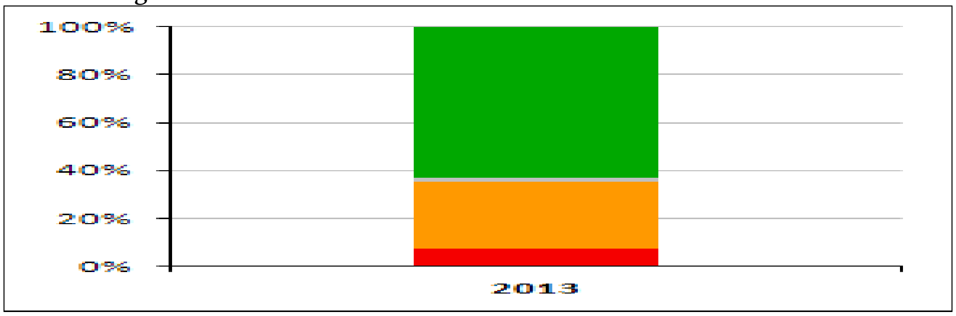
Table V.1. Number of habitats reported according to Annex I of the Habitats Directive

Bioregion	HABITATS	
	Annex I	
	Non-priority	Priority
Number of habitats in Romania	60	25
	85	

Alpine (ALP)	37	11
Pontic Black Sea (BLS)	18	3
Continental (CON)	34	17
Pannonian (PAN)	11	5
Stepic (STE)	18	6
Black Sea (MBLS)	6	

Source: ibis.anpm.ro and National Summary for Article 17 Romania - 2007-2012 by EC

Figure V.1. Global assessment of habitat conservation status

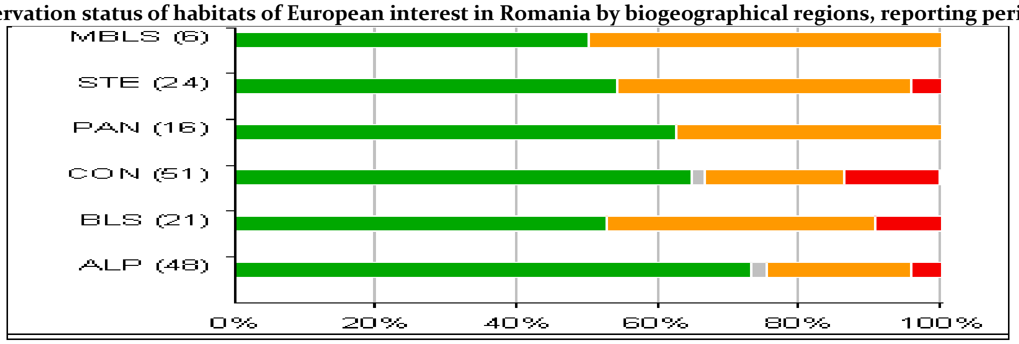


Source: ibis.anpm.ro and National Summary for Article 17 Romania - 2007-2012 by EC

FV - Favorable
NA - Unreported
XX - Unknown
U1 - Unfavorably inadequate
U2 - Unfavorably bad

It is observed that overall the habitats in Romania evaluated and reported are in a percentage of over 60% in a favorable state of conservation and approximately 7% of them were assessed with a "totally unfavorable state".

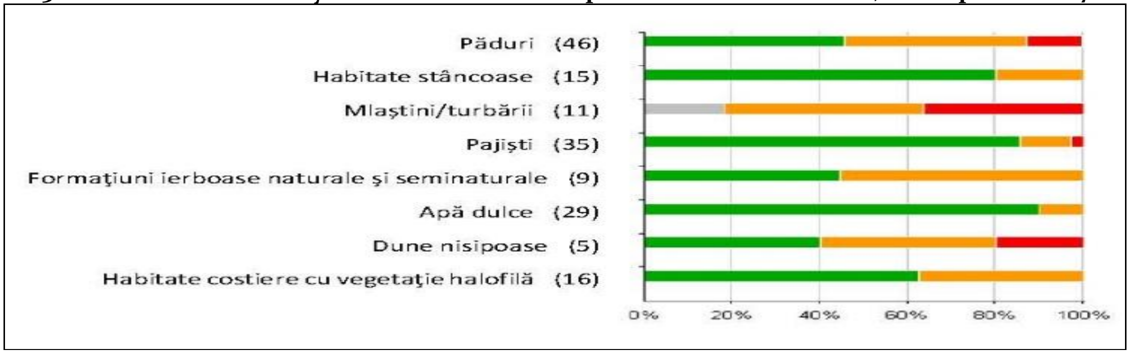
Figure V.2. Conservation status of habitats of European interest in Romania by biogeographical regions, reporting period 2007-2012 (%)



Source: ibis.anpm.ro and National Summary for Article 17 Romania - 2007-2012 EC
Note:*The number in each bracket corresponds to the number of assessments at the level of each biogeographical region for the reporting period*

In the alpine region there are most habitats whose conservation status is favorable, a region followed in order by the biogeographical regions: continental, pannonian, stepic and pontic.

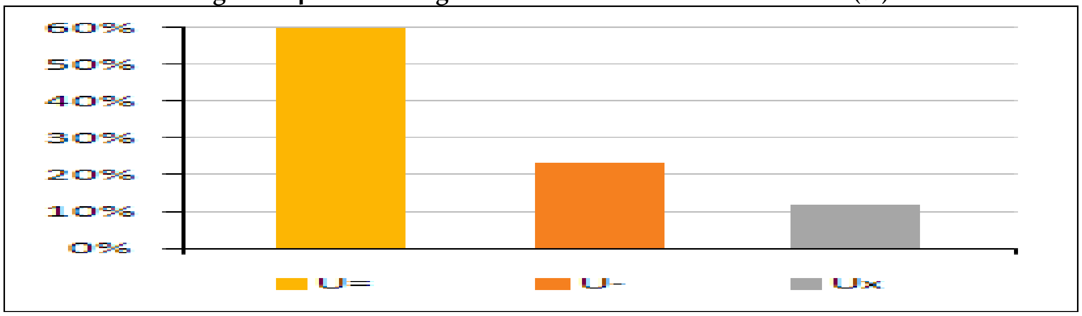
Figure V.3. Conservation status by habitat classes of European interest in Romania, in the period 2007-2012 (%)



Source: ibis.anpm.ro and National Summary for Article 17 Romania - 2007-2012 by EC
***Note**: The number in each bracket corresponds to the number of evaluations for the period 2007-2012*

The habitat class of swamps and peat bogs was assessed with an unfavorable state of conservation in a percentage of over 80%, in the period 2007-2012.

Figure V.4. Habitats - general trend of conservation status (%)



Source: ibis.anpm.ro and National Summary for Article 17 Romania - 2007-2012 by EC

Note:
(U +) = unfavorable (inadequate or bad) with a tendency to improve
(U =) = stable unfavorable
(U-) = unfavorable with a tendency to worsen
(Ux) = unfavorable with unknown tendency

Trends regarding the situation of priority species

RO 07
Romania indicator code: RO 07 EEA indicator code: CSI 007 / SEBI 003
TITLE: **SPECIES OF EUROPEAN INTEREST**
DEFINITION: The indicator shows changes in the conservation status of species of European interest. It is based on data collected under monitoring obligations in accordance with Article 11 of the Habitats Directive (92/43 / EEC).

Indicator RO07 shows changes in the conservation status of species of Community interest, based on data collected under monitoring obligations in accordance with Article 11 of the Habitats Directive. It refers to species of Community interest (listed in Annexes II, IV and V of the Habitats Directive), with the exception of bird species.

The conservation status of the species is assessed nationally and biogeographically and reported on a 3-level scale, coded differently by color, as mentioned for the RO40 indicator.
It also estimates the overall state of conservation, during the reporting period and the general trends of the state of conservation (ratings: improved "+", declining "-", stable "=", unknown "x").

For the definition of the RO07 indicator at national level, relevant are the data and information that Romania reported to the European Commission, regarding the conservation status of species of community interest, as a result of the monitoring carried out within the projects implemented by the Ministry of Environment, Waters and Forests. .
The Ministry of Environment, Waters and Forests is currently carrying out a project co-financed by the Cohesion Fund through the Large Infrastructure Operational Program 2014-2020 "*Completing the level of biodiversity knowledge by implementing the monitoring system of conservation of species and habitats of community interest Romania and reporting under Article 17 of the Habitats Directive 92/43 / EEC* ", which aims to monitor the species in the annexes of the Habitats Directive throughout the country, both inside and outside protected natural areas.

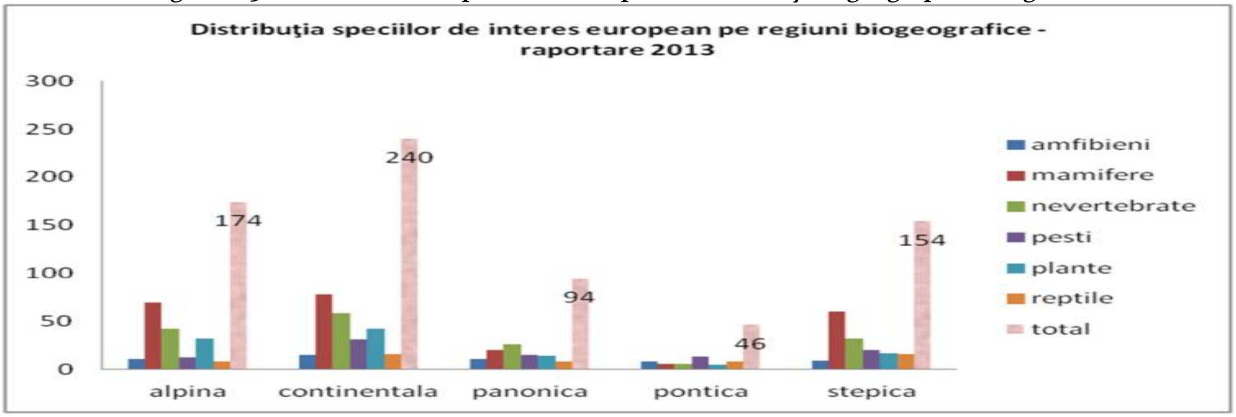
This report presents the results of the monitoring of species of community interest, from 2007-2012, provided by experts from the Project *"Monitoring the conservation status of species and habitats in Romania based on Article 17 of the Habitats Directive"*, implemented by the Institute of Biology of the Romanian Academy, Bucharest in partnership with the Ministry of Environment, Waters and Forests and completed in 2013.

Table V.2. Number of species in the Annexes to the Habitats Directive

Bioregion	SPECIES					
	Annex II		Annex IV		Annex V	
	Non-priority	Priority	Including those in Annex II	Without those in Annex II	Including those in Annex II	Without those in Annex II
Number of species in Romania	147	15	174	50	35	26
	162		**174**		**35**	
Alpine (ALP)	74	7	94	33	20	18
Pontic Black Sea (BLS)	25	1	24	11	15	9
Continental (CON)	114	12	140	44	29	21
Pannonian (PAN)	49	2	55	20	14	10
Stepic (STE)	64	3	87	39	19	13
Black Sea (MBLS)	2		3	1		

Source: ibis.anpm.roand National Summary for Article 17 Romania - 2007-2012 by EC

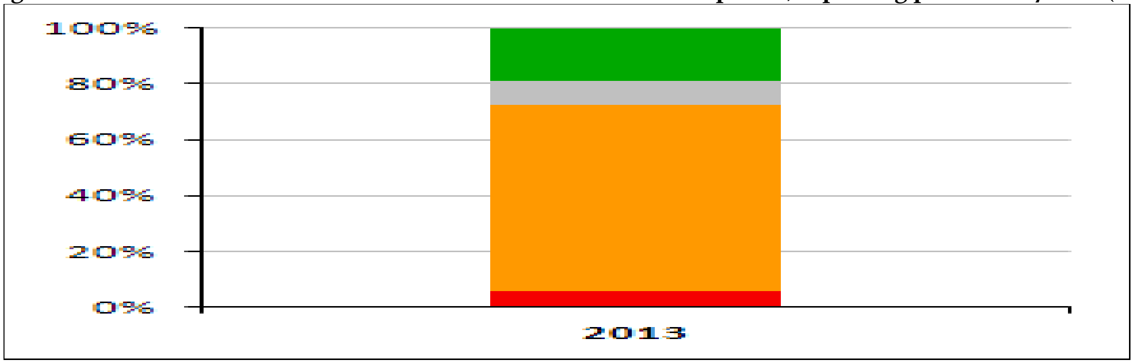
Figure V.5. Distribution of species of European interest by biogeographical regions



Source: ibis.anpm.roand National Summary for Article 17 Romania - 2007-2012 by EC

The biogeographical regions with the highest wealth of species of European interest are: continental, alpine and stepic.

Figure V.6. Global assessment of the conservation status of the species, reporting period 2007-2012 (%)



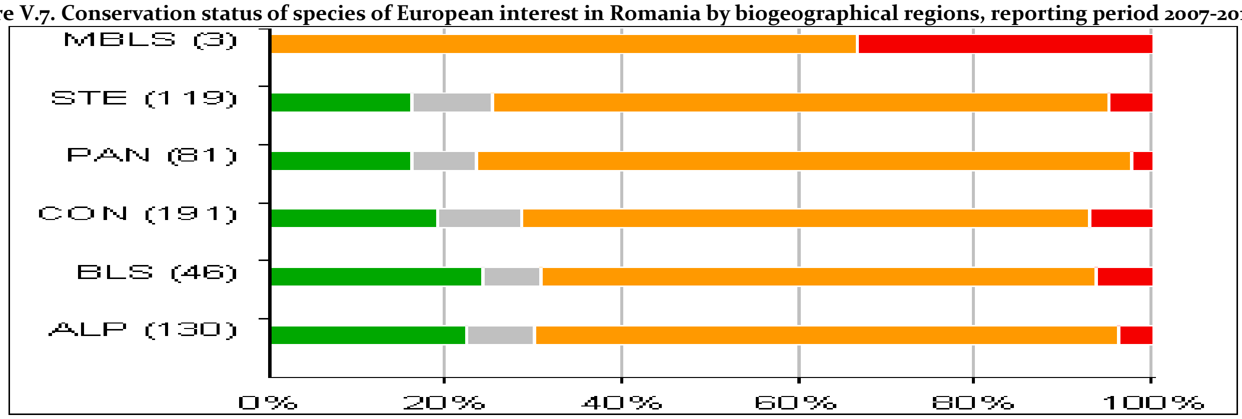
Source: ibis.anpm.ro and National Summary for Article 17 Romania - 2007-2012 by EC

The legend

- *FV - Favorable*
- *NA - Unreported*
- *XX - Unknown*
- *U1 - Unfavorably inadequate*
- *U2 - Unfavorably bad*

According to the reported data, it is estimated that a large percentage (67%) of the total species evaluated have an inadequately unfavorable conservation status, while 5% have a totally unfavorable condition. Thus, with an overall value of 72% unfavorable conservation status for species of Community interest, Romania is well above the European average (54% in the EU-25 - SOER 2010). 18% of the evaluated species have a favorable state (compared to the EU average of 17%), and the percentage of non-assessed species in Romania is lower compared to the EU average.

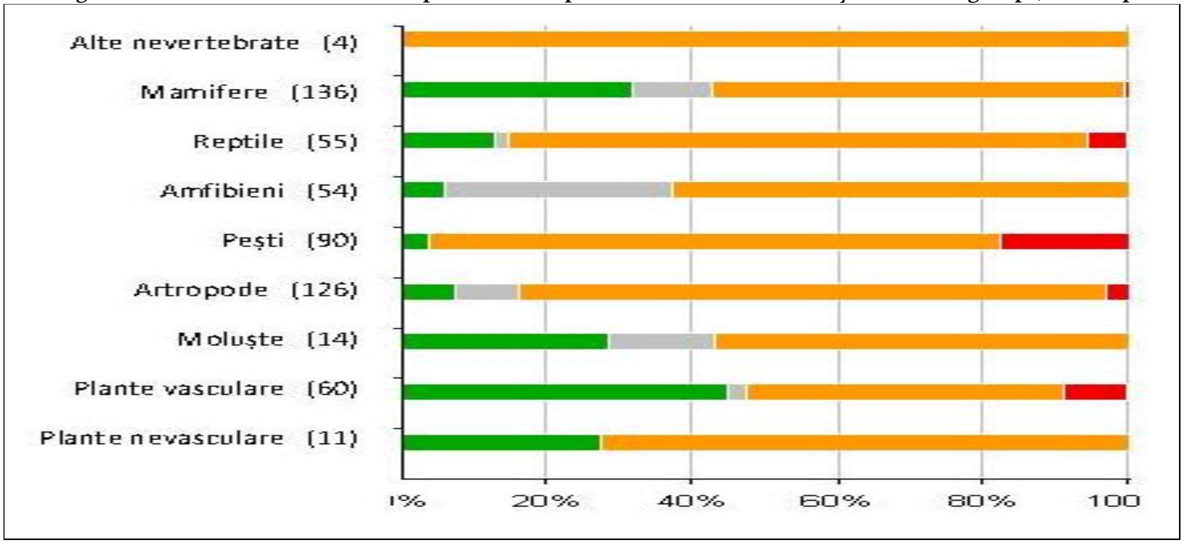
Figure V.7. Conservation status of species of European interest in Romania by biogeographical regions, reporting period 2007-2012 (%)



Source: ibis.anpm.ro and National Summary for Article 17 Romania - 2007-2012 by EC

According to the data reported to the Commission, the situation is alarming in the Black Sea region, as there is no favorable assessment for any of the species assessed and reported.

Figure V.8. State of conservation of species of European interest in Romania by taxonomic groups, for the period 2007-2012 (%)

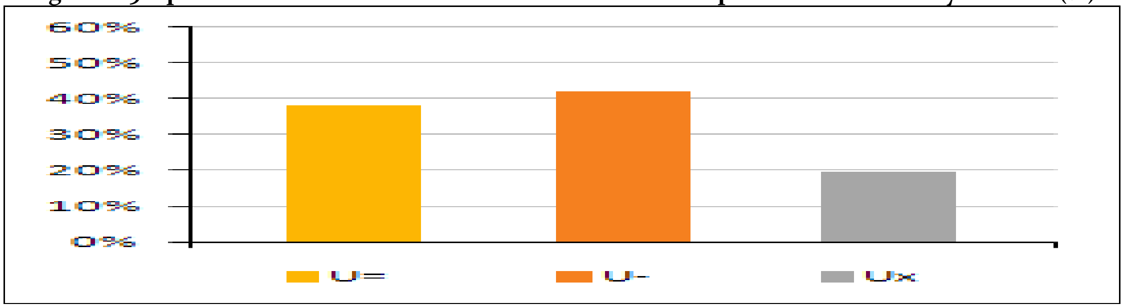


Source: ibis.anpm.ro and National Summaryfor Article 17 Romania - 2007-2012 by EC

***Note:**The number in brackets represents the number of assessments by bioregions corresponding to the reporting period 2007-2012*

The data and information reported in 2013 show that among the species evaluated, fish have the weakest favorable conservation status, followed by amphibians and arthropods, then reptiles, mollusks, mammals and plants.

Figure V.9. Species - General trend of conservation status of species of Community interest (%)



Source:ibis.anpm.roand National Summary for Article 17 Romania - 2007-2012 by EC

***Note**:*
(U +) = unfavorable (inadequate or bad) with a tendency to improve
(U =) = stable unfavorable
(U-) = unfavorable with a tendency to worsen
(Ux) = unfavorable with unknown tendency

Within the project "*Completing the level of knowledge of biodiversity by implementing the monitoring system of the conservation status of bird species of community interest in Romania and reporting based on Article 12 of the Birds Directive 2009/147 / EC*" *MySMIS 119428*", whose beneficiary is the Ministry of Environment, Waters and Forests, the species of birds as well as their populations, and their distribution were evaluated. The information obtained was reported by Romania in 2020 to the European Commission, in accordance with Article 12 of the Birds Directive.

The trends of bird populations at national level and the trends of nesting species distributions, assessed according to the data reported in 2020, are presented in the tables and graphs below, where the percentage trend categories are shown (in parentheses are given the initials and official categories of the reporting tool): increasing (I - increasing), stable (S - stable), fluctuating (F - fluctuating), uncertain (U - uncertain) and unknown (UNK - unknown). For populations, both short-term and long-term trends are included, both the phenological categories Reproduction (B - breeding) and Wintering (W - wintering). For spatial distributions, both short-term and long-term trends are included, but only for nesting species (B - breeding).

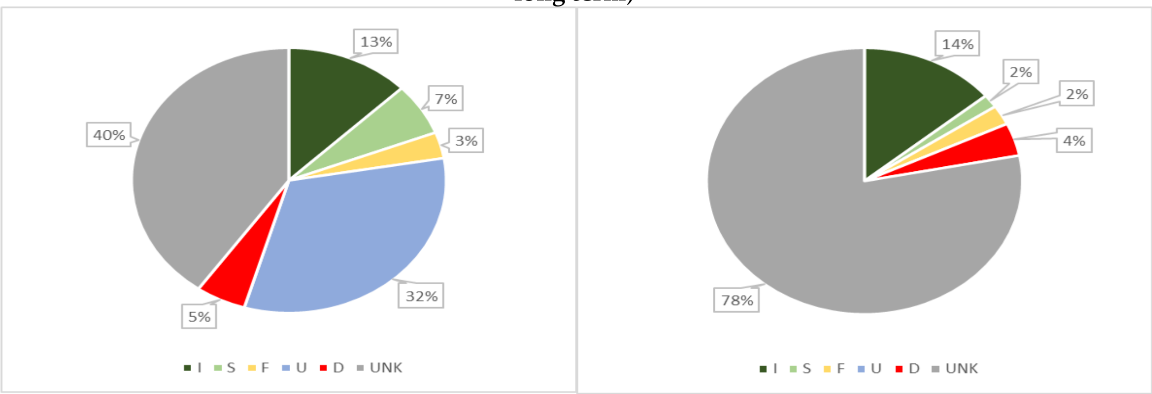
- Total number of species reported: 291
- Total number of reports included (Nesting / Breeding, Wintering / Wintering and Migration / Passage categories: 366
- Number of species reported in the Breeding category: 251 (86.3% of species reported for the nesting period)
- Number of species reported in the Wintering category: 47 (16.2% of species reported for the wintering period)
- Number of species reported in the Passage category: 68 (23.4% of species reported for the nesting period).

Table V.3. Number of bird species by types of population trends, for each phenological category

Category	Short-term population trends						Long-term population trends						Total
	and	S	F	U	D	UNK	and	S	F	U	D	UNK	
Nesting	32	16	8	81	13	101	35	4	6	0	10	196	251
Wintering	5	3	0	30	8	1	10	8	0	17	11	1	47
Passage	-	-	-	-	-	-	-	-	-	-	-	-	68

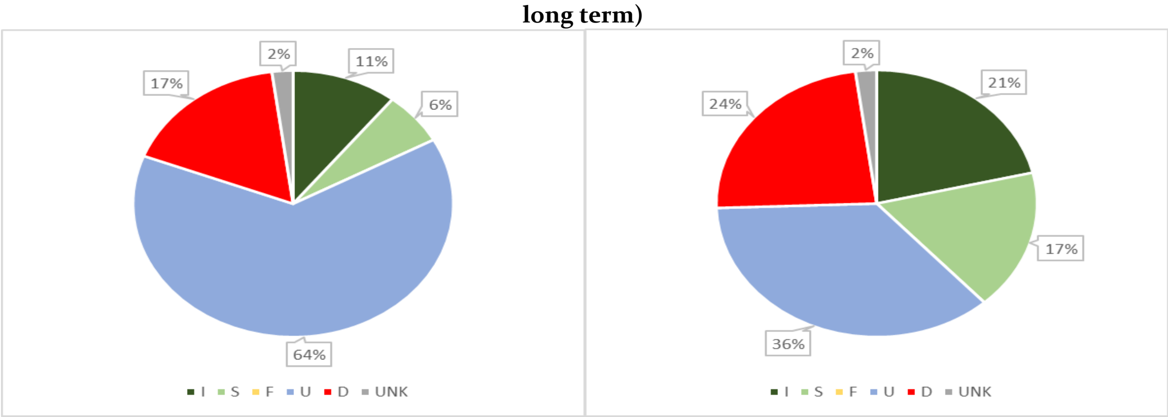
Source: SOR www.sor.ro

Figure V.10. Trends of bird populations, Breeding category. Percentage of different trends in the total (left - short term, right - long term)



Source: SOR www.sor.ro

Figure V.11. Trends of bird populations, Wintering category. Percentage of different trends in the total (left - short term, right - long term)



Source: SOR www.sor.ro

Short-term and long-term population trends are calculated only for the phenological categories Nesting / Breeding and Wintering).

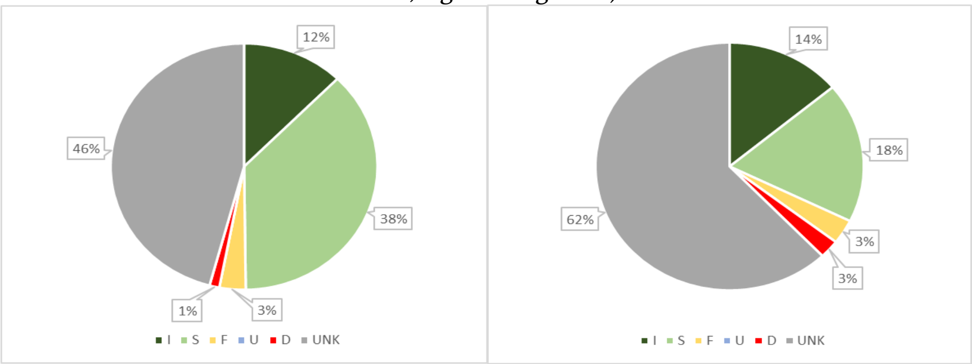
Trends in the spatial distribution of bird species are calculated only for the Nesting / Breeding category.

Table V.4. Number of bird species by types of distribution trends

Category	Short-term population trends						Long-term population trends						Total
	and	S	F	U	D	UNK	and	S	F	U	D	UNK	
Nesting	31	94	8	0	3	115	35	46	8	0	6	156	251

Source: SOR www.sor.ro

Figure V.12. Trends in the distribution of bird species, Breeding category. Percentage of different trends in the total (left - short term, right - long term)



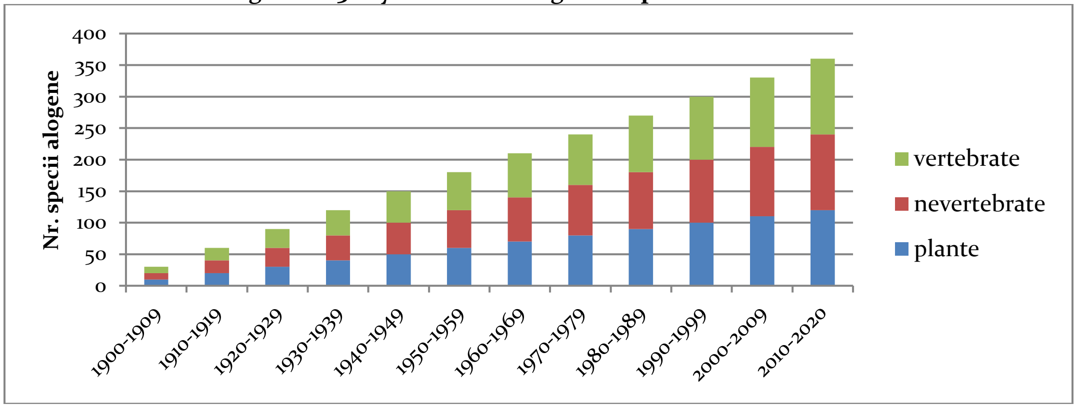
Source: SOR www.sor.ro

Invasive allogenic species

RO 43
Romania indicator code: RO 43 EEA indicator code:: SEBI 010
TITLE: **INVASIVE ALLOGENIC SPECIES**
DEFINITION: The indicator includes two elements: "The total number of allogenic species in Europe since 1900", which shows the evolution of species that have the potential to become invasive allogenic species, and "the most harmful invasive allogenic species that threaten biodiversity in Europe", which includes a list of invasive species with demonstrated negative impact.

At the national level, invasive species have a major impact on biodiversity, posing a real threat to terrestrial and marine ecosystems.

Figure V.13. Dynamics of allogeneic species in Romania



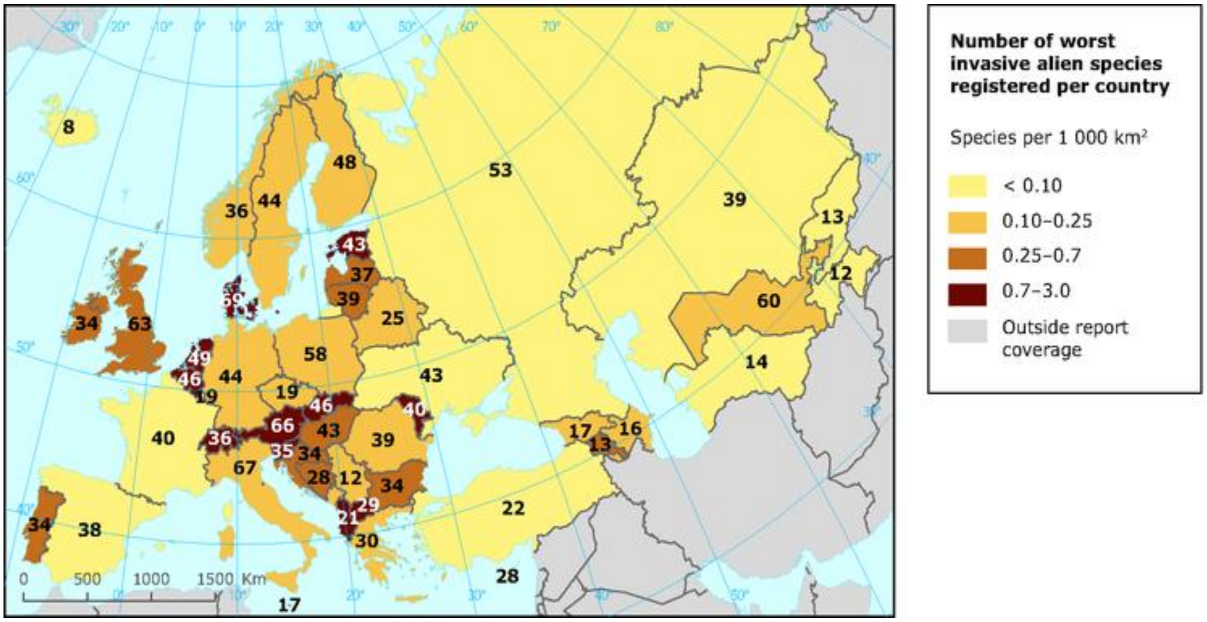
Source: DAISIE

The current situation in Romania can be characterized as follows:

- a low level of public awareness and consequently an opposition of civil society to the interventions of the government administration;
- extremely low degree of accessibility of scientific information, especially in connection with species identification, risk analysis, etc .;
- the absence of a priority approach to actions to control invasive species;
- unhindered introduction of invasive species - often by post - as inadequate inspection and quarantine measures;
- inadequate monitoring capacity;
- lack of effective emergency measures;
- poor coordination between government agencies, local authorities and communities.

The National Strategy and Action Plan for Biodiversity Conservation 2010 - 2020 states that at national level there is no clear evidence of the number of allogenic, invasive species, the only centralization of data and information related to them in the European database DAISIE, by researchers, voluntarily.

Figure V.14. Number of the most dangerous invasive species per country



Source: DAISIE

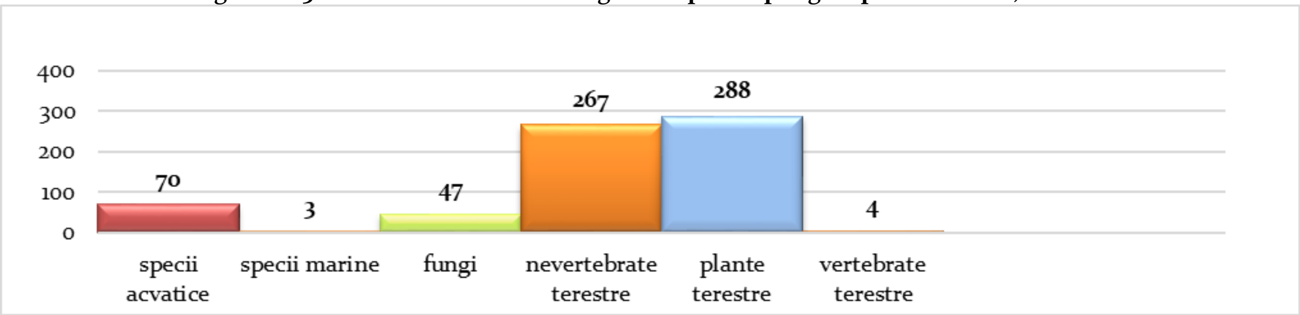
In Romania, according to data voluntarily recorded by many experts in the DAISIE application and information reported by some environmental protection agencies, we find a total of approximately 679 allogeneic species, of which 70 aquatic species, 3 marine species, 267 species of terrestrial invertebrates, 47 species of fungi, 288 species of terrestrial vertebrates and 4 species of terrestrial plants.

The Government of Romania adopted Law no. 62/2018 on the control of Ambrosia weed (*Ambrosia artemisiifolia*) at national level, as well as Government Decision no. 707/2018 for the approval of the Methodological Norms for the application of Law no. 62/2018 on the control of Ambrosia weed.

According to the legal competences, the environmental protection agencies carried out during the year 2020 information-awareness campaigns with the support of the media, addressed to the citizens / local public administrations regarding the provisions ofLaw no. 62/2018 on Ambrosia weed control.

Additional information on the application of the rules mentioned above can be found on the website of the Ministry of Environment, Waters and Forests at the following link: http://www.mmediu.ro/app/webroot/uploads/files/Ambrozia%20prezentare%20si%20combatere.pdf.

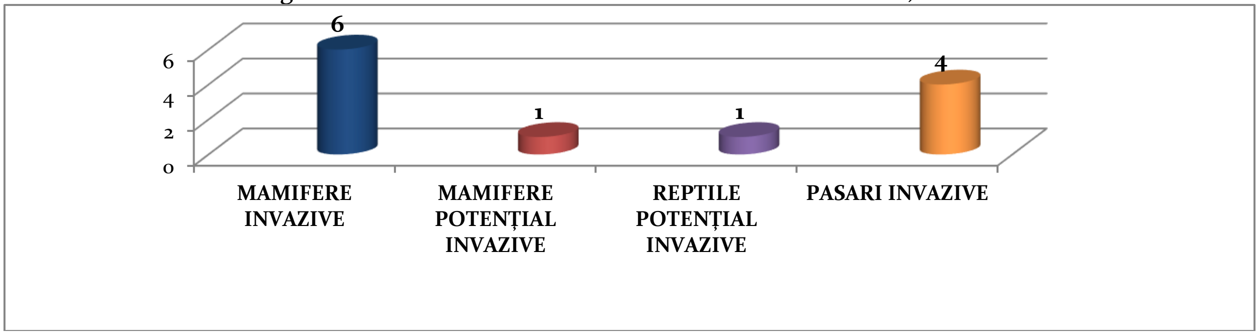
Figure V.15.The total number of allogeneic species per group in Romania, in 2020



Source: DAISIE & APM

The situation of invasive animals that threaten biodiversity makes a distinction between the most harmful, by ecosystems and taxonomic groups, in terms of their impact on national biodiversity and the change in abundance or spread.

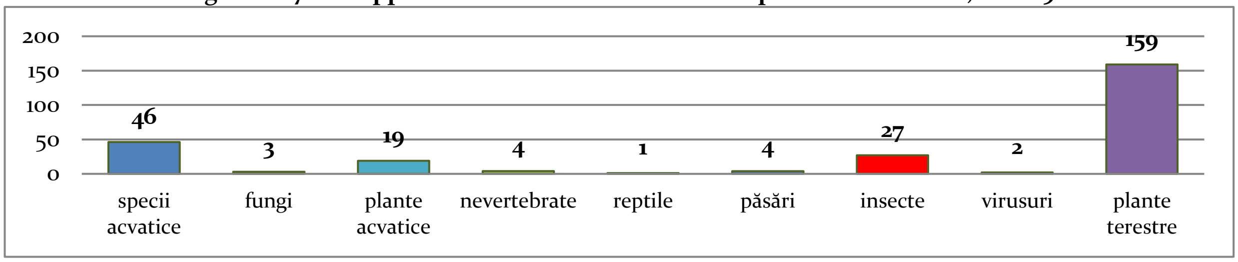
Figure V.16. The situation of invasive animals in Romania, in 2020



Source Environmental Protection Agencies

According to the data transmitted by some of the environmental protection agencies, a number of about 265 invasive species have been established (aquatic species 46, fungi 3, aquatic plants 19, invertebrates 4, reptiles 1, birds 4, insects 27, viruses 2, terrestrial plants 159).

Figure V.17.The approximate situation of invasive species in Romania, in 2019



Source: Environmental Protection Agencies

In the period 2018-2022, the Ministry of Environment, Waters and Forests, as beneficiary, implements the project "*Adequate Management of Invasive Species in Romania, in accordance with EU Regulation 1143/2014 on preventing and managing the introduction and spread of invasive allogen species*" - SMIS Code 2014 + 120008. , which has a total budget of 29,507,870.54 lei. Specifically, the project contributes to the achievement of Objective 5 of the EU Biodiversity Strategy 2020, by identifying and prioritizing invasive allogen species in Romania and the ways of introduction, control and eradication of priority species.

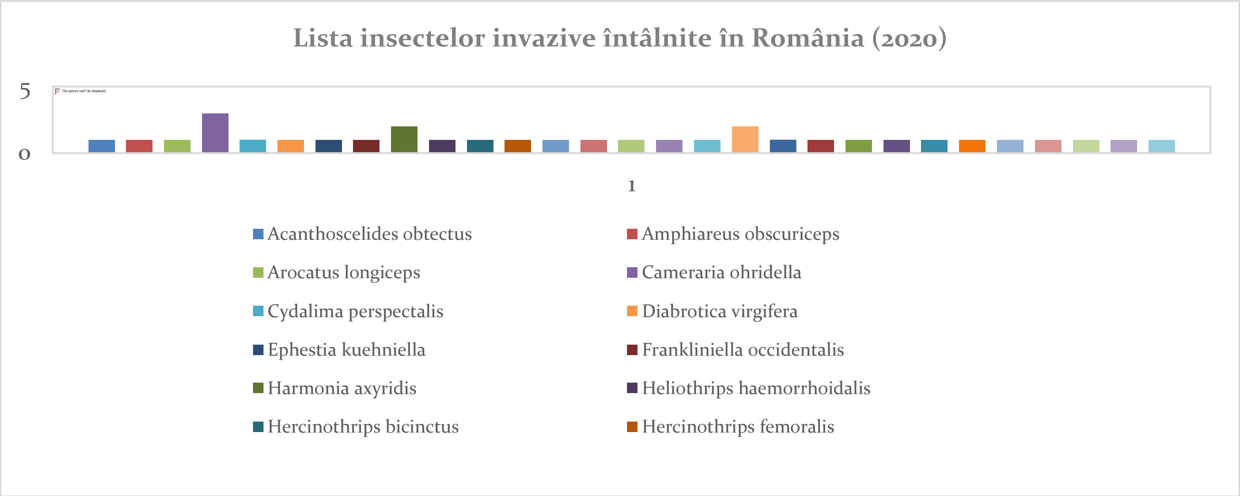
It will also create specific tools for the management of introduction routes to prevent the introduction and rapid identification of new invasive allogenic species. At the same time, it will contribute to the adequate management of Natura 2000 sites in Romania, objective of the Priority Action Framework for Natura 2000, by combating invasive species. Further information on the above-mentioned project can be found on the specially created page http://invazive.ccmesi.ro.

According to the data provided by the project, the list of invasive species in Romania of interest to the EU includes 20 species (updated June 2019), namely:

- *Ailanthus altissima*
- *Asclepias syriaca*
- *Baccharis halimifolia*
- *Carolingian cabomba*
- *Elodea nuttallii*
- *Eichhornia crassipes*
- *Eriocheir sinensis*,
- *Heracleum buttered*
- *Heracleum sosnowskyi*,
- *Impatiens glandulifera*,
- *Lepomis gibbosus*
- *Lysichiton americanus*,
- *Myocastor coypus*
- *Myriophyllum aquaticum*
- *Procyonoid nyctereutes*, *Ondatra zibethicus*
- *Perccottus glenii*
- *Pseudorasbora parva*
- *Trachemys scripta*
- *Orconectes limosus*

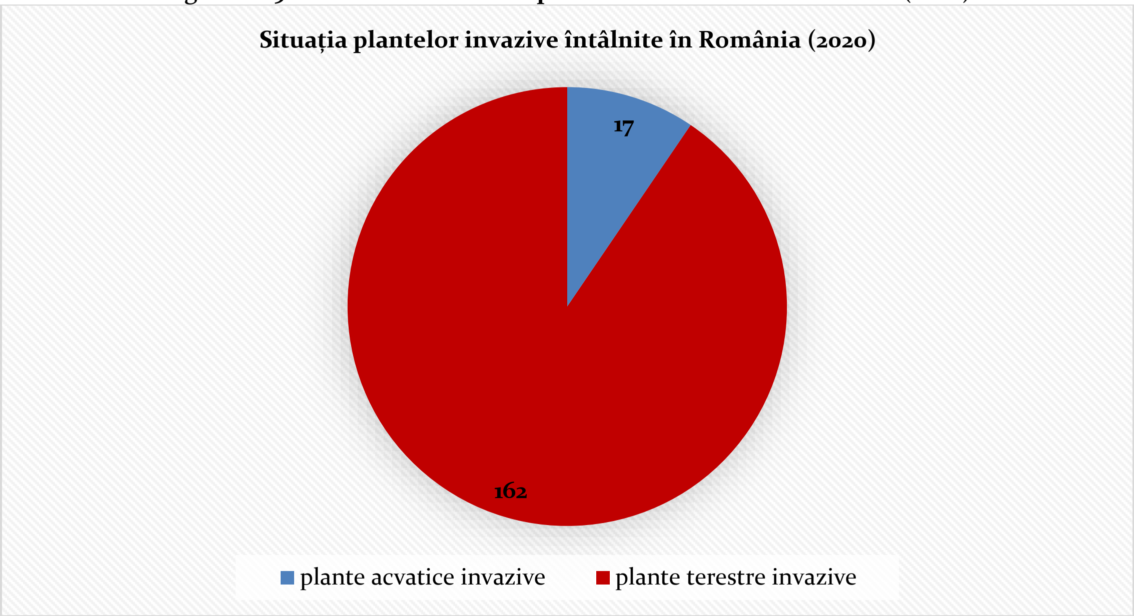
The Bucharest - Ilfov Regional Development Agency implements, between 2018 and 2020, as a partner, together with 7 other regions from 7 EU member countries, the INVALIS project (Protecting European Biodiversity from Invasive Allogenic Species), financed through the INTERREG EUROPE Program, under the Environment and Resource Efficiency priority. APM Bucharest has a representative in the working group of this project. The aim of the project is to improve the specific regional policies on biodiversity and environmental protection, by supporting policies for the prevention, early detection, control and eradication of invasive allogenic species in natural ecosystems.

Figure V.18. List of invasive insects encountered in Romania (2020)



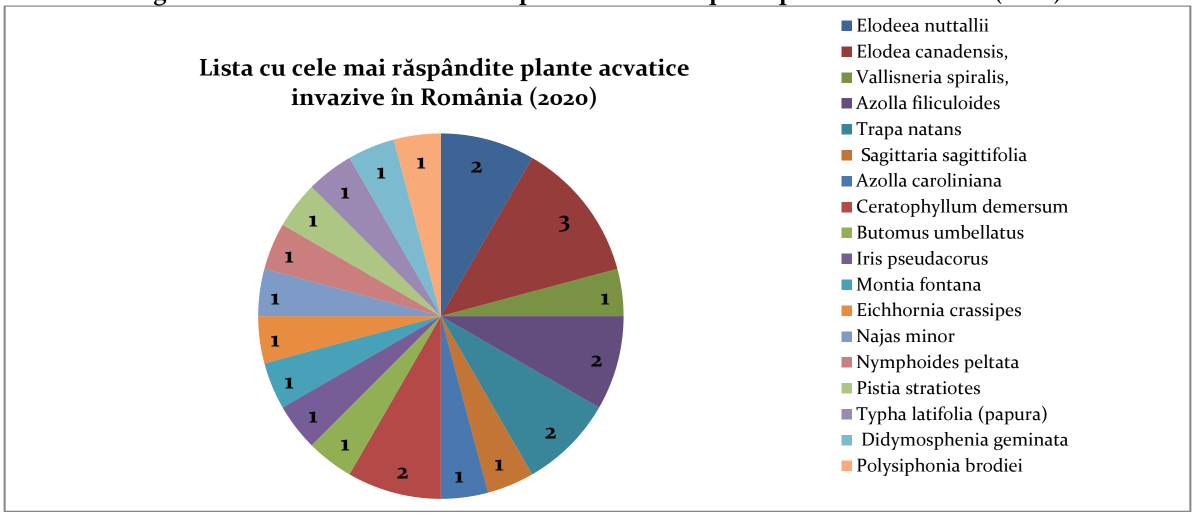
Source: Environmental Protection Agencies

Figure V.19. Situation of invasive plants encountered in Romania (2020)



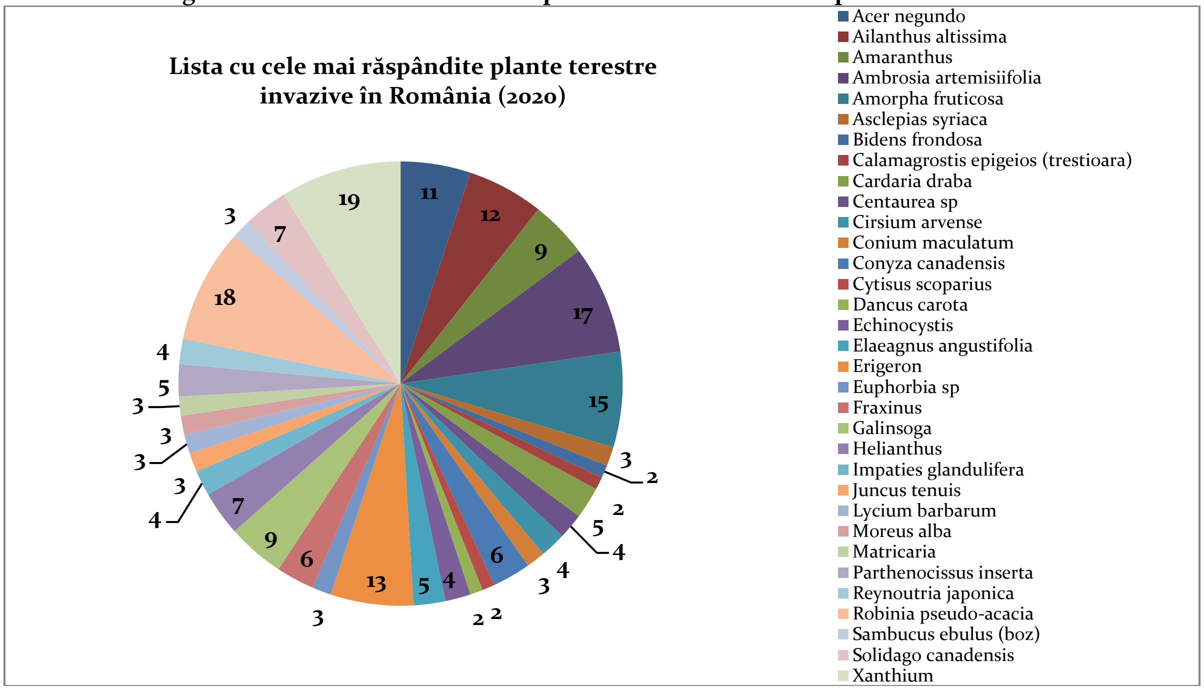
Source: Environmental Protection Agencies

Figure V.20. List of the most widespread invasive aquatic plants in Romania (2020)



Source: Environmental Protection Agencies

Figure V.21. List of the most widespread invasive terrestrial plants in Romania



Source: Environmental Protection Agencies

Prevention and control actions carried out in 2020:

✓*Carrying out by the central environmental protection authority an awareness campaign on invasive allogenic species;*

✓*Seminars, conferences and training programs were held for horticulturists, farmers, hunting staff, veterinarians, traders of plant and / or animal materials, aquarium owners, terrariums, zoo administrators, etc .;*

✓*Local authorities and institutions have carried out campaigns to clean and sanitize rural communities along the roads, as they are transitional habitats for invasive species to natural habitats. Each species, without exception, appears in these rural communities without conservation value, so regular mowing or eradication with herbicides would be an appropriate way to eliminate them;*

✓*Prohibition of planting with invasive species, and here we refer especially to Robinia pseudacacia, but also to Ailanthus altissima, Amorpha fruticosa, Gleditsia triacanthos*

http://ec.europa.eu/environment/nature/invasivealien/index_en.htm

Fragmentation of ecosystems

RO 44
Romania indicator code: RO 44 EEA indicator code: SEBI 013
TITLE: **FRAGMENTATION OF NATURAL AND SEMI-NATURAL AREAS**
DEFINITION: The indicator shows differences in the average of natural and semi-natural surfaces, based on terrain maps made by interpreting satellite images. The indicator is intended to address the issue of ecosystem integrity by providing a "measure" of land disintegration on the entire surface of Romania.

In terms of biodiversity, the indicator is relevant by providing information on the evolution of natural and semi-natural areas for any type of ecosystem.

If the area of the area decreases significantly, it will have a negative influence on habitat types and species dependent on these habitat types.

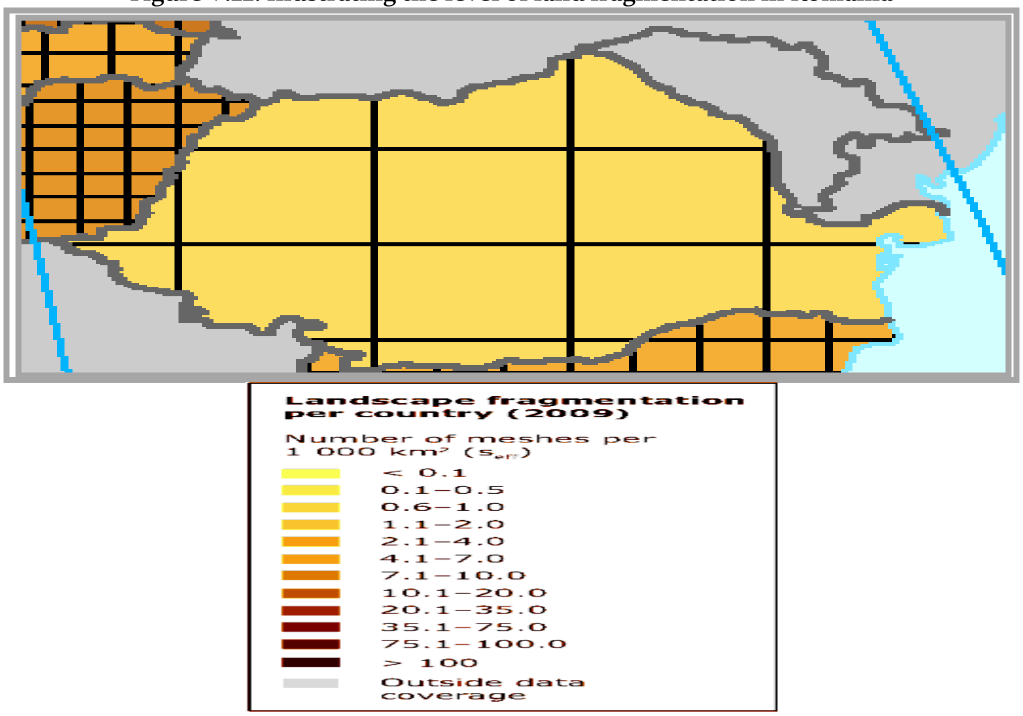
Conclusions However, the conclusions of the "*Landscape fragmentation in Europe Joint EEA-FOEN report*" show a smaller fragmentation of Romania's territory compared to other EU countries, the situation being similar to that in the Nordic countries.

The evolution of the percentage of forest area losses between 1990–2000 is presented in the form of a map (using the Corine Land Cover database).

In the map below, the fragmentation of habitats is shown in terms of the number of meshes on a certain area. The size of the effective mesh (Meff) is proportional to the probability that two randomly selected points in the region are connected.

The higher the number of meshes, the more fragmented the landscape.

Figure V.22. Illustrating the level of land fragmentation in Romania



Source:http://www.eea.europa.eu/data-and-maps/figures/illustration-of-the-level-of

In the case of studies on the degree of habitat fragmentation and degradation, we must also take into account the fact that in some cases a minimal habitat loss can cause a high degree of fragmentation. It is a wrong approach to evaluate investments in the authorization procedure only by reporting the affected areas to the total area of a habitat type or natural protection area (national park, Natura 2000 site, etc.).

The loss of natural areas has repercussions that extend beyond the extinction of rare species. Thus, it is necessary to ensure the necessary natural conditions through an integrated approach to land use by:

- Improving connectivity between existing natural areas to counter fragmentation and to emphasize their ecological coherence, for example by protecting hedges, strips of vegetation at the edge of fields, small watercourses;
- Increase the permeability of the landscape to support species dispersal, migration and movement, for example by using land in a way that is conducive to fauna and flora or introducing ecological agricultural or forestry schemes that support extensive agricultural practices;
- Identification of multifunctional areas. In such areas, compatible land use, which supports healthy ecosystems, is favored at the expense of destructive practices. For example, these may be areas where agriculture, forestry, recreation and ecosystem conservation all operate in the same space.

Reduction of natural and semi-natural habitats

RO 14

Romania indicator code: RO 14
EEA indicator code: CSI 014

TITLE: **LAND USE**

DEFINITION: The indicator shows the quantitative change of the occupation of agricultural lands, forested, semi-natural and natural, through the expansion of urban and artificial lands. It includes construction areas and urban infrastructure, as well as urban green spaces, sports and leisure complexes.

Natural and semi-natural ecosystems represent about 47% of the country's surface, 45% represent agricultural ecosystems, the remaining 8% is construction and infrastructure. The major categories of ecosystem types are: forest ecosystems, grassland ecosystems, freshwater and brackish ecosystems, marine and coastal ecosystems and underground ecosystems.

The main determining factors in land occupation are grouped in processes resulting from the extension:

- housing, services and recreation spaces;
- industrial and commercial areas;
- transport networks and infrastructure;
- undeveloped landmines, quarries and landfills;
- construction sites.

A factor that leads to the degradation and / or total destruction of natural habitats is the *change of land use*. Increasing the need for space for civil and / or industrial constructions, expanding agricultural crops, expanding the road network and energy transmission networks, expanding the hydrotechnical constructions and the surface of the accumulation lakes, opening some quarries for the extraction of mineral aggregates and areas of sorting and storage of the resulting ballast are just some of the anthropogenic activities that lead to changes in land use and obviously to the degradation and especially the destruction of natural habitats. Natural phenomena, such as landslides, collapses or torrents, also lead to the change of land use and of course to the degradation and destruction of habitats.

Forest exploitation

RO 45

Romania indicator code: RO 45
EEA indicator code: SEBI 017

TITLE: **FOREST FUND, GROWTH AND CUTTING OF WOODEN MASS**

DEFINITION: The indicator shows the evolution of the forest fund, the net annual growth and the annual fellings, as well as the forest utilization rate (the fraction of annual fellings from the annual growth).

Until 2008, the maximum volume of wood that could be harvested annually from forests was set by government decision, being, as a rule, lower than the annual possibility, due to the wood mass located in inaccessible forest basins. In the period 2000 - 2008 the volume of wood established to be harvested experienced an ascending dynamic, following the application of the provisions of Ordinance no. 70/1999, regarding the necessary measures for the accessibility of the forest fund, through the construction of forest roads. After the entry into force of Law no. 46/2008 - Forestry Code, the volume of wood that can be harvested annually from forests cannot exceed the annual possibility established by forestry arrangements.

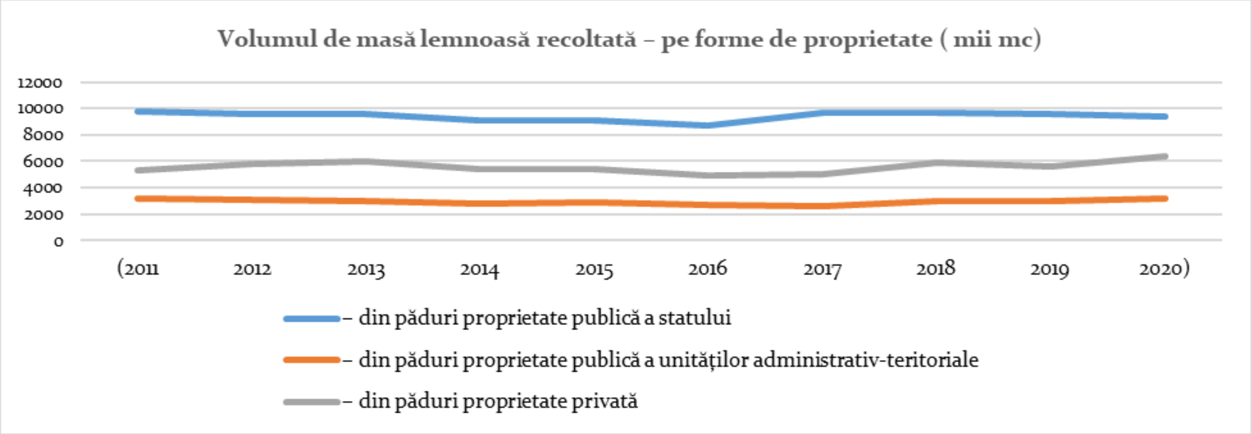
Table V.5. The volume of wood harvested in the period 2011-2020

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Harvested wood	*18705*	*19081*	*19282*	*17889*	*18133*	*17198*	*18316*	*19462*	*18904*	*19652*
-% -	100	102.0	103.1	95.6	96.9	91.9	97.9	104.0	101.1	105.1

Source: MEWF

The wood harvested in 2020 was higher than in 2019 by 3.95%. The volume extracted in 2020 exclusively from the national forest fund was of 18,948 thousand cubic meters, the remaining 704 thousand cubic meters was harvested from the forest vegetation located on lands outside the forest fund.

Figure V.23. The volume of wood harvested in 2011-2020 - by forms of ownership



Source: MEWF

The main danger to which the forests in Romania are subjected is the phenomenon of uncontrolled felling.

Faced with the real danger of irreversible degradation of large areas of forest, to prevent and combat illegal logging but also to fulfill the obligations assumed by the government program and those established by the Decision of the Supreme Council of Defense, Ministry of Environment, Waters and Forests adopted a set of measures as follows:

- At the legislative level, the aim was to ensure an updated and adequate normative framework, which would suppress the permissive or interpretable lacunar character of the current regulations in the field;
- At the institutional level, the aim was to strengthen the action capacity of the Forest Guards by expanding, both in terms of responsibilities and in terms of the number of staff and logistics, the territorial commissariats for forestry and hunting;
- Ensuring the financial funds necessary for the reforestation of the forest land areas from which the wood mass was harvested and which were not reforested within the legal term;
- Development of the integrated IT system for tracking SUMAL wood materials, operationalization of the FMIMS system and development of the “Forest Radar” system, alerting the institutions with responsibilities in the matter.
- The establishment of antitrust measures in the wood industry, the elimination of abuses of dominant position and monopoly, as well as rules for the exploitation of wood for the benefit of the sustainable development of local communities.

Network of protected natural areas

RO 41

Romania indicator code: RO 41
EEA indicator code: SEBI 007

TITLE: **NATURALLY PROTECTED AREAS DESIGNATED AT NATIONAL LEVEL**

DEFINITION: The indicator illustrates the growth rate of the number and total area of protected areas of national interest over time. The indicator can be characterized according to: IUCN categories, biogeographical region and country.

Changes in the data on protected natural areas occurred in 2015 as a result of the implementation by Ministry of Environment aof the project "***Development of spatial data sets in accordance with the INSPIRE technical specifications for protected natural areas, including Natura 2000 sites, aiming at optimizing their management facilities***", which analyzed the boundaries of protected natural areas, following the collection of field data based on existing documentation.

The last designations of protected natural areas have been madein 2016: 1 natural park - Văcărești Natural Park, 23 areas of special avifauna protection (SPA), 54 sites of community importance (SCI), new and expanded areas of several existing SCIs, and in 2020 Ramsar site Jijia Ponds in Iasi.

At the level of the year 2020, in Romania there is a number of 945 protected natural areas of national interest.

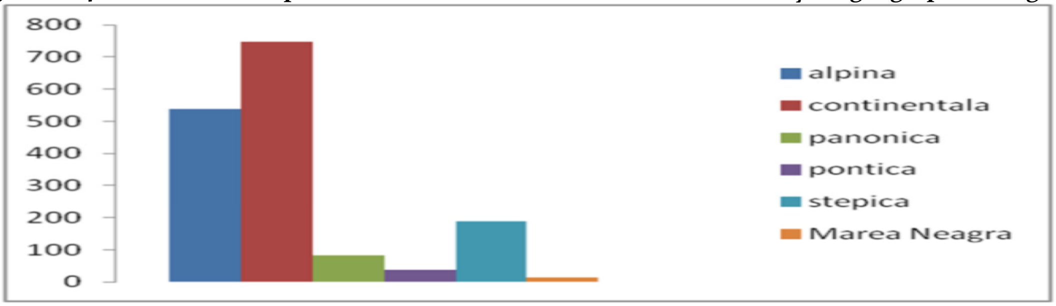
Table V.6. Categories of protected natural areas in Romania at the level of 2020

Categories of protected natural areas	Number	Area (ha)
Scientific reserves, natural monuments, nature reserves	916	307973.06
National parks	13	317419.19
Natural parks	16	770026.529
Areas of special avifauna protection (SPA)	171	3875297.58
Sites of Community Importance (SCI)	435	4650970.00
Biosphere reserves	3	661939.33
Wetlands of international importance (Ramsar sites)	20	1096640.01
Natural sites of universal natural heritage	1	311915.88

Source: MEWF

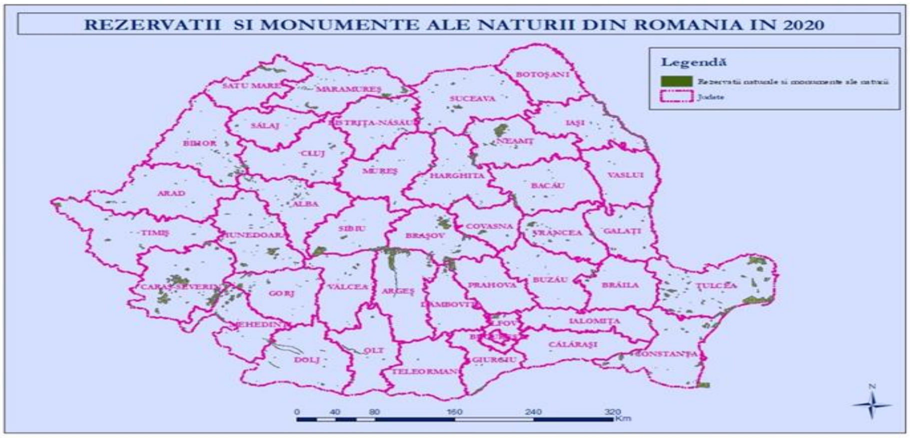
The establishment of the Bucegi nature reserve in 1926 opened the process of designating protected natural areas in Romania. The number of protected natural areas increased to 425 in 1990, but the highest number of designated protected natural areas of national interest was in the period 2000-2007. Currently, Romania has over 1500 protected natural areas, of which about 2/3 are of national interest.

Figure V.24. Distribution of protected natural areas of national interest by biogeographical regions



Source: ibis.anpm.ro MMAP

Figure V.25. National distribution of protected natural areas of national interest: nature reserves and monuments, natural and national parks



Source: MEWF

TableV.7. National parks in Romania, in the year2020

Name	County	Area (ha)
Total		**317419.2**
Domogled-Valea Cernei	Caraş - Severin, Mehedinţi, Gorj	61661.28
Munţii Rodnei	Bistriţa - Năsăud, Maramureş,	47202.31
Retezat	Hunedoara, Caraş - Severin, Gorj	38315.95
Cheile Nerei-Beuşniţa	Caraş - Severin	36811.52
Semenic-Cheile Caraşului	Caraş - Severin	36100.29
Călimani	Bistriţa - Năsăud, Harghita, Mureş, Suceava	24435.47
Cozia	Vâlcea	16725.23
Piatra Craiului	Argeş, Braşov	14789.21
Munţii Măcinului	Tulcea	11247.02
Defileul Jiului	Gorj, Hunedoara	10976.39
Ceahlău	Neamţ	7763
Cheile Bicazului-Hăşmaş	Harghita, Neamţ	6912.82
Buila-Vânturariţa	Vâlcea	4478.7

Source: MEWF

Table V.8. Natural parks in Romania, in 2020

Name	County	Area (ha)
Total		770026.5
Apuseni	Alba, Bihor, Cluj	76054.97
Munţii Maramureşului	Maramureş	133450.43
Porţile de Fier	Caraş-Severin, Mehedinţi	128101.71
Geoparcul Platoul Mehedinţi	Mehedinţi	106376.34
Geoparcul Dinozaurilor–Ţara Haţegului	Hunedoara	100049.66
Grădiştea Muncelului-Cioclovina	Hunedoara	38106.85
Putna-Vrancea	Vrancea	38060.18
Bucegi	Prahova, Braşov, Dâmboviţa	32519.7
Vânători-Neamţ	Neamţ	30705.62
Comana	Giurgiu	25107
Balta Mică a Brăilei	Brăila	20665.48
Lunca Mureşului	Arad, Timiş	17397.39
Defileul Mureşului Superior	Mureş	10158.58
Lunca Joasă a Prutului Inferior	Galaţi	8109.96
Cefa	Bihor	4977.94
Văcăreşti	Bucharest-sector 4	184,719

Source: MEWF

RO 42

Romania indicator code: RO 42
EEA indicator code: SEBI 008

TITLE: **PROTECTED AREAS OF COMMUNITY INTEREST DESIGNATED UNDER THE HABITAT AND BIRDS DIRECTIVE**

DEFINITION: The indicator shows the current stage of application of the Habitats (92/43 / EEC) and Birds (79/409 / EEC)

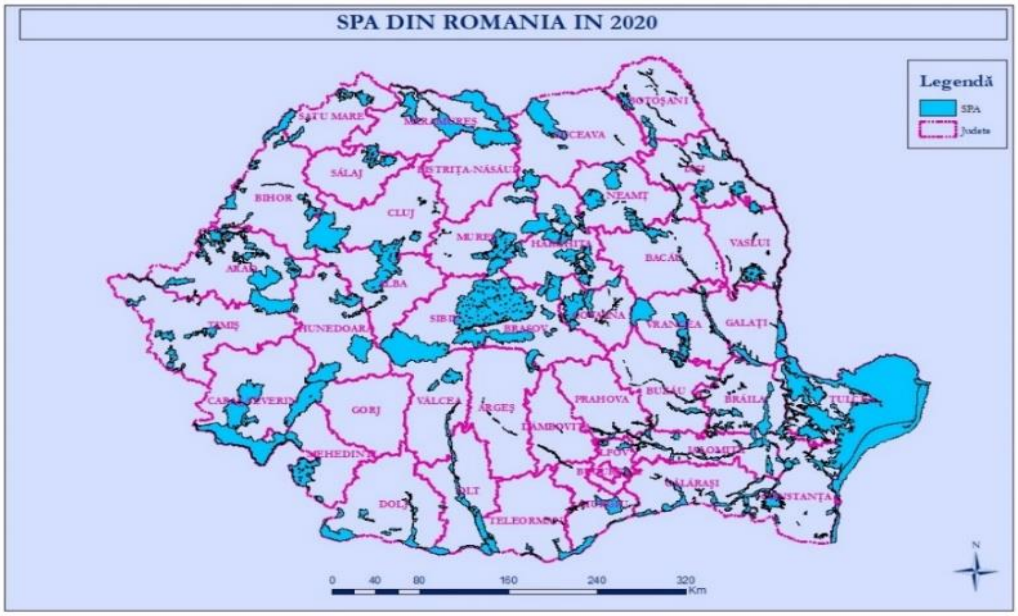
Directive by Member States through 2 sub-indicators:
(a) highlighting trends in spatial coverage with proposed Natura 2000 sites;
(b) the calculation of a sufficiency index on the basis of these proposals.

As a member state of the European Union, Romania contributes to ensuring biodiversity at European level by conserving natural habitats, as well as wild fauna and flora. In this sense, it was established on the Romanian territory **Natura 2000 Ecological Network** through which are conserved the species and habitats considered to be of Community importance, by designating sites of Community interest SCI -*Sites of community importance*and SPA -*Special avifauna protection areas*.

In 2016, Romania designated the last Natura 2000 sites reaching a number of 606 of which 435 SCIs and 148 SPAs. The area covered by Natura 2000 sites has increased from about 18% in 2007 to about 23% of the country's area today.

In the context of ensuring the coherence of the Natura 2000 network and in order to respond to requests from the European Commission in infringement procedures aimed at insufficient designation of sites for the protection of species and habitats of Community interest, The Ministry of Environment, Waters and Forests carried out an analysis and identified several new SCIs to be added to the current list, as well as others for which changes are proposed. The procedure for designating new SCIs is still ongoing at the end of 2020.

Figure V.26. National distribution of Natura 2000 sites



Source: MEWF

The standard forms of Natura 2000 sites were updated in 2020 with information provided by management plans, carried out in projects implemented at the level of protected natural areas and were reported to the European Commission in November and December 2019. *The updates include information on "surface favorable reference status for habitat type in the protected natural area ", or "size of the reference population for the favorable status in the protected natural area", information available on the website of the European Environment Agency (https://cdr.eionet.europa.eu/ro/eu/n2000/) and can be consulted in the online application Integrated Environmental System (SIM) implemented at the level of the National Agency for Environmental Protection (ANPM) which has a component dedicated to Nature Conservation known as RNI-IBIS or SIM-CN available at* natura.anpm.ro

In 2020, the Ministry of Environment, Water and Forests continued the process of updating the data and information on the designation of *special protection areas* (SACs). Romania has in process of approving the first set of SACs, for the SCI's for which there are approved management plans.
The designation of SACs will be done progressively, as new SCIs will have approved management plans.

Another category of protected natural areas is protected natural areas of international interest, respectively biosphere reserves, wetlands of international importance also known as Ramsar sites and natural sites of universal natural heritage.

Figure V.27. National distribution of protected natural areas of international interest

Source: MEWF

Biosphere reserves

Three Biosphere Reserves have been declared in Romania
• Danube Delta (1991)
• Pietrosul Rodnei (1979)
• Retezat (1979).

Table V.9. Biosphere reserves in 2020

Name	County	Area (ha)
Total		662047
Delta Dunării	Tulcea, Constanța	580000 *)
Pietrosul Rodnei	Maramureș, Bistrița-Năsăud,	44000
Retezat	Caraș-Severin, Hunedoara, Gorj	38047

**) only the area related to Romania from the total area of the Danube Delta Biosphere Reserve mentioned on the site: https://en.unesco.org*
Source:https://en.unesco.org/biosphere/eu-na

The Danube Delta- was designated a biosphere reserve in 1998.

One of the reasons why the Danube Delta has been designated a biosphere reserve is the much richer and more diverse biodiversity compared to other deltas in Europe and even on Earth. The Danube Delta has maintained a high density of many species that are rare or missing from other parts of the continent.

The mosaic of habitats developed in the Danube Delta Biosphere Reserve is the most varied in Romania with a great diversity of plant and animal communities whose number has been estimated at over 5000 types.
The Danube Delta is the largest wetland and reed area in Europe.

Pietrosul Rodna- was designated a biosphere reserve in 1979
At the beginning, only the mountain gap around Pietrosu Peak was protected, later the surface of the reservation was extended, reaching now 44000 ha.
On the surface of the reservation there is the most impressive glacial relief in the Rodna Mountains with the

Buhăescu glacial circuses - the largest in the Rodna Mountains, Zănoaga Iezerului, Zănoaga Mare, Zănoaga Mică, Rebra, Gropi, having in the basal part moraines and waterfalls on the thresholds of glacier-polished rock.
The area is uninhabited, but the surrounding villages depend on agriculture, animal husbandry, hunting and forestry. Due to traditional agriculture, the wild landscape is maintained today.

Retezat- It was recognized as a biosphere reserve also in 1979 due to its very diverse habitats, many natural or little modified by human intervention.
This biosphere reserve is relevant for the conservation of European forest diversity. Vegetation it is very diverse due to the varied relief and the junction of three floristic regions.
The biosphere reserve is uninhabited, but rural communities outside the reserve depend on agriculture, animal husbandry and forestry. The impact on the environment comes from overgrazing and recreation.

Ramsar sites

Romania acceded to the Ramsar Convention in 1991 by Law 5/1991.
At the end of 2020, Romania had 20 Ramsar sites designated by the Secretariat of the Ramsar Convention, with a total area of 1108880 ha, representing about 5% of the country's surface. The Jijia Ponds site, also nicknamed "Delta of Moldova" is the last Ramsar site designated in Romania in June 2020 and the first Ramsar site in the region of Moldova.
More information about these sites can be found on the Ramsar website:https://www.Ramsar.org/wetland/romania

Table V.10. Ramsar sites in Romania in2020

Nr. No.	Name	County	Area (ha)
	Total		**1108880**
1.	Delta Dunării	Tulcea, Constanța	580000 *)
2.	Parcul Natural Porțile de Fier	Caraș-Severin, Mehedinți	115666
3.	Ostroavele Dunării-Bugeac-Iortmac	Călărași, Constanța, Ialomița	82832
4.	Confluența Olt-Dunăre	Olt, Teleorman	46623
5.	Blahnița	Mehedinți	45286
6.	Calafat-Ciuperceni-Dunăre	Dolj	29206
7.	Bistreț	Dolj	27482
8.	Parcul Natural Comana	Giurgiu	24963
9.	Dunărea Veche - Brațul Măcin	Brăila, Tulcea, Constanța	26792
10.	Brațul Borcea	Călărași, Ialomița	21529
11.	Confluența Jiu-Dunăre	Dolj	19800
12.	Suhaia	Teleorman	19594
13.	Eleșteele Jijia	Iași	19432
14.	Insula Mică a Brăilei	Brăila	17586
15.	Parcul Natural Lunca Mureșului	Arad, Timiș	17166
16.	Canaralele de la Hârșova	Ialomița, Constanța	7406
17.	Iezerul Călărași	Călărași	5001
18.	Lacul Techirghiol	Constanța	1462
19.	Tinovul Poiana Stampei	Suceava	640
20.	Complexul Piscicol Dumbrăvița	Brașov	414

**)only the area related to Romania from the total area of the Ramsar Danube Delta site mentioned on the site: ramsar.org*
Source: Ramsar website:https://www.ramsar.org/wetland/romania

The most important Ramsar sites are:

Insula Mică a Brăilei
Lunca Mureșului
Lacul Techirghiol
Complexul piscicol Dumbrăvița
Parcul Natural Comana
Parcul Natural Porţile de Fier
Tinovul Poiana Stampei
Bistrețul
Iezerul Călărași
Balta Suhaia

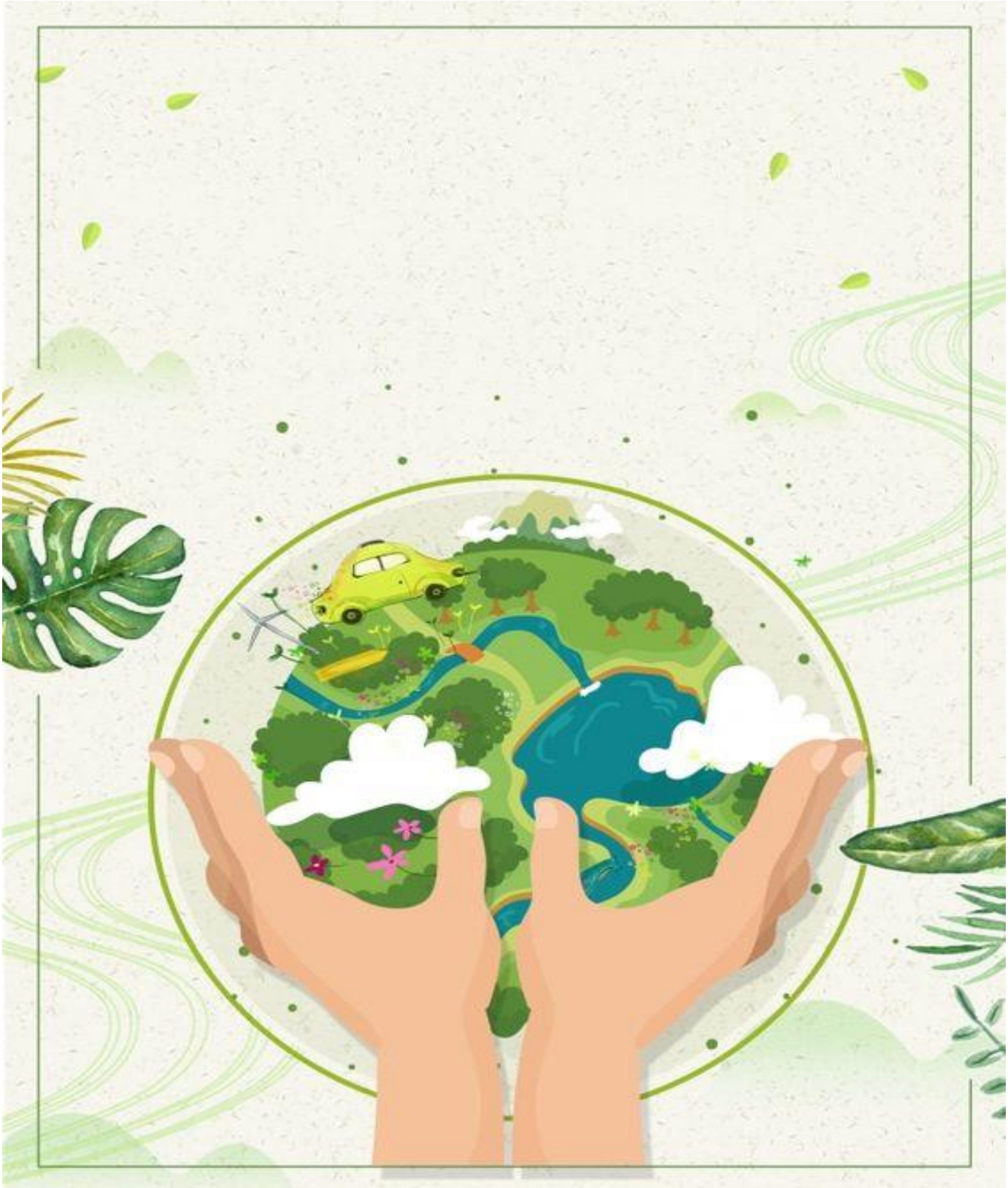
Natural sites of universal natural heritage

Since 1991, the Danube Delta has been included in the List of the UNESCO World Heritage Convention, as a recognition of the value of the universal natural heritage of this territory.

The reasons for the designation as a site of the universal natural heritage were mainly the complexity of habitats of world value for certain rare and endangered species being a wetland, unique, both at European and international level, with a special cultural value.

The management of this site is carried out in accordance with its own regulations and plans for protection and conservation, in compliance with the provisions of the Convention on the Protection of the World Cultural and Natural Heritage, under the auspices of UNESCO.

INDICATORS REPORT 2020
CHAPTER V
FORESTS



NATIONAL FOREST FUND: STATUS AND CONSEQUENCES

Evolution of the forest fund area

RO 45

Romania indicator code: RO 45
EEA indicator code: SEBI 17

TITLE: FORESTS: forest fund, growth and harvesting of wood mass

DEFINITION: The indicator shows the evolution of the forest fund, the net annual growth and the annual fellings, as well as the utilization rate of the forests (the fraction of annual fellings from the annual growth)

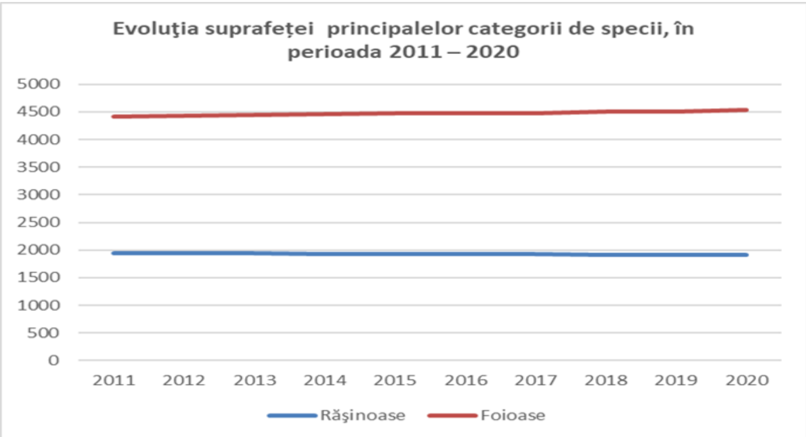
Romania's national forest fund had an area of 6,604 thousand hectares at the end of 2020, respectively 27.7% of the country's area. On December 31, 2020, compared to the same date in 2019, the forest fund area increased by 12 thousand hectares due mainly to the redevelopment of forested pastures and the introduction of degraded land in the forest fund, under Law no. 46/2008 on the Forestry Code, republished, with subsequent amendments and completions.

Table VI.1 Evolution of the forest area from the forest fund with the main categories of species, in the period 2011 - 2020 (thousand hectares)

The main species Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Forest area - total	*6365*	*6373*	*6381*	*6387*	*6399*	*6404*	*6406*	*6418*	*6427*	*6449*
Softwood	1949	1945	1937	1930	1931	1929	1924	1917	1915	1916
Hardwood	4416	4428	4444	4457	4468	4475	4482	4501	4512	4533

Source: MEWF-DPSS

Figure VI.1. Evolution of the area for the main categories of species in the forest fund, in the period 2011 - 2020 (thousand ha)

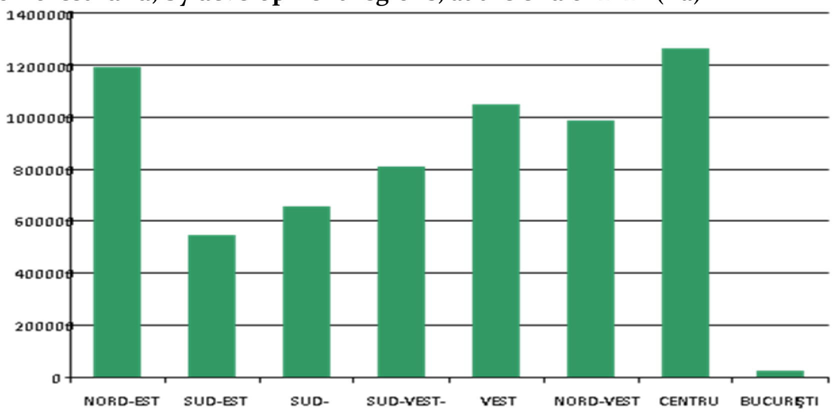


Source: MEWF-DPSS

Approximately 42% of the forest fund area covers the counties of Suceava (6.6%), Caraș-Severin (6.5%), Hunedoara (4.8%), Argeș (4.2%), Vâlcea (4, 1%), Bacău (4.1%), Harghita (4%), Neamt (4%) and Maramureș (3.9%).

The distribution of the forest fund by development regions indicates a significant forest power in the CENTER (19.3%) and NORTH-EAST (18.2%) development regions, followed by the WEST development regions (16.2%), NORTH- WEST (15.2%), SOUTH-WEST-OLTENIA (12.3%) and the lowest in SOUTH-MUNTENIA (10.0%), SOUTH-EAST (8.4%) and BUCHAREST-ILFOV (0, 4%).

Figure VI.2 Distribution of forest fund, by development regions, at the end of 2020 (ha)



Source: MEWF-DPSS

The forest area per capita is 0.34 ha (on January 1, 2020 the resident population was 318 thousand people), close to the European 0.31 ha. The average annual growth, at the level of 2020, was of 7.8 m³ / year / ha (according to the data provided by the Forest Fund Inventory), above the European average of 4.4 m³ / year / ha.

Table VI.2 Wood harvesting index - m³ / year / ha in the period 2015-2020

Year	2015	2016	2017	2018	2019	2020
Wood harvesting index - m³ / year / ha	2.8	2.7	2.8	2.95	2.95	2.94

Source: MEWF-DPSS

Health status of forests

RO 46
Romania indicator code: RO 46 EEA indicator code: SEBI 18
TITLE: FORESTS: dead wood (dry)
DEFINITION: The indicator shows the volume of dead wood, in the form of dry or felled trees, by type of forest (m³ / ha)

Evolution of the phenomenon of abnormal drying of trees, monitoring of the health of forests and carrying out control works

Abnormal drying of trees is the phenomenon of physiological degradation of trees which has as a final consequence the drying of these due to various causes (pollution, drought, inadequate seasonal conditions, etc.). In recent decades this phenomenon has become more common and manifests itself at premature ages, a component of a process that has been called the decline of forests.

One of the major causes that determined the appearance and evolution of the phenomenon of premature drying of trees, according to the observations and results of specialized studies, is climate change due to the elimination of ozone protection, arid climate), changes that have led to extreme weather events such as: excessive temperatures with high frequency and duration, successive and long-lasting droughts, precipitation (rain, snow) quantitatively significant relative to the unit of time and surface , early and late frosts, etc.

Against the background of the physiological weakening of the trees, due to the effects produced by the drought, favorable conditions were created for the development of insects and cryptogamic agents, which infested the trees and accentuated the state of decline until they dried.

Spruce, although it is a less demanding species compared to the water regime in the soil compared to fir, is very sensitive to the action of wind and the pressure exerted by the weight of the snow layer.

Softwood trees damaged by abiotic factors are a favorable environment for the development of bark beetles, which quickly infest these trees and cause them to dry out en masse. The most affected by the drought were the coniferous stands located outside their natural area, especially those in the east of the country, where the water deficit in the soil was very pronounced.
In the coniferous stands in the area of 171,416 ha, 50,684 race trees and 23,993 pheromone races were used to control Ipidae. Measures have been taken to combat and limit Ipidae attacks, which consisted in the exploitation and evacuation with priority, of trees attacked on the leg, as well as of those broken or felled.
In the young coniferous plantations, works were carried out to control the Hylobius Abietis and Hylastes pests on 2,646 ha and in the areas where the presence of these pests was reported, preventive and curative measures were applied, according to the technical norms in force.
Among the quercineae, the pedunculate oak proved to be more sensitive, but also the “brumariu” oak, the sessile oak, show drying phenomena.
One of the deciduous species that is in an obvious state of decline is ash. This species shows a high sensitivity to the action of biotic and abiotic factors. The water stress to which the ash has been subjected in the last decade, characterized by the existence of particularly dry periods alternating with periods characterized by excess moisture, has weakened it.
On the surface of 358,346 ha of deciduous trees infested with defoliating insects, works were carried out to control them on the surface of 5,616 ha in which an intensity of infestations was registered from medium to very strong. The main deciduous leaf insect against which treatments were applied was Lymantria dispar.
In 697 ha of young crops, treatments were applied to control various harmful insects (Stereonichus fraxini, Pygaera anastomosis, Nycteola asiatica, Melasoma populi, etc.).
In the regeneration of quercineae, works were carried out to control plant parasites (Microsphaera abbreviata) on an area of 3,364 ha.
Premature drying of trees causes great economic damage, by reducing the growth on large areas, the low value of the extracted wood, the additional costs of afforestation, etc. Permanent monitoring of the phenomenon (monitoring the physiological weakening and drying of trees) is indispensable to highlight the risk of forest drying, the species most affected by the phenomenon of weakening and drying and the physical-geographical distribution of the phenomenon.

Preventing and extinguishing forest vegetation fires

In 2020, the production of a total number of 627 forest **vegetation fires** was recorded in Romania, which affected **a total area of 5151.99 ha**, of which:
- 584 fires occurred in the national forest fund on 4735.92 ha
- 43 fires occurred at the forest vegetation located on lands outside the forest fund on 416.07 ha.

As a result of these fires, **material damages were estimated in a total amount of 991.64 thousand lei**, produced by burning a number of 195.67 thousand seedlings from plantations and natural regenerations and a quantity of 2993 m3 of wood material.
A total of 12855 people participated in the firefighting actions, of which:
- forestry staff - 3313 people
- military and civilian firefighters - 3903 people
- police and gendarmes - 466 people
- citizens - 5173 people

The analysis of the forest vegetation fire files produced in 2020 revealed the following data:

a) Causes of forest fires:
1. Unknown - 115 fires on 863.16 ha
2. Natural causes - lightning - 2 fires on 2.2 ha
3. Accidental causes: - 10 fires on 60.91 ha, of which:
   - power lines - 1 fire on 0.7 ha
   - train - 4 fires on 54.16 ha
   - vehicle fires - 2 fires on 4.75 ha
   - self-ignition - 1 fire on 0.3 ha
   - other accidental causes - 2 fires on 1 ha
4. Negligence - 497 fires on 4223.22 ha, of which:
   - by spreading fire from agricultural land (burning of dry vegetation on meadows) - 465 fires on 4106.61 ha
   - burning of stubble - 22 fires on 88.11 ha
   - from the burning of garbage - 2 fires on 9.2 ha
   - from lighted cigarettes - 8 fires on 19.3 ha
5. Re-ignitions - 3 fires on 2.5 ha

b) Nature of the affected property from the national forest fund:

1. State public property - 387 fires on 1975.37 ha
2. Public property of ATU - 89 fires on 738.8 ha
3. Private property - 170 fires on 2056.75 ha (62 fires were common on several property types)

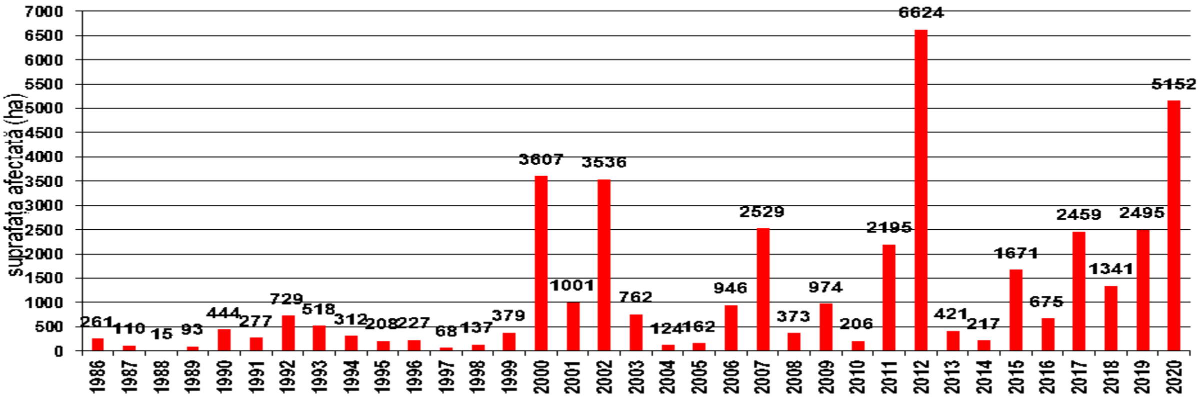
c) Type of fire:

1. Litter fires - 607 fires on 4973.14 ha
2. Mixed fires (litter, canopy, underground) - 20 fires on 178.85 ha

d)b As a site, most fires were recorded in the counties:

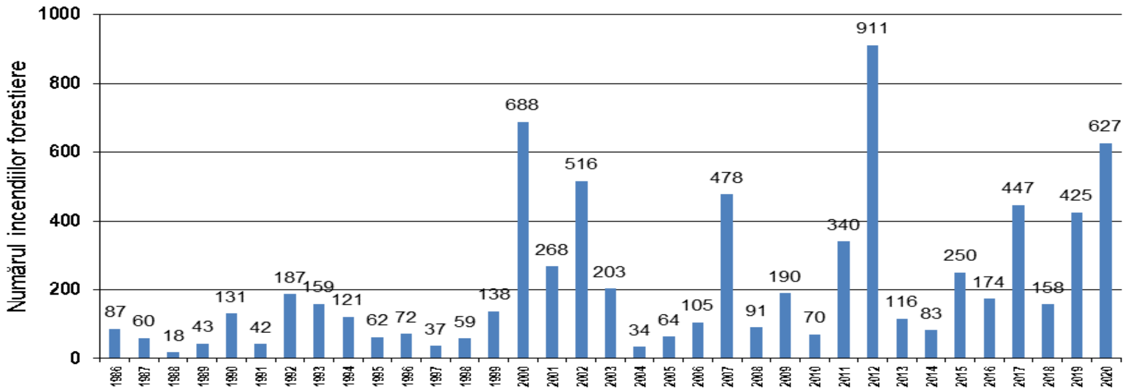
1. Caras-Severin - 59 fires on 806.98 ha
2. Hunedoara - 35 fires on 290.8 ha
3. Gorj - 37 fires on 280.1 ha
4. Mehedinti - 45 fires on 230.3 ha
5. Sibiu - 30 fires on 92.12 ha

Figure VI.3 Dynamics of the area affected by forest fires in Romania in the period 1986 - 2020



Source: MEWF-DPSS

Figure VI.4 Dynamics of the number of forest fires produced in Romania during 1986 - 2020



Source: MEWF-DPSS

Figures VI.3 and VI.4 show that in 2020 there was a worrying increase in the number of fires and the area affected, being the second "hottest" year after 2012.
From the analysis of the causes of forest fires, it is obvious that the main cause of forest vegetation fires is the spread of fire from agricultural lands adjacent to forests, mainly due to pasture and stubble cleaning fires. It is found that the burning of pastures and hayfields is predominant before entering the vegetation or at the exit of vegetation, on days without precipitation.

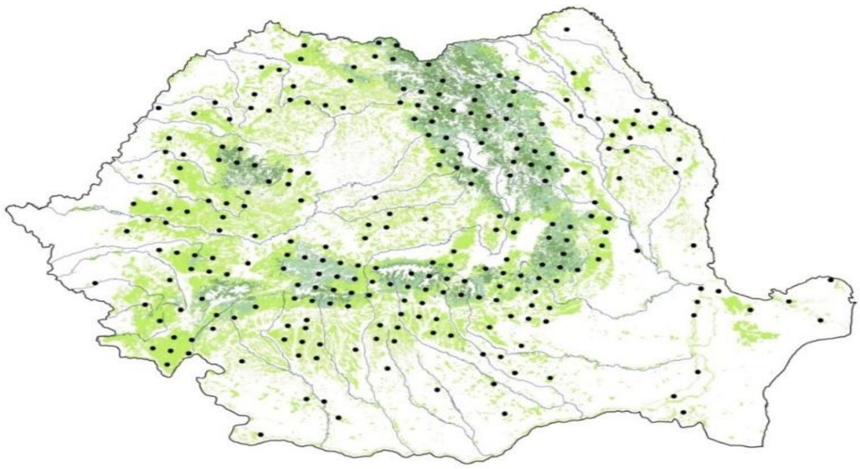
These burns are out of control due to local wind intensifications, which are specific to these periods, and the perpetrators of the fires are often unidentified. It is also specified that all these practices are aimed at

obtaining the subsidy from APIA, but not complying with the GAEC Code 6, should be permanently eliminated from the practice of farmers. A favorable factor in 2020 was considered to be the Covid-19 pandemic, which led to a reduction in travel and economic activities, which led to a shift in attention to agricultural activities, including the "traditional" burn of hayfields from which the hay was not mowed in the previous year.
In 2020, the densest period with registered forest fires was between March 17 and April 24, when 444 fires were recorded on 4305 ha, with a maximum of 41 fires on April 6. In contrast, no fires were recorded between October and December.
In 2020, a number of 57 forest vegetation fires were registered, the duration of which was longer than 24 hours, of which we highlight the one within the commune of Stejari (Gorj county) which was extinguished after 10 days and from the commune Lăzăreni (Bihor county) which were extinguished after 8 days, and another 6 fires were extinguished after 5-7 days (in Buzău county, Caraș Severin, Alba, Bistrița Năsăud, Hunedoara). The largest area affected in a single fire was 565 ha, within the commune of Băuțar, Caraș Severin County.

Source: MEWF / DPSS

In 2020, the assessment of the health of trees was carried out in the framework of the **pan-European network of permanent surveys** (Level I), **systematically located in all forests of Europe (Regulation (EEC) No 3528/86 of the Council of the European Union)**, having a density of 16 x 16 km (a survey at 25600 ha) and a number of 240 surveillance areas in Romania (figure VI.11). This network is not representative in Romania (the sampling error being 8%), the results showing only a trend of the evolution of the health condition from one year to another and even for longer periods in the past. The information obtained from this network, regarding the forests of Romania, is integrated at European level with those obtained from similar networks, of the ICP-Forests member countries (the error being of approximately 1.3%).
A total number of 5424 trees were evaluated, of which 831 softwood trees (15.3%) and 4593 deciduous trees (84.7%). At the species level, a total number of 6 species of conifers were evaluated, of which spruce is predominant (73.5%), followed by fir (19.6%) and 30 species of deciduous trees, with beech as the dominant species (41.6%) followed by sessile oak (13%) and hornbeam (11.8%).
Between 15 July and 31 August 2020, field information was collected on the health status of forest ecosystems. This period represents the moment of maximum physiological activity of the trees, moment in which the climatic factors, the atmospheric pollution and other causes of biotic and abiotic nature exert maximum pressure on the processes of growth of the trees.
The evaluation was performed according to the specific methodology of the ICP-Forests Program (International Co-operative Program on Assessment and Monitoring of Air Pollution Effects on Forests) by the specialized staff of the National Institute for Research and Development in Forestry "Marin Drăcea" (NIRDF).

Figure VI.5 Pan-European Forest Health Monitoring Network (16x16 km -Level I)



Source: NIRDF

The average percentage of damaged trees (defoliation classes 2-4) at national level is 12.9% increasing by 1.3 percent compared to 2019. By groups of species there is a steady increase in the average percentage of damaged trees by softwoods from 9.6% in 2015, 10.4% in 2016, 10.7% in 2017, 12.7% in 2018, 13.7% in 2019, to 17.4 percent in 2020. In the case of hardwoods, in the year 2020 registers a value of 12.1%, increasing by 0.9% compared to 2019, but still with a decreasing trend compared to the values recorded in recent years.(Table VI.3).

Table VI.3 Dynamics of the percentage of healthy trees (Def≤25) and injured (Def> 25), 2015 - 2020

Year	No. arb	Share%	Def≤25%	Def> 25%
Group of species	**Softwood**			
2015	1103	19.0	90.4	9.6
2016	1120	19.3	89.6	10.4
2017	1092	18.6	89.3	10.7
2018	1051	18.0	87.3	12.7
2019	989	17.3	86.3	13.7
2020	831	15.3	82.6	17.4
Group of species	**Hardwood**			
2015	4705	81.0	86.1	13.9
2016	4688	80.7	85.8	14.2
2017	4788	81.4	85.0	15.0
2018	4781	81.9	86.1	13.9
2019	4732	82.7	88.8	11.2
2020	4593	84.7	87.9	12.1
Group of species	**Total species**			
2015	5808	100	86.9	13.1
2016	5808	100	86.5	13.5
2017	5880	100	85.8	14.2
2018	5832	100	86.3	13.7
2019	5721	100	88.4	11.6
2020	5424	100	87.1	12.9

Source: NIRDF

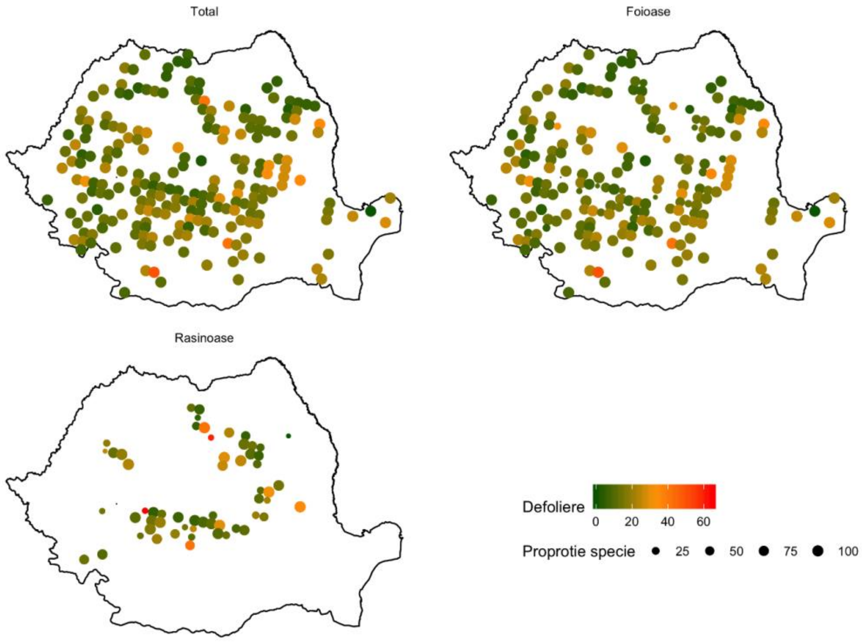
Among the conifers, the fir tree registers the best state of health with a proportion of damaged trees in slight growth compared to 2019 from 9.9% to 11.0% in 2020. Much more obvious is the decline in the health of spruce species and pine where there is an increase in the percentage of damaged trees, from 10.4% in 2018, 12.4% in 2019 to 15.7 in 2020, respectively from 61.5% in 2018, 64.1% in 2019 to 79.5% in 2020.

Unlike previous years, there is a considerable decrease in the proportion of damaged trees of the oak species, from 46.7% in 2017, 48.7% in 2018, 9.1% in 2019, and 10% in 2020. Maximum values of the proportion of deciduous trees is found in poplar (24.6%), garnish (20.5%), willow (19.4%) and ash (19.5%).

The mortality level (defoliation class 4) is very low of 0.1% for all species, specimens of dry trees being recorded for both groups of species, the highest degree of mortality being attributed to the species poplar, hornbeam, acacia or “other deciduous ”.

At the regional level, there are high percentages of average defoliation of deciduous species in the central and western part of the country. In conifers, slightly higher values are found in the area of the curvature Carpathians and the northern area of the Eastern Carpathians (figure VI.6).

Figure VI.6 Spatial distribution of average defoliation in 2020



Source: NIRDF

Overall, the results of assessments carried out in recent years (2015-2020) indicate that the health of the country's forests, assessed in the pan-European network of permanent surveys (Level I), is relatively constant with small differences from a year to year in terms of the percentage of trees, with a defoliation of the crown of more than 25% (damaged trees), which at the level of 2020 registered a value of 12.9%, 0.2 percent lower than in year 2015 (13.1%).

Source: NIRDF

One of the major causes that determined the appearance and evolution of the phenomenon of premature drying of trees, according to the observations and results of specialized studies, is climate change, which generated extreme weather events such as: excessive temperatures with high frequency and duration, droughts successive and long-lasting, significant precipitation (rains, snow) quantitatively related to the unit of time and surface, early and late frosts, etc .

From a meteorological point of view, the year 2020 was characterized by the existence of two antagonistic periods: the period January-June rich in rainfall and the period July-December with a deficit of precipitation and temperatures above the multiannual averages specific to these months. Quite frequently in recent years there have been early and late frosts that have caused the frost of young tree vines.

Although the period 2017-2019 was more balanced in rainfall, the excessive drought that manifested itself between 2006 and 2012 continued to influence the physiological state of some tree species with demands on the soil moisture regime.

Against the background of the physiological weakening of the trees, due to the effects produced by the drought, favorable conditions were created for the development of insects and cryptogamic agents, which infested the trees and accentuated the state of decline until they dried.

Compared to previous years, the percentage of drying of the fir remained at a relatively constant level, respectively 6% of the area of the state-owned forest fund occupied by this species (compared to 10% in 2015 and 8% in 2016), the cause The main cause of this phenomenon is prolonged drought. Spruce, although it is a less demanding species compared to the water regime in the soil compared to fir, is very sensitive to the action of wind and the pressure exerted by the weight of the snow layer.

Softwood trees damaged by abiotic factors are a favorable environment for the development of bark beetles, which quickly infest these trees and cause them to dry out en masse. The most affected by the drought were the coniferous stands located outside their natural area, especially those in the east of the country, where the water deficit in the soil was very pronounced.

Among the deciduous species, oak trees face drying phenomena on larger areas, respectively 13,867 ha (3% of the area of the state-owned forest fund occupied by these species). Among the quercineae, the pedunculate oak proved to be more sensitive, but also the oak, the sessile oak, show drying phenomena.
In recent decades, pollution has increased in several forest areas, greatly affecting the health of trees and their ability to regenerate. Industrial pollution, both domestic and transboundary, generates acid rain. The harmful effect of the powders resulting from the activity of the units producing construction materials (cement, lime, ballast, etc.) acts and is felt on large areas.
From the analysis of the data reported by the forestry directorates, for the year 2020, the following results:

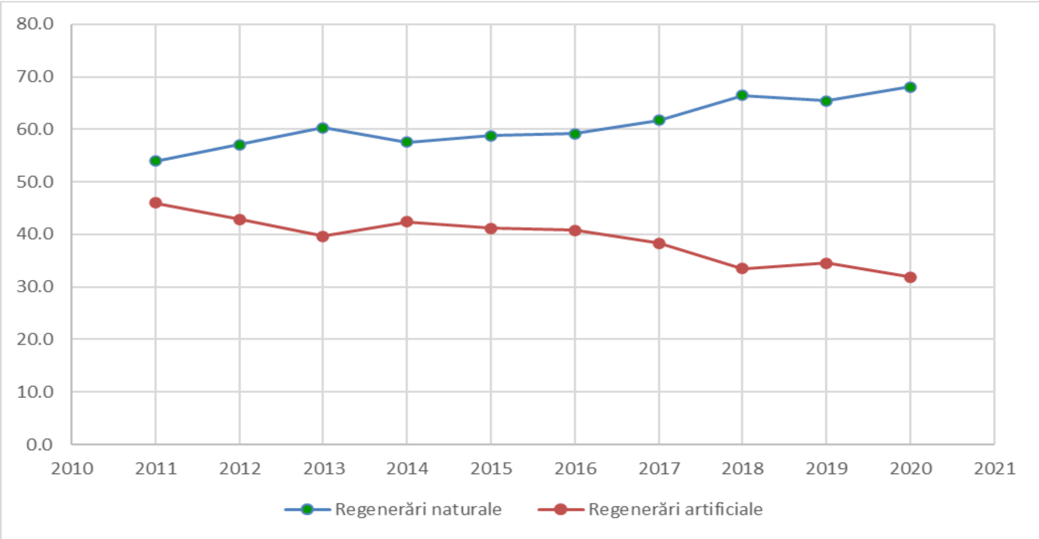
- the surface of the stands affected by the drying is of 44,930 ha (1% of the total surface of the forest fund public property of the state, administered by the National Directorate of Forests - Romsilva); the total area of deciduous trees affected by the drying phenomenon is 26,352 ha, representing 1% of the total area occupied by these species;
- among deciduous trees, oak trees are affected on an area of 16,159 ha (3%), beech on 3,072 ha (0.3%), various hard species on 5872 ha (1%) and various soft species on 2709 ha (1%);
- the total surface of the coniferous stands affected by the drying phenomenon is of 18,846 ha, representing 2% of the total surface occupied by these species;
- among the conifers, on the first place as affected surface is the fir with 8,516 ha (6%), on the next places being the spruce with 9,729 ha (2%) and the pine species with 595 ha (1%);
- the total volume of dry or drying trees was 207.9 thousand m3. From this volume, 157.5 thousand m3 were extracted during 2020, the difference of 50.4 thousand cubic meters will be exploited during 2021.

Source: ROMSILVA

Renewed forests surfaces

Forest regeneration is the process that lays the foundations of a new stand, after the end of a life or production cycle of the previous generation of trees, consisting of the activity of renewal or restoration of the tree population after exploitation or destruction due to various causes (eg felling wind, pollution, landslides, etc.). It is imposed as a mandatory link, a permanent means of evolution of the tree vegetation, which ensures the continuity of the forest in time and space.
In accordance with the provisions of the Forestry Code, the development of the national forest fund and the expansion of forest areas is an obligation of the central public authority responsible for forestry and a national priority.
Ensuring the regeneration of the forest after harvesting the timber after the application of main products, afforestation of land without forest vegetation that had no other uses assigned by forest management, as well as ecological reconstruction of land affected by various forms of degradation, are priority objectives of public authority central responsible for forestry.
The increase of forest-covered areas is achieved by afforesting land with a purpose other than forestry: land for agricultural use, in order to improve environmental conditions and optimize the landscape, ensure and increase agricultural crops, prevent and combat soil erosion, protect roads , dams and banks, localities and economic, social and strategic objectives or degraded lands improved by afforestation works, in order to protect the soil, restore the hydrological balance and improve the environmental conditions.
The regeneration works aim at the realization of the regeneration compositions established by the forest arrangements. According to the provisions of art. 30 para. (1) of the Forestry Code, regeneration works are carried out within a maximum of two seasons of vegetation from single felling or when mature trees are removed after accidental felling or in case of illegal felling on compact areas of over 0.5 ha .
If the owners do not fulfill their obligation to regenerate the forests they own, for imputable reasons, the central public authority responsible for forestry ensures, through forestry schools or certified companies, the execution of afforestation works, until the closure of the state of massive, the equivalent value of the works being borne by the owner, according to the procedure provided in art. 32 of the Forestry Code.
In 2020, forest regeneration works were carried out on 25189 hectares, 3% more than in 2019. Of the total areas of the forest fund covered with regeneration cuts, 17162 ha were natural regenerations, with 1146 ha (7.2%) more than the previous year, and 8027 ha were represented by afforestation (artificial regeneration), with 416 ha (4.9%) less than in the previous year.

Figure VI.7 Evolution of naturally and artificially regenerated areas in the period 2011-2020 (%)



Source: MEWF-DPSS

Table VI.4 Evolution of regenerated areas, by land categories, in the period 2011 - 2020

- hectares -

Land categories Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Regenerations - total	*25000*	*25727*	*26285*	*29505*	*28750*	*28456*	*28032*	*27043*	*24459*	*25189*
Natural regenerations	13501	14701	15848	16997	16904	16841	17296	17972	16016	17162
- in forest background	13501	14618	15848	16997	16903	16841	17281	17970	16016	17162
- in lands taken over in the forest fund	-	65	-	-	1	-	-	2	-	-
- in lands outside the forest fund	-	18	-	-	-	-	15	-	-	-
Artificial regenerations	11499	11026	10437	12508	11846	11615	10736	9071	8443	8027
- in forest background	10331	10088	9902	10077	11260	11004	10508	9001	8242	7921
- in lands taken over in the forest fund	425	106	33	76	61	1	8	28	72	20
- in lands outside the forest fund	743	832	502	2355	525	610	220	42	129	86

Source: MEWF-DPSS

In 2020, most of the regenerations, respectively 99.6% were made on lands from the forest fund and only 0.3% on lands outside the forest fund and 0.1% on lands taken over from the forest fund. Compared to 2019, the forested area in 2020 with deciduous species was smaller by 102 ha and the one with coniferous species was higher by 832 ha.

Source: MEWF / DPSS

Forest regeneration in 2020

In 2020, forest regeneration works were carried out on 25189 hectares, 3% more than in 2019. Of the total areas of the forest fund covered with regeneration cuts, 17162 ha were natural regenerations, with 1146 ha (7.2%) more than the previous year, and 8027 ha were represented by afforestation (artificial regeneration), with 416 ha (4.9%) less than in the previous year.

Table VI.5 Regenerated areas, by types of regeneration and by categories of land, in the period 2011 - 2020

- hectares -

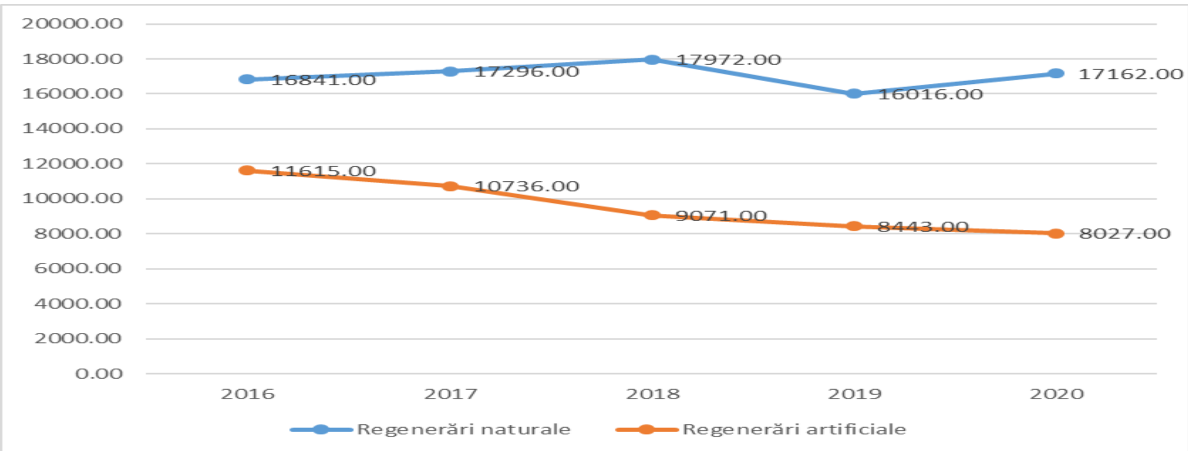
Land categories Year	2016	2017	2018	2019	2020
Regenerations - total	***28456***	***28032***	***27043***	***24459***	***25189***
Natural regenerations	**16841**	**17296**	**17972**	**16016**	**17162**
Natural regenerations in forest background	16841	17281	17970	16016	**17162**
Natural regenerations in lands taken over in the forest fund	-	-	2	-	-
Natural regenerations in lands outside the forest fund	-	15	-	-	-
Artificial regenerations	**11615**	**10736**	**9071**	**8443**	**8027**
Artificial regenerations in forest background	11004	10508	9001	8242	**7921**
Artificial regenerations in lands taken overin the forest fund	1	8	28	72	**20**
Artificial regenerations in lands outside the forest fund	**610**	**220**	**42**	**129**	**86**

Source: Statistics on Forestry Activities in 2020
https://insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020

Throughout the analyzed period, the artificial regenerations had a lower share in the total regenerated surface than the natural regenerations. Between the first and last year of the analyzed series there is an increase in the proportion of naturally regenerated area to the detriment of artificial regeneration, in 2011 the share of natural regeneration being about 54% and in 2020 about 68%, 14 percentage points higher.

Figure VI.8 Evolution of naturally and artificially regenerated surfaces in the period 2016 – 2020

-% -



Source: Statistics on Forestry Activities in 2020
https://insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020

In 2020, most of the regenerations, respectively 99.6% were made on lands in the forest fund, 0.3% on lands outside the forest fund and 0.1% on lands taken over in the forest fund.

Table VI.6 Evolution of regenerated areas, by land categories in the period 2016 - 2020 (hectares)

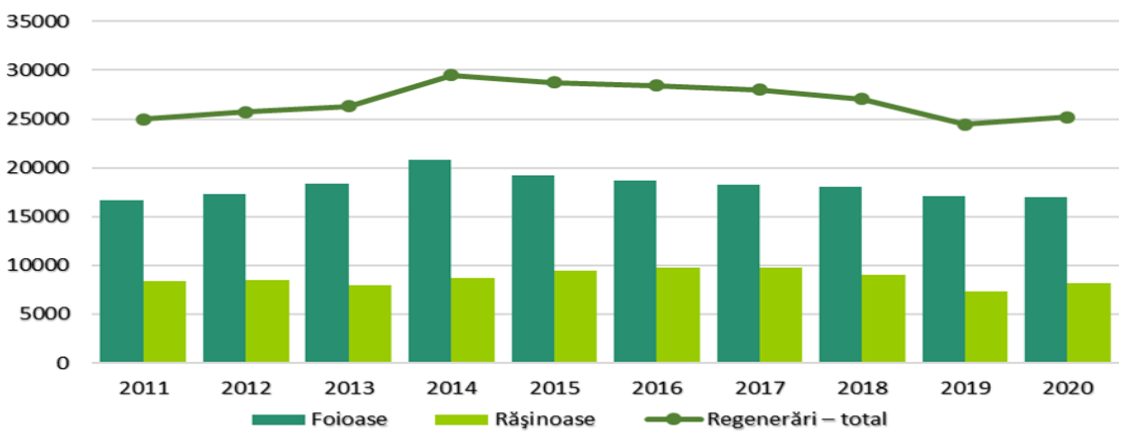
Land categories Year	2016	2017	2018	2019	2020
Regenerations - total	***28456***	***28032***	***27043***	***24459***	***25189***

In the background forest	27845	27789	26971	24258	25083
- on surfaces traversed with cuts of	24780	24712	24764	22352	23065
- substitutions and restorations of weak trees	1195	1098	940	981	1288
- unregenerated clearings and gaps	1805	1942	1258	911	723
- degraded lands from the forest fund	61	37	9	14	4
- protective forest curtains	4	-	-	-	3
In lands taken over in the forest background	1	8	30	72	20
- degraded lands taken	1	8	2. 3	4	3
- forest curtains of protection	-	-	7	68	17
In outdoor grounds forest fund	610	235	42	129	86
- protective curtains of the field	-	-	-	-	-
- afforestation erosion	-	-	2	-	-
- degraded lands outside the fund	610	235	40	129	86

Source: Statistics on Forestry Activities in 2020
https://insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020

In 2020, most of the regenerations, respectively 99.6% were made on lands from the forest fund and only 0.3% on lands outside the forest fund and 0.1% on lands taken over from the forest fund. Compared to 2019, the forested area in 2020 with deciduous species was smaller by 102 ha and the one with coniferous species was higher by 832 ha.

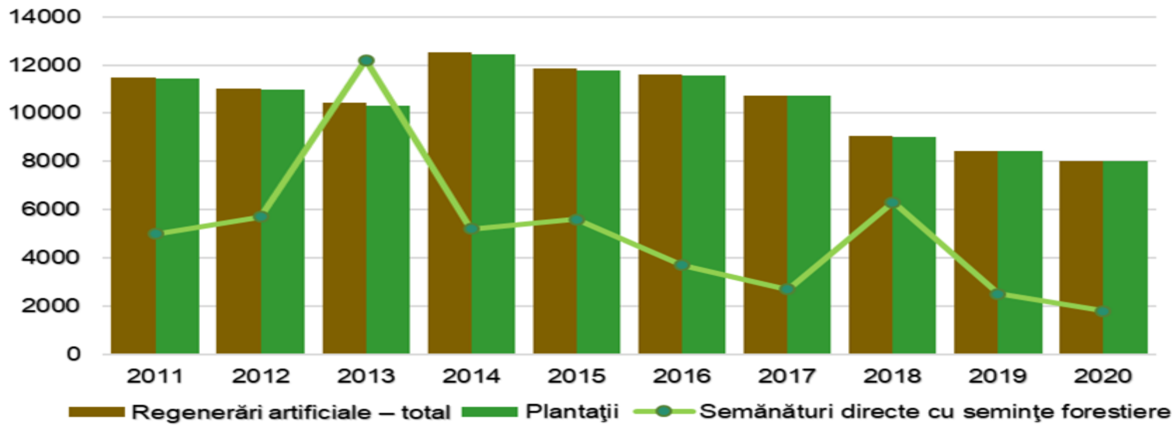
Figure VI.9 Regenerated areas, by species, in the period 2011 - 2020 (ha)



Source: Statistics on Forestry Activities in 2020
https://insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020

Out of the total artificially regenerated area in 2020, the largest share of 99.8%, is represented by the regeneration achieved by plantations, of which with seedlings of resinous species on 4417 hectares and with seedlings of deciduous species on 3592 ha, being represented in the graph below on the first axis. The direct sowings with forest seeds represented in the same graph on the second axis were of 50 hectares in 2011 and of 18 ha in 2020.

Figure VI.10 Artificially regenerated areas, by types of artificial regenerations, in the period 2011 - 2020 (ha)



Source: Statistics on Forestry Activities in 2020
https://insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020

In 2020, land preparation works were carried out on an area of 2251ha, 230 ha less than in 2019, soil preparation works on an area of 1545 ha, 299 ha more than in 2019 and works for the care of young crops on 65101 ha, with 7512 ha less, compared to 2019. At the same time, works were also carried out to help the natural regeneration on 17451 ha, with 957 ha less than in 2019. Between the first and last year of the analyzed series, there was observed a decrease in the areas of land preparation works and an increase in the works to help the natural regenerations, while the works of care of young crops and natural regenerations were kept at approximately the same level.

Table VI.7 Land and soil preparation works, care of young crops and aid for natural regeneration, in the period 2011 - 2020 (ha)

Works Year	2016	2017	2018	2019	2020
Land preparation	3023	2981	2224	2481	**2251**
Soil preparation	1816	1549	1379	1246	**1545**
Plantation fencing and natural regeneration installed	-	7937 1)	1191 1)	784 1)	**539 1)**
Care works for young crops and natural regenerations	83730	85299	83027	72613	**65101**
Natural regeneration support works - total	18134	19044	20662	18408	**17451**
- works for the installation of the natural seedbed	5417	5979	6327	4262	**4959**
- sowings and plantations under the massif	711	698	259	363	**248**
- maintenance works	**12006**	**12367**	**14076**	**13783**	**12244**

1) *indicator introduced starting with 2017*
2) *it also contains soil preparation*

Source: Statistics on Forestry Activities in 2020
ttps: //insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020

At the level of development regions, 28.8% of the total regenerated area in 2020 was achieved in the North-East region, 17.2% in the Center region, 13.6% in the North-West region, 12.8% in the region South-East, 10.3% in the South-Muntenia region, 8.7% in the West region, 8.0% in the South-West Oltenia region and 0.6% in the Bucharest-Ilfov region.

Figure VI.11 Distribution of regenerated areas, by counties, in 2020 (hectares)

Source: Statistics on Forestry Activities in 2020
https://insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020

The largest regenerated areas were registered in the counties: Suceava (2910 ha), Bacău (1351 ha), Vrancea (1284 ha), Harghita (1182 ha), Vaslui (1017 ha), Cluj (924 ha), Neamț (885 ha), Caraș-Severin (877 ha), Maramureș (854 ha), Iași (843 ha), Bihor (807 ha), Dâmbovița (737 ha) and Mureș (721 ha).

Source: Statistics on Forestry Activities in 2020
https://insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020

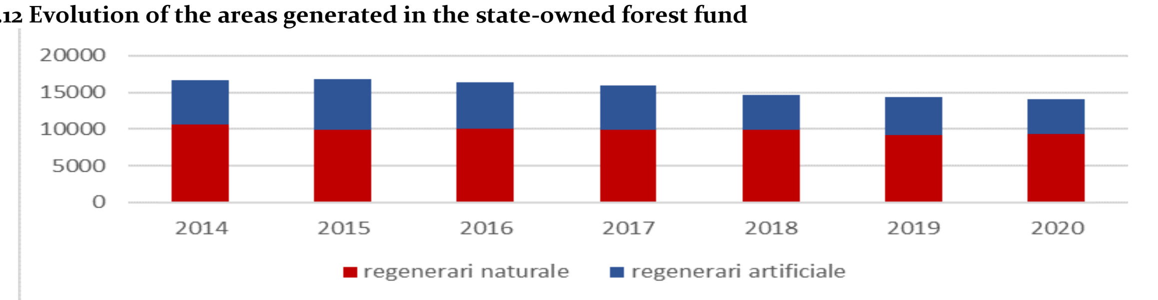
The evolution of the surfaces on which regeneration works were carried out in the period 2014 - 2020, is in close correlation with the surfaces covered with treatments with regeneration under mass.

Table VI.8 Areas covered with forest regeneration works in the state-owned forest fund

Year	Total regeneration (ha)	Natural regenerations (ha)	Artificial regeneration (ha)	of total: degraded land taken over (ha)
2014	16665	10547	6118	34
2015	16732	9918	6814	49
2016	16421	9995	6426	
2017	15984	9916	6068	
2018	14582	9850	4732	
2019	14331	9149	5182	
2020	14083	9253	4830	
Total 2014 - 2020	**108798**	**68628**	**40170**	**83**

Source: ROMSILVA

Figure VI.12 Evolution of the areas generated in the state-owned forest fund



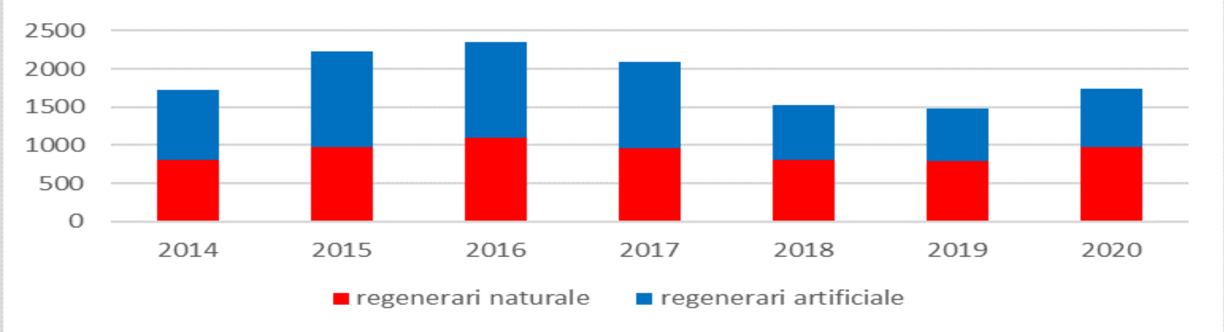
Source: ROMSILVA

Table VI.9 Areas covered with forest regeneration works in the forest fund of other owners managed by RNP - Romsilva

The year	Total regeneration (ha)	Natural regenerations (ha)	Artificial regeneration (ha)
2014	1731	815	916
2015	2226	969	1257
2016	2349	1094	1255
2017	2095	959	1136
2018	1531	804	727
2019	1488	800	688
2020	1735	976	759
Total 2014 - 2020	**13155**	**6417**	**6738**

Source: ROMSILVA

Figure VI.13 Evolution of regenerated forest areas of other holders managed by RNP - Romsilva



Source: ROMSILVA

In the period 2014 o 2020, the state of regenerations installed both naturally and artificially was significantly influenced by climatic and edaphic factors, to which the specialists had to respond with adequate forestry measures. The biological processes found during the installed regenerations, in the extremely dry years in the areas subject to arid and steppe aridization, were the devitalization of the trees and even their drying.
In order to increase the resilience of natural regenerations and plantations to environmental adversities in the context of climate change, the following measures will be taken:

- the use in forest regeneration works will be pursued, especially of the native species, of the origins and of the clones best adapted to the seasonal conditions
- at the same time, the ecological requirements of the species with the seasonal potential will be taken into account in each ecological zone, taking into account the changes occurred in the species areas, consequence of the climatic changes occurred in the last decades and materialized in the increase of the average annual temperature. 8oC. For this purpose, the implementation of the regeneration compositions established by the forest arrangements or technical studies will be carefully followed, in accordance with the natural type of forest;

- Natural regeneration will be promoted with priority, through the adoption and correct application of treatments, so that they take into account the temperament of the main species, the years with fruiting and the state of development of the usable seed. The share of natural regenerations currently represents 66% of the total regeneration works carried out in the forest fund, public property of the state, and will increase in the future, as a result of the forestry measures that will be applied.

Source: ROMSILVA

Areas with a deficit of forest vegetation and afforestation availability

Since 2016, following the amendment and completion of Law no. 46/2008 Forest Code, republished, areas deficient in forests are those counties in which the area of the forest fund represents less than 30% of its total area.

Table VI.10 Deficient counties in forests 2020 -% of the county area covered with forest

Nr.	County	%
1	Municipiul Bucuresti	3
2	Calarasi	4
3	Teleorman	5
4	Braila	6
5	Constanta	6
6	Ialomita	6
7	Galati	8
8	Olt	10
9	Botosani	11
10	Giurgiu	11
11	Tulcea	12
12	Dolj	12
13	Timis	12
14	Vaslui	14
15	Satu Mare	16
16	Ilfov	16
17	Iasi	18
18	Cluj	24
19	Salaj	25
20	Buzau	26
21	Arad	27
22	Bihor	28
2. 3	Dambovita	29

Source: MEWF / DPSS

For the next period, it is expected to increase the area occupied by forest vegetation, with priority in these counties, by afforestation in degraded lands unfit for agriculture and by afforestation in order to achieve the National System of Forest Protection Curtains.

Source: MEWF / DPSS

The distribution of forest vegetation on the Romanian territory is uneven. In hilly and mountainous areas, the cover with forest vegetation is considered satisfactory. In contrast, in the plain area, the percentage of forest vegetation cover is very low, just over 5%. Given that an area can be considered as deficient in forests if the percentage of forest vegetation cover is below 15%, table VI.17 presents the situation of the counties that are in this situation. Of the 13 counties, 4 have afforestation percentages below 5% (Brăila, Călărași, Constanța and Teleorman), 3 have afforestation percentages between 5% and 10% (Galați, Ialomița and Olt), the other 6 counties have afforestation percentages between 10% and 15%. Starting from here, it is possible to prioritize afforestation actions.

There are also other counties that, although they have afforestation percentages higher than 15%, should be included in the afforestation plans, because the plain areas in them have very few forests (for example, Buzău, Vrancea, Arad counties, etc.). The percentages of forest vegetation coverage for each county were obtained by photointerpretation of 1: 5000 scale orthophotoplanets obtained following the flights from 2003-2005.

Table VI.11 Areas with deficiency in forest vegetation

COUNTY	Forest%	OWL%
BOTOSANI	11.4	0.0
BRAILA	4.8	0.0
CALARASI	4.1	0.0
CONSTANTA	4.2	0.1
DOLJ	11.3	0.1
GALATI	8.5	0.1
GIURGIU	10.7	0.1
IALOMITA	5.4	0.0
OLT	9.4	0.1
TELEORMAN	4.6	0.0
TIMIS	14.4	0.1
TULCEA	11.6	0.0
VASLUI	14.7	0.1
Source: NIRDF		

Source: NIRDF

National afforestation program

Regeneration of stands on the areas from the forest fund public property of the state under administration and from the forest fund belonging to other owners, natural or legal persons, with which RNP-Romsilva concluded management contracts, areas from which the wood was harvested as a result of the works exploitation - regeneration, afforestation of lands without forest vegetation, which have no other uses assigned by forestry arrangements, as well as the installation of forest curtains to protect communication routes, were in 2020 priority objectives in the activity program.

The forest regeneration program approved for 2020, aimed at ensuring the integrity and permanence of forests, the continuous exercise of protection, production and recreational functions, as well as expanding the forest fund area by carrying out works on degraded land taken over the forest fund in previous by RNP - Romsilva.

The biological material used in the forest regeneration works carried out in the state-owned forest fund, in 2020 - 26.3 million forest seedlings, was provided by the over 1080 forest nurseries within RNP - Romsilva, in the assortment of species corresponding to the compositions regeneration provided in the technical documentation.
The value of the forest regeneration works carried out in 2020 in the state-owned forest fund managed by RNP - Romsilva was **140,417.8 thousand lei**, of which: 151.7 thousand lei represent the value of the works carried out in the perimeters of degraded lands taken over, financed from the land improvement fund, and 550.2 thousand lei represent the value of the works of establishment and maintenance of plantations in forest curtains, financed by to the state budget.

At the level of 2020, the forest regeneration program was implemented in a proportion of 112.4%, executing works on the total area of **14,083 Ha**, with 1,552 ha higher than scheduled.

The natural regeneration works were carried out on the surface of **9,253 Ha**, and the artificial regeneration works were carried out on the surface of **4,830 Ha**. The total of the artificial regenerations carried out also includes 17 ha on which the forest protection curtains of the A2 highway were installed, within Constanța county.
In order to consolidate the plantations established in the previous years and in the spring of 2020, current completion works were carried out until the end of 2020. **2,097 Ha** and restoration work on calamity plantations on the surface of **404** Ha.

In the woods ownedterritorial regeneration units, respectively in the private property of the natural persons, managed or for which they provide forestry services, the National Forests Authority - Romsilva, in

2020 **1,735 ha**, of which: **natural regenerations** on the surface of **976 ha**, and **artificial regenerations** on the surface of **759 ha**.

Also, current additions have been made in the plantations carried out in previous years **on 126 ha** and **1 ha** of restoration. For the afforestation, completion and restoration works carried out in the forest fund of other owners managed by the directorate, approx. 3.8 millions of forest seedlings.

The value of the regeneration works performed in 2020, in the forest fund of other owners, managed by the National Directorate of Forests - Romsilva on the basis of contracts is of 11.1 million lei,settled from the forest conservation and regeneration fund, set up by the owners.

Source: ROMSILVA

THREATS AND PRESSURE ON FORESTS

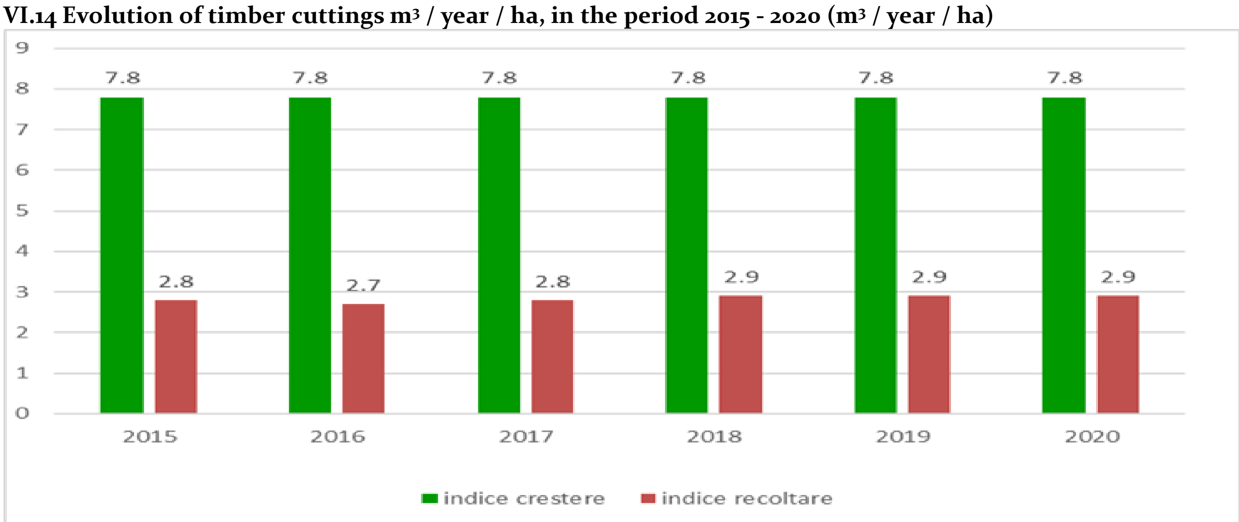
Forest areas covered with cuttings

RO 45
Romania indicator code: RO 45 EEA indicator code: SEBI 17
TITLE: FORESTS: forest background, growing and harvesting timber
DEFINITION: The indicator shows the evolution of the forest fund, the net annual growth and the annual fellings, as well as the utilization rate of the forests (the fraction of annual fellings from the annual growth)

The evolution of society has brought with it the emergence of products that meet the growing needs of different industries, namely the emergence of materials that can replace wood, but the pressure on forest ecosystems is still very high to provide as much wood and No reduction in this pressure is expected in the next period.
The profile market is better documented and has technologies at very high standards, so that high quality wood (resonant wood, wood for aesthetic veneer, etc.) but also wood for timber and cellulose is highly sought after in the profile market. .

At regional and global level, considerable pressures are being created on forest ecosystems from the area of expanding economies and growing populations, which want to meet the needs of consumption and profit as soon as possible (forest owners want maximum profit in a time in short, which contradicts the availability and regenerative capacity of forest ecosystems). Efforts to conserve forest ecosystems are supported by states with higher living standards, while poor countries are often willing to sacrifice their forest resources without taking into account the disastrous effects that accompany these processes.

Figure VI.14 Evolution of timber cuttings m³ / year / ha, in the period 2015 - 2020 (m³ / year / ha)



Source: MEWF / DPSS

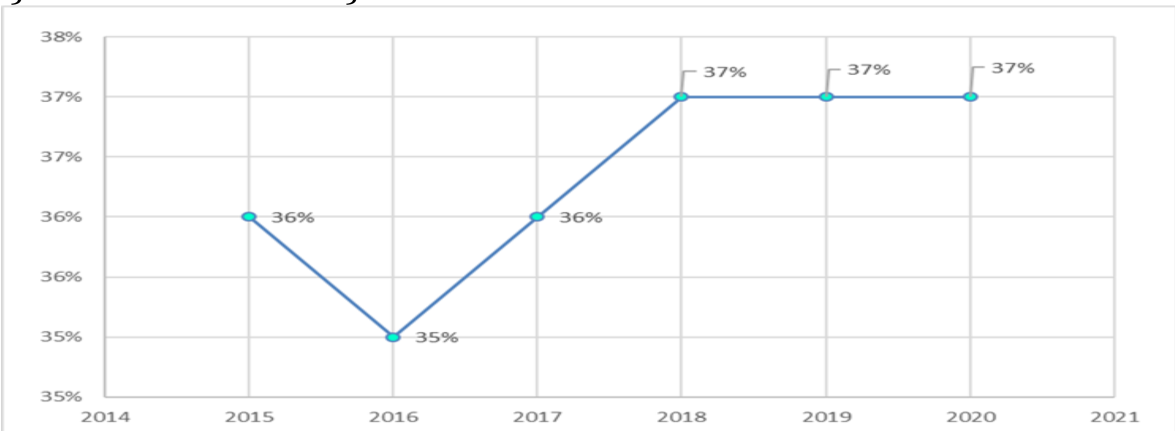
Table VI.12 Evolution of forest areas covered with cuttings, in the period 2015-2020

Types of cuts		Year					
		2015	2016	2017	2018	2019	2020
Regeneration cuttings, of which:	regeneration cuttings in the forest-ha	67791	65127	70321	64507	74258	68724
	regeneration cuttings in grove-ha	3665	3229	3212	3573	4022	3499
	substitution cuts-ha	776	755	728	867	576	872
	conservation cuttings-ha	24221	68107	103035	112614	111754	112244
Total		**98453**	**137218**	**177296**	**181561**	**190610**	**185339**

Source: MEWF / DPSS

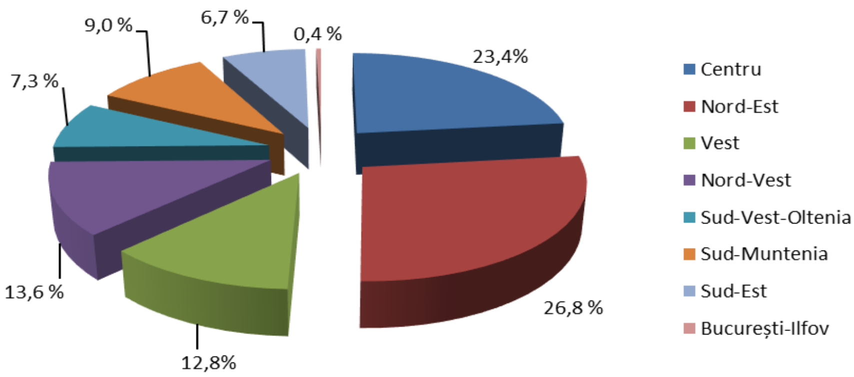
The evolution of the forest fund growth and timber harvesting in Romania is illustrated by the forest utilization rate (the ratio between the harvesting index and the growth index).

Figure VI.15 Forest utilization rate in 2015-2020



Source: MEWF / DPSS

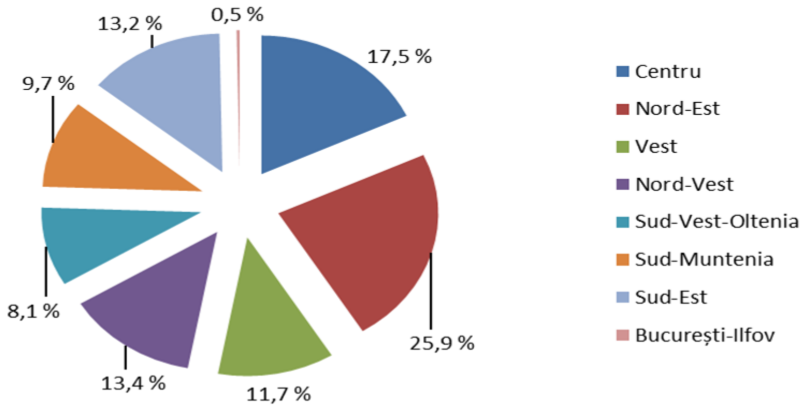
Figure VI.16 Harvested timber (%), by development regions, in 2019



Source: MEWF / DPSS, www.insse.ro

The highest volume of timber harvested in the development region NORTH-EAST 26.8% of the total volume of timber harvested, followed by the development region CENTER by 23.4% and a lower share was registered in the development regions WEST by 12.8%, NORTH-WEST by 13.6%, SOUTH-MOUNTAIN by 9%, SOUTH-WEST OLTENIA by 7.3%, SOUTH-EAST by 6.7% and BUCHAREST-ILFOV by 0.4% .

Figure VI.17 Forest regeneration works (%), by development regions, in 2019



Source:www.insse.ro

Harvesting the wood mass from the forest fund public property of the state administered by the National Directorate of Forests - Romsilva

A. The volume of harvested wood

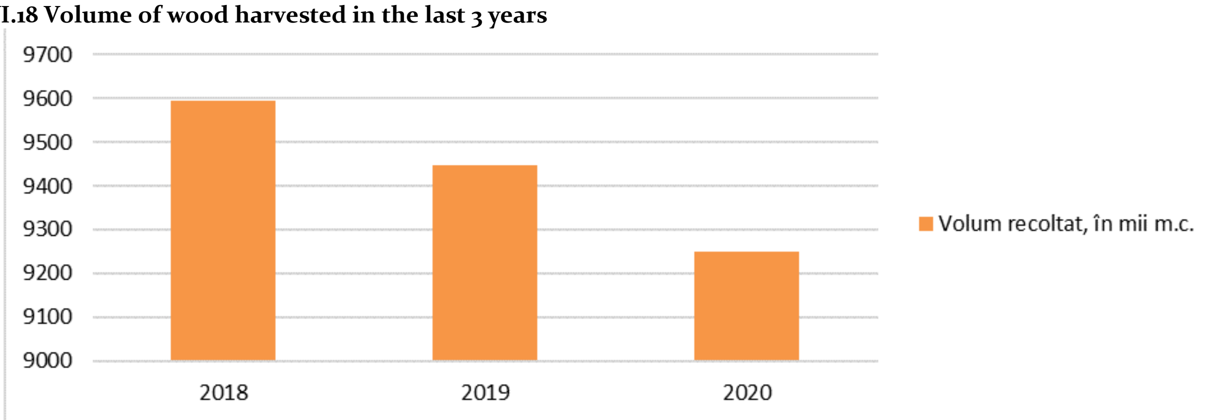
In accordance with the provisions of Law no. 46/2008 - Forestry Code, with subsequent amendments and completions, of the provisions of the forest arrangements and of the real conditions of exploitation of the wood mass, in 2020, from the forest fund public property of the state was harvested a total volume of 9,250 thousand m3 wood mass . The situation of wood harvesting by ways of recovery is presented in Table VI.13.

Table VI.13 Situation of timber harvesting by ways of recovery (thousand m3)

YEAR	Total volume of wood harvested	from which: capitalized as a wooden table on the foot	operated through the provision of services	exploited on its own
2018	9,595.9	5,622.2	2,005.3	1,968.4
2019	9,447.0	6,497.6	1,048.6	1,900.8
2020	9,250.1	6,469.1	892	1,889

Source: ROMSILVA

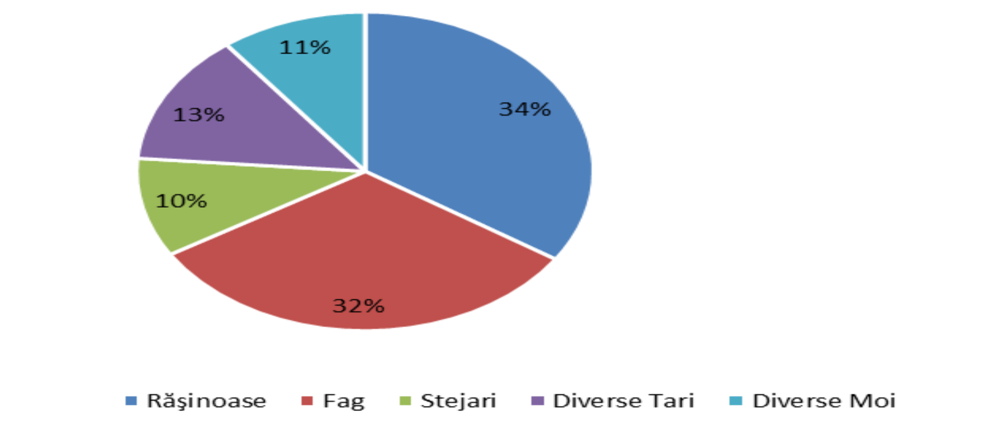
Figure VI.18 Volume of wood harvested in the last 3 years



Source: ROMSILVA

The structure by species of the volume harvested in 2020 is, in general, similar to that of previous years, being represented in Figure VI.19.

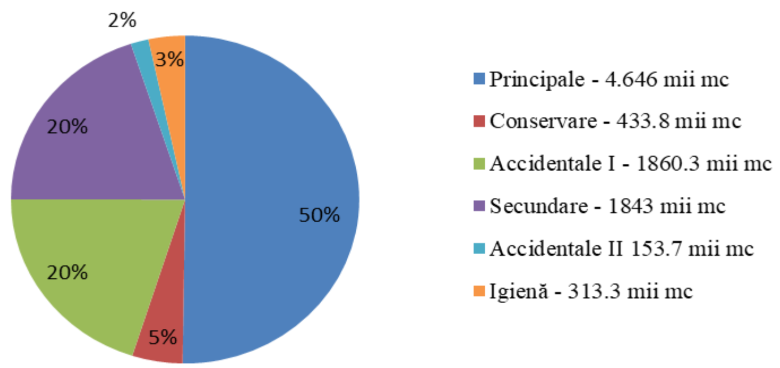
Figure VI.19 The structure by species of the volume of wood harvested in 2020



Source: ROMSILVA

By nature of products, 6,940 thousand m3 are the main products and those assimilated to them (canning and accidental products I), 1,997 thousand m3 are by-products (including the volume of accidental products II) and 313 thousand m3 hygiene products.

Figure VI.20 Product structure by nature of the timber harvested in 2020



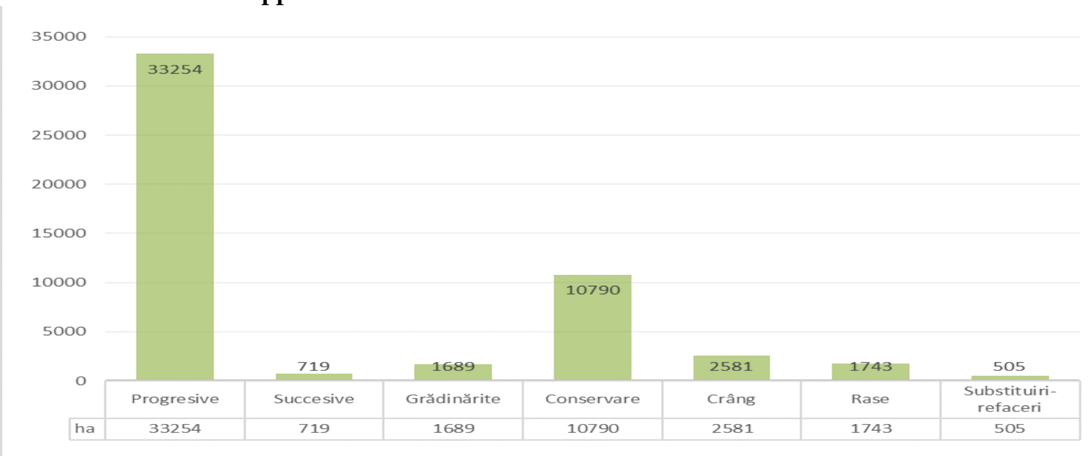
Source: ROMSILVA

Due to the action of destabilizing factors, biotic and / or abiotic, during 2020 accidental products were harvested that accumulated a volume of 2,014 thousand m3 (22% of the total volume of wood harvested in 2020), of which 1,860 , 3 thousand m3 accidental products I and 153.7 thousand m3 accidental products II.

The rational and sustainable management of the state-owned forest fund has required the application of a wide range of treatments capable of contributing to the greatest extent to the promotion of valuable native species, ensuring and continuous exercise of the multiple functions (ecological, economic and social) that trees they can meet them. By applying the treatments, the aim was to ensure the regeneration of the stands scheduled for pruning and the achievement of optimal structures in terms of function, the cleared cuttings being executed on small areas, only in the situations provided by the forest arrangements.

The weight of the application of the treatments (methods of regeneration of the stands), as covered area, is presented in figure VI.21.

Figure VI.21 Structure of treatment applications in 2020



Source: ROMSILVA

B. Care work for young trees

In the forest fund public property of the state administered by RNP - Romsilva in 2020 were made care works on a total area of 103,715 ha, in accordance with the provisions of forest arrangements. By nature of works, the situation of carrying out the care works is presented in table VI.14 and figure VI.22.

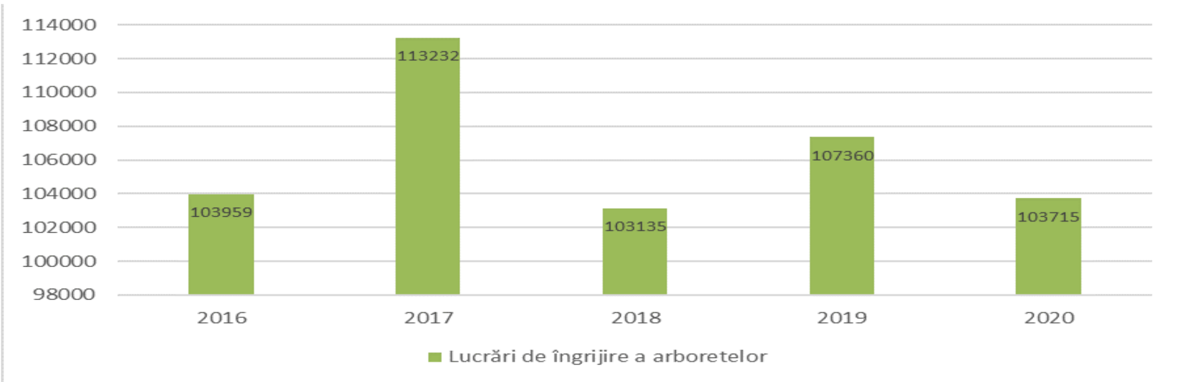
Table VI.14 Situation of carrying out care works by nature of workand

-Ha-

The nature of the works	2016	2017	2018	2019	2020
Clearances	10,220	10,614	12,797	11,334	10,776
Cleanings	16,388	17,040	18,723	17,533	17,711
Thinning	75,814	83,067	69,978	76,430	73,506
Artificial pruning	1,537	2,511	1,637	2,063	1,722
TOTAL	**103,959**	**113,232**	**103,135**	**107,360**	**103,715**

Source: ROMSILVA

Figure VI.22 Tree care works



Source: ROMSILVA

In the forest fund of other owners, based on the forest management / services contracts concluded with RNP - Romsilva,the forestry directorates aimed at carrying out the care works of the young stands and in the forest fund of other owners, in accordance with the provisions of the forest arrangements and the condition of the stands. In 2020, in the respective forests, care works were carried out on the young stands on 12,654 ha, of which:

- Clearances 615 ha;
- Cleanings 1,242 ha;
- Thinning 10,797 ha.

Source: ROMSILVA

Land use change

RO 44
Romania indicator code: RO 44 EEA indicator code: SEBI 013
TITLE: FRAGMENTATION OF NATURAL AND SEMI-NATURAL AREAS
DEFINITION: The indicator shows differences in the average of natural and semi-natural surfaces, based on terrain maps made by interpreting satellite images. It is based on a simple methodology, including mathematical calculations and GIS analysis, based on Corine Land Cover (CLC).

Fragmentation of ecosystems

In the last two centuries, under the impact of anthropogenic activities corroborated with those induced by disturbing natural factors, the use and coverage of land has undergone numerous transformations due to the reduction of forest areas and expansion of agricultural land, or those intended for transport and / or construction.

The local reduction of the surface of forest ecosystems has led to the fragmentation of ecosystems, sometimes with irreversible consequences on biological diversity. In recent years, special emphasis has been placed on the protection and conservation of forest ecosystems, as well as increasing the percentage of reforestation and reducing the level of fragmentation. The main cause of fragmentation is the radical change of ownership of forest land. Thus, we moved from forests entirely owned by the state to the gradual change, starting with 1990, to other forms of ownership, so that in 2019 we find forests in public or private ownership of territorial administrative units, owned by individuals or property of legal persons. In the application of the forestry regime, forest landowners have specific obligations and responsibilities. The privately owned forests of individuals (approximately 900,000) are subject to major pressures due to the large number of properties, apparently individual, in fact small collective properties until the debate on successions, situations that cause multiple administrative and legal issues. Also, the fragmentation of the forest fund occurs frequently in the case of the construction of isolated dwellings that subsequently require access roads and utilities. in fact, small collective properties until the debate of the successions, situations that determine multiple administrative and legal problems. Also, the fragmentation of the forest fund occurs frequently in the case of the construction of isolated dwellings that subsequently require access roads and utilities. in fact, small collective properties until the debate of the successions, situations that determine multiple administrative and legal problems. Also, the fragmentation of the forest fund occurs frequently in the case of the construction of isolated dwellings that subsequently require access roads and utilities.

Source: MEWF-DPSS

TRENDS, FORECASTS AND ACTIONS REGARDING SUSTAINABLE FOREST MANAGEMENT

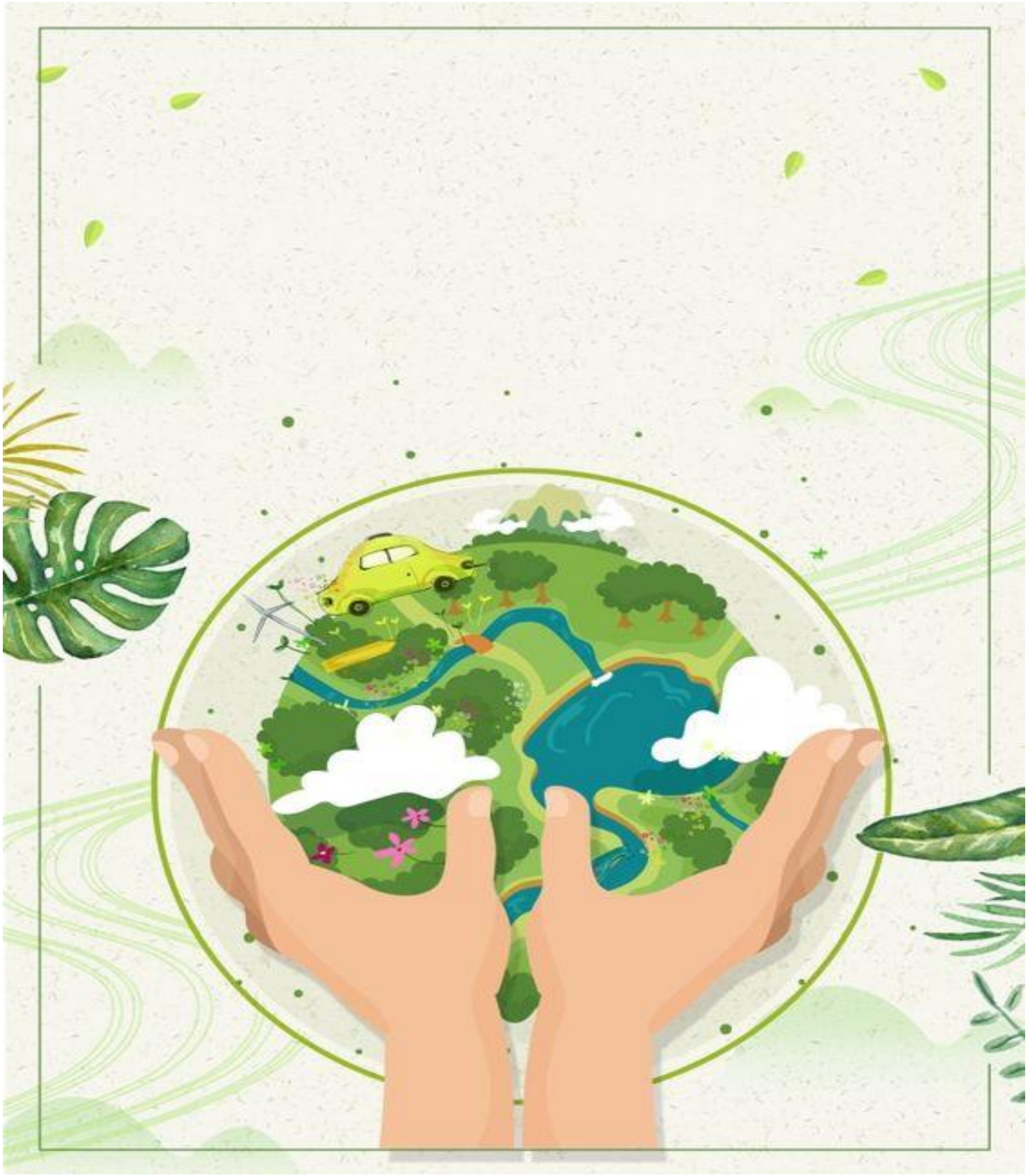
Forests are multifunctional, having an economic, social and environmental utility. They provide habitat for animals and plants and play a major role in mitigating climate change and other environmental services. Almost a quarter of the European Union's forested area is protected under the Natura 2000 program, and a large part of the rest of the area is protected by European Union nature protection legislation. Forests also offer great benefits to society, including human health, recreation and tourism. The socio-economic importance of forests is high, but often underestimated. Forests contribute to rural development and provide about three million jobs. Wood is still the main source of financial income in forests. Therefore, The strategy also takes into account the forestry industries in the European Union, which are covered by the European Union's industrial policy. Wood is also considered an important source of raw materials for emerging bio-industries.

Measures in the forestry sector under the Rural Development Regulation constitute the financial basis of the strategy (90% of total European Union funding in the forestry sector). According to the updated plans, in the period 2007-2013, EUR 5.4 billion from the European Agricultural Fund for Rural Development has been allocated for forestry measures. Thus, the level of expenditure in the period 2014-2020 is expected to be similar to that of the current period, although this will depend on the rural development plans of the Member States. This expenditure should contribute to the

achievement of the objectives of this strategy and in particular to ensure that forests in the European Union are managed in accordance with the principles of sustainable forest management, as can be demonstrated.
The National Forestry Strategy 2014-2023 corresponds to the principles of sustainable development and is meant to ensure the landmarks of the forestry sector for a period of 10 years. An important element of the strategy is the correlation of the activity of the forestry sector with the policies in other fields such as agriculture, environment, tourism, education, energy, etc. The overall objective of the strategy is to ensure the sustainable management of the forestry sector, in order to increase the quality of life and ensure the present and future needs of society, in a European context.
The following 6 strategic objectives derive from the general objective:
1. Streamlining the institutional and regulatory framework for forestry activity;
2. Sustainable management of forest resources;
3. Management of the national forest fund;
4. Superior capitalization of forest products;
5. Development of intersectoral dialogue and strategic communication in the forestry field;
6. Development of scientific research and forestry education.

Source: Ministry of Environment, Waters and Forests

INDICATORS REPORT 2020
CHAPTER VII
MATERIAL RESOURCES AND WASTE



Generation and management of municipal waste

RO 16
Romania indicator code: RO 16 EEA indicator code: CSI 16
TITLE: **MUNICIPAL WASTE GENERATION**
DEFINITION: The indicator expresses the total amount of municipal waste generated per capita (kg per capita and year.)

Generated municipal waste

The value has been calculated by summing up the quantities generated for the following types of waste:

- household and similar waste and municipal services collected by sanitation operators, excluding inert waste;
- household waste generated and not collected by sanitation operators;
- recyclable waste from the population, collected through authorized economic operators, other than sanitation operators (paper and cardboard, metals, plastics, glass, wood, textiles, WEEE, waste batteries and accumulators).

Are included bulky waste, waste from parks, gardens and street cleaning, including the contents of street rubbish bins, as well as waste electrical and electronic equipment from households.

They are excluded sludges from urban wastewater treatment and construction and demolition waste.

The quantities of waste generated by the population that is not served by sanitation services are calculated using the generation indices provided in the National Waste Management Plan: 0.65 kg / place / day for the urban environment and 0.3 kg / place / day for rural environment.

Table VII.1 Quantities of municipal waste generated in the period 2015-2019

Indicator name	2015	2016	2017	2018	2019
Amount of municipal waste generated (tons)	4903535	5142542	5333171	5296239	5430341
From which:					
- Household waste collected from the population and assimilated from economic operators (tonnes)	3685250	3894853	4162921	4249988	4632802
- Municipal waste (tonnes)	429286	454170	400228	430097	419429
- Waste generated and uncollected (tonnes)	600345	523670	419444	314022	178470
- Recyclable waste from the population, collected through authorized economic operators, other than sanitation operators (tonnes)	188654	269849	350578	302132	199640

Source: National Environmental Protection Agency

Figure VII.1. The share of the main categories of municipal waste generated in 2019

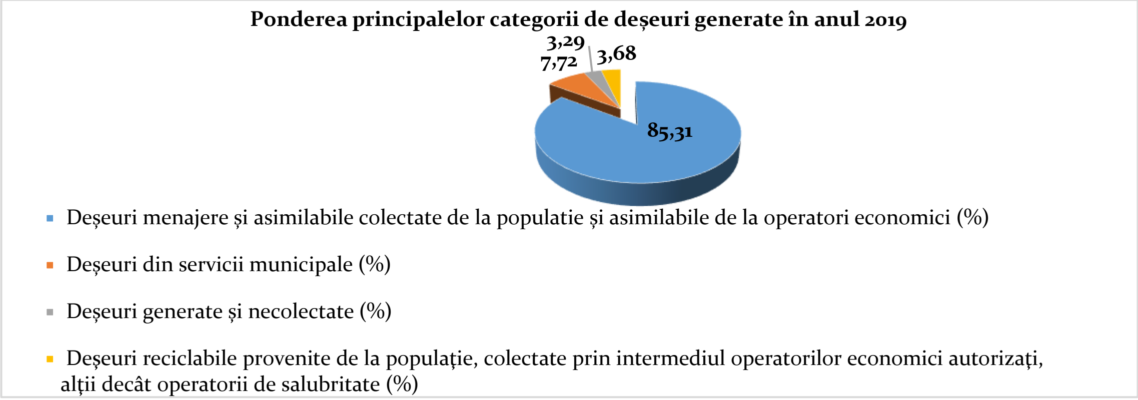
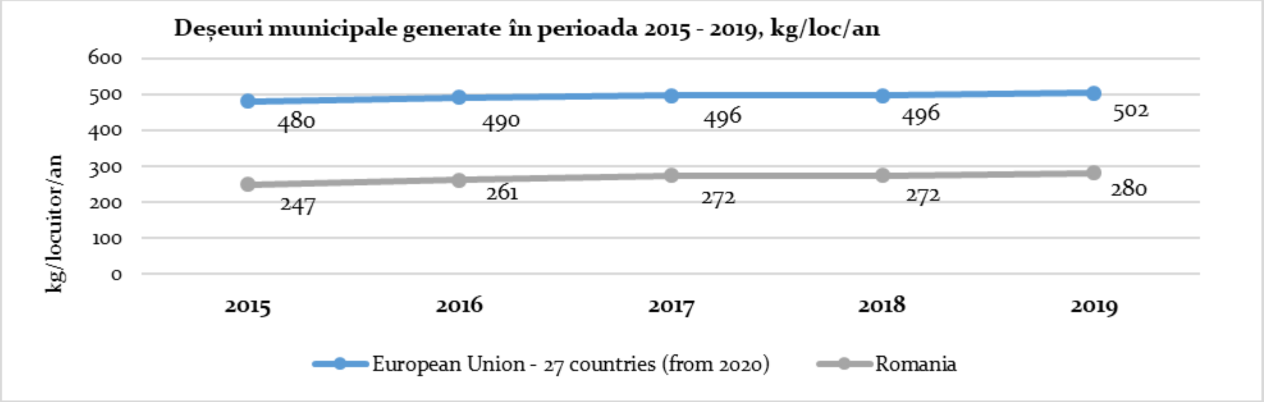


Figure VII.2. Evolution of the municipal waste generation indicator, 2015-2019, Kg / place / year



Source: EUROSTAT

Sustainable development indicators on municipal waste

The following indicators of sustainable development on municipal waste at national level have been calculated:

- Degree of connection to the sanitation service - the data were reported by the sanitation operators.
- Municipal waste generated - presented in the previous table.
- Recycled municipal waste (including composting).

The value has been calculated by summing up the quantities recycled for the following types of waste:

- o wastes from municipal waste sorting facilities, by type of material, sent for recycling;
- o household and similar waste and municipal services reported by sanitation operators as sent for recycling;
- o recyclable waste from the population, collected through authorized economic operators, other than sanitation operators (paper and cardboard, metals, plastics, glass, wood, biodegradable, textiles, WEEE, waste batteries and accumulators).

- Degree of recycling achieved for municipal waste.

The value has been calculated by reporting the quantities of municipal waste recycled to the total quantities of municipal waste generated.

- Municipal waste energy recovery

The value has been calculated by summing up the quantities reported by sorting station operators, TMBs and economic sanitation operators as sent for co-incineration.

- Biodegradable waste stored.

The value has been calculated by summing up the quantities reported by sanitation operators sent to municipal landfills.

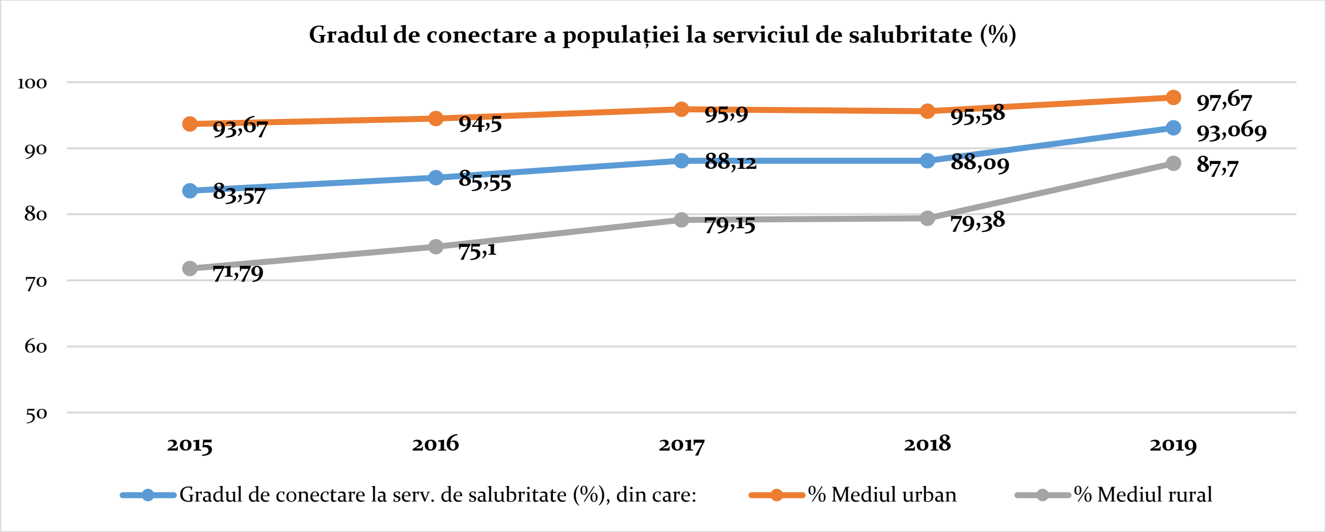
Table VII.2 - Specific information on municipal waste in the period 2015-2019

Indicator name	2015	2016	2017	2018	2019
Degree of connection to the sanitation service (%)	83.57	85.55	88.12	88.09	93.07
- Urban area	93.67	94.5	95.9	95.58	97.67
- Country side	71.79	75.1	79.15	79.38	87.7
Amount of municipal waste collected separately (tonnes)	430305	580602	696742	634536	576816
Amount of recycled municipal waste * (tonnes)	649591	689443	745427	586406	623214
Degree of recycling achieved for municipal waste (%)	13.25	13.41	13.98	11.07	11.48
Amount of municipal energy waste (tonnes)	116296	219608	227280	241445	251277
Amount of biodegradable waste from municipal waste landfill (tonnes)	1856416	1913329	2159103	2068288	2120022
Number of compliant municipal depots in operation	35	37	42	43	44
Number of transfer stations in operation	36	51	52	53	84
Number of sorting stations in operation, including manual sorting activities	99	101	103	105	103

**recycled waste comes from both separate collection and mixed waste, which enters into treatment processes*
Source: National Environmental Protection Agency

At national level, in 2019 the degree of connection of the population to the sanitation service increased to 93%. In urban areas it is about 98% and in rural areas it has increased to 88%.

Figure VII.3. The degree of connection of the population to the sanitation service in the period 2015-2019



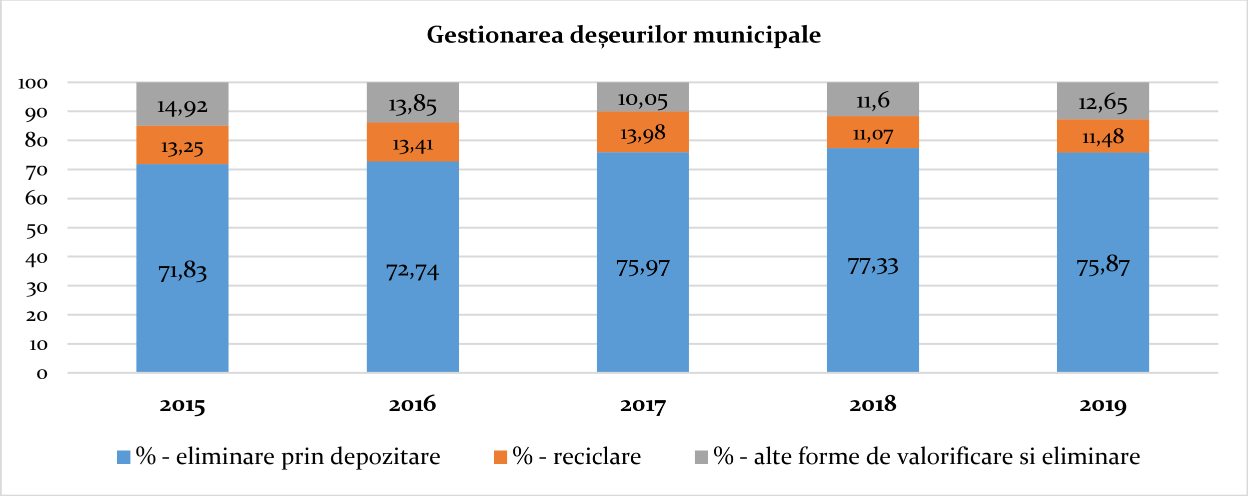
Source: National Environmental Protection Agency

The responsibility for municipal waste management lies with the local public administrations, which, by their own means or by delegating the sanitation service to an authorized operator, must ensure the collection (including separate collection), transport and treatment of this waste. For certain waste streams that fall into the category of municipal waste, collection from the population and by authorized economic operators is allowed.

Part of the collected municipal waste is sent directly to final recovery (material or energy), respectively to disposal, while another part is sent to intermediate treatment facilities (sorting stations, composting).

Disposal of municipal waste that is not recovered is done exclusively by landfill. To date, no municipal waste incineration plants have been put into operation in Romania. At the end of 2019, 44 compliant landfills for municipal waste were authorized for operation.

Figure VII.4. The share of the main *municipal waste management activities*, related to the amount of waste generated, in the period 2015 - 2019



Source: National Environmental Protection Agency

Note: The decrease in the share of recycled waste from 2018 is determined by the change of calculation methodology - starting this year, the amount of individually composted biodegradable waste was no longer considered recycled, taking into account the provisions of PNGD and European legislation

In 2019 there is a slight reduction in the quantities of municipal waste stored. However, the amount of waste deposited remains high, which is inconsistent with the principles and objectives adopted by the EU through the circular economy legislative package.

Reducing the amount of biodegradable waste stored

According to the provisions of GD no. 349/2005 on the storage of waste, within a maximum of 15 years from 16 July 2001, it is necessary to reduce the storage of biodegradable waste to 35% of the total quantity, expressed gravimetrically, produced in 1995. Romania requested and received a four-year derogation to achieve this goal, so the deadline was July 16, 2020.

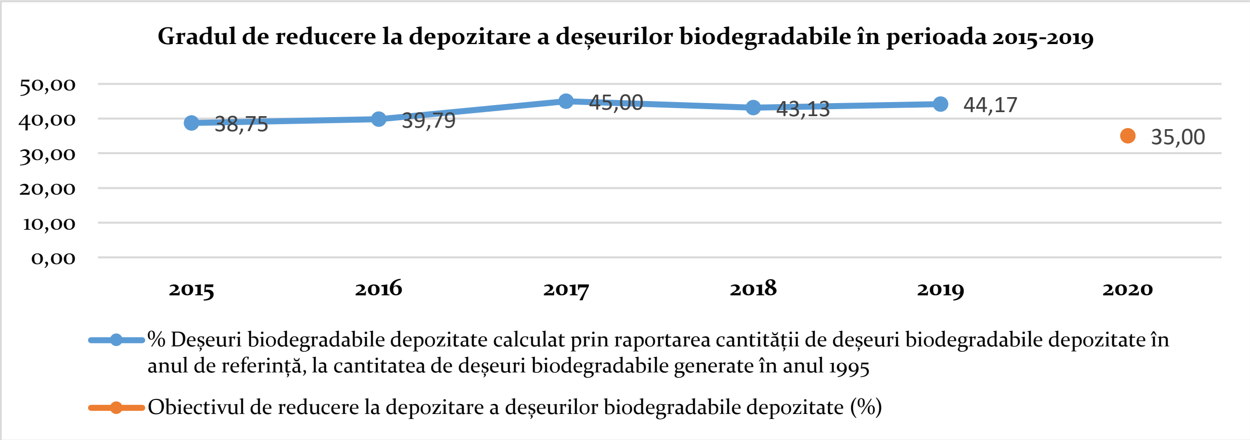
Table VII.3 - Quantities of biodegradable waste generated and stored during 2015-2019

Indicator name	1995	2015	2016	2017	2018	2019
Quantity of biodegradable waste generated						

(million tonnes)	4.80	2.57	2.64	2.89	2.81	2.99
Quantity of biodegradable waste stored (million tons)		1.86	1.91	2.16	2.07	2.12
Biodegradable waste stored compared to 1995 (%)		38.75	39.79	45.00	43.13	44.17

Source: National Environmental Protection Agency

Figure VII.5. Evolution of the degree of reduction in landfill of biodegradable waste in the period 2015-2019 (%)



Source: National Environmental Protection Agency

Waste Electrical and Electronic Equipment (WEEE)

RO 63

Romania indicator code: RO 63
EEA indicator code: WASTE 003

TITLE: **WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT**

DEFINITION: The indicator shows the quantities of electrical and electronic equipment (EEE) that are placed on the market, the quantities of waste electrical and electronic equipment (WEEE) collected and the recovery objectives achieved.

Only manufacturers registered in the Register of Producers and Importers of EEE, established by ANPM (lat the beginning of 2006, the procedure for registering the producers of electrical and electronic equipment in this Register was started, according to the requirements of the legislation in force).

At the end of 2020, 3725 manufacturers of electrical and electronic equipment (EEE) were registered.

Table VII.4. EEE placed on the market

Category	Quantities of EEE (tonnes)			
	2015	2016	2017	2018
1 - Large household appliances	103475.36	129548.53	140581,085	146794,551
2 - Small household appliances	14667.61	16224.62	18467,346	22675,785
3 - Computer and telecommunications equipment	13469.45	13231.54	15230,911	16031.34
4 - Consumer equipment	15236.29	17594.37	27702,545	26189,225

5 - Lighting equipment	6010.49	7042.15	9084,300	13666,494
6 - Electric and electronic tools	9654.61	11108.44	18030,341	23935,021
7 - Toys, sports and leisure equipment	1616.51	2150.54	3489,874	4718,887
8 - Medical devices (except all implanted and infected products)	673.90	564.86	889,331	1430,596
9 - Supervisory and control instruments	2566.35	2126.21	3343,294	4539.39
10 - Vending machines	808.83	1093.56	**1225,335**	1169,184
TOTAL	**168179.40**	**200684.82**	**238044,36**	**261150,47**

Source: National Environmental Protection Agency

Table VII.5. EEE placed on the market in 2019 *

Category	Quantities of EEE (tonnes)
	2019 * (preliminary dates)
1 - Heat transfer equipment	77574.175
2 - Screens, monitors and equipment (with an area greater than 100 cmP)	25520,678
3 - Lamps	2132.268
4 - Large equipment (any of the external dimensions greater than 50 cm)	117635.151
5 - Small equipment (no external size greater than 50 cm)	57311.506
6 - Computer and telecommunications equipment small size (no external size greater than 50 cm)	9584.868
TOTAL	**289758.65**

Source: National Environmental Protection Agency

**Starting with 2019, it went from 10 categories to 6 categories according to GEO no. 5/2015 on waste electrical and electronic equipment.*

Operating licenses and contact details of authorized collective organizations are published on the website of the Ministry of Environment, Water and Forests under the heading Waste Management - WEEE Commission (http://www.mmediu.ro/categorie/comisie-deee/213).

The minimum objectives for WEEE collection, provided for by European and national legislation, are:

- in the period 2008 - 2015, 4 kg of waste / inhabitant.year;
- for 2016, at least 40% of the average quantities of EEE placed on the market in the previous 3 years;
- between 2017 and 2020, 45% of the average quantities of EEE placed on the market in the previous 3 years.

Despite all the efforts made by the responsible authorities and economic operators, up to and including the reference year 2019, the corresponding collection target has not been reached in any year.

Table VII.6. WEEE collected between 2015 and 2018

Category	Quantities of WEEE (tons)			
	2015	**2016**	**2017**	**2018**
1 - Large household appliances	24122.22	29592.17	31175.22	35755.95
2 - Small household appliances	1218.31	1320.07	1303.18	1633.02
3 - Computer and telecommunications equipment	6837.44	5645.37	6571.14	9362.28
4 - Consumer equipment	5385.17	7063.19	6545.39	9699.59
5 - Lighting equipment	1781.32	1292.77	2002.53	3171.92
6 - Electric and electronic tools	796.00	891.33	903.08	1206.34
7 - Toys, sports and leisure equipment	107.26	115.51	83.39	91.31
8 - Medical devices (except all implanted and infected products)	48.43	83.24	67.33	114.16
9 - Supervisory and control instruments	383.15	411.01	700.15	2065.84

10 - Vending machines	94.84	239.79	337.79	678.47
TOTAL	**40774.13**	**46654.45**	**49689.20**	**63778.88**

Source: National Environmental Protection Agency

Table VII.7. WEEE collected in 2019 *

Category	Quantities of WEEE (tons)
	2019 * (preliminary dates)
1 - Heat transfer equipment	19764.14
2 - Screens, monitors and equipment (with an area greater than 100 cmP)	10283.45
3 - Lamps	399.24
4 - Large equipment (any of the external dimensions larger than 50 cm)	42292.40
5 - Small equipment (no external size greater than 50 cm)	6292.84
6 - Computer and telecommunications equipment small in size (no external size greater than 50 cm)	8590.96
TOTAL	**87623.02**

Source: National Environmental Protection Agency

**Starting with 2019, the EEE classification is made on 6 categories, according to GEO no. 5/2015 on waste electrical and electronic equipment.*

Table VII.8. Recovery objectives for WEEE period 2015-2018

Category	Capitalization objective provided by the legislation (%) for 2015	Capitalization objective provided by the legislation (%) for years 2016-2018	Achieved capitalization objectives (%)			
			2015	**2016**	**2017**	**2018**
1 - Large household appliances	80	85	70	84	88	92
2 - Small household appliances	70	75	93	75	91	91
3 - Computer and telecommunications equipment	75	80	78	99	91	79
4 - Consumer equipment	75	80	83	87	91	83
5 - Lighting equipment	80	75	54	80	83	83
6 - Electric and electronic tools	70	75	95	71	91	89
7 - Toys, sports and leisure equipment	70	75	65	82	91	94
8 - Medical devices (except all implanted and infected products)	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable
9 - Supervisory and control instruments	70	75	88	71	95	95
10 - Vending machines	80	85	93	83	86	89

Source: National Environmental Protection Agency

Table VII.9. Recovery targets for WEEE for 2019

Category	Capitalization objective provided by the legislation for 2019 (%)	Capitalization target achieved (%) in 2019 * (preliminary data)
1 - Heat transfer equipment	85	95
2 - Screens, monitors and equipment (with an area greater than 100 cmP)	80	98
3 - Lamps	80	80
4 - Large equipment, (any of the external dimensions greater than 50 cm)	85	94
5 - Small equipment (no external dimensions greater than 50 cm)	75	90
6 - Small computer and telecommunications equipment, (no external dimensions greater than 50 cm)	75	94
TOTAL	85	95

Source: National Environmental Protection Agency

** Starting with 2019, the WEEE classification is made on 6 categories, according to GEO no. 5/2015 on waste electrical and electronic equipment.*

Packaging waste

RO 17

Romania indicator code: RO 17
EEA indicator code: CSI 17

TITLE: **GENERATION AND RECYCLING OF PACKAGING WASTE**

DEFINITION: The indicator represents the total quantity of packaging used in Romania, expressed in kg per capita per year.

The annual objectives for recovery or incineration in energy recovery incineration plants and, respectively, for the recycling of packaging waste, which must be achieved at national level, are the following:

a) recovery or incineration in incineration plants with energy recovery of at least 60% of the weight of packaging waste;

b) the recycling of at least 55% of the total weight of the packaging materials contained in the packaging waste, with the achievement of the minimum values for the recycling of each type of material contained in the packaging waste.

The recycling targets for each type of material are as follows:

a) 60% by weight for glass;

b) 60% by weight for paper / cardboard;

c) 50% by weight for the metal;

d) 15% by weight for wood;

e) 22.5% by weight for plastic, considering only the recycled material in the form of plastic.

Table VII.10. Packaging introduced on the market (tons), by types of material, 2014-2018

Tip materiale	2014	2015	2016	2017	2018
	tone	tone	tone	tone	tone
sticla	164521	194347	210027	237590	272123
plastic	336818	359036	348794	360463	391376
hartie/carton	388017	441764	427434	437955	482540
metal	65666	66830	64006	67476	77913
lemn	289691	334573	299876	305316	343156
altele	24	11	31	10	0
TOTAL	1244737	1396561	1350168	1408810	1567108

Source: National Environmental Protection Agency

Table VII.11. Capitalized packaging waste, by types of material, 2014-2018

Tip materiale	2014		2015		2016		2017		2018	
	tone	%	tone	%	tone	%	tone	%	tone	%
sticla	89103	54,16	79874	41,10	134646	64,10	149608	63,00	166377	61,14
plastic	155353	46,12	170595	47,50	173972	49,90	186375	51,70	178551	45,62
hârtie/carton	325024	83,77	395861	89,60	398322	93,20	407495	93,00	441594	91,51
metal	42147	64,18	42845	64,10	39767	62,10	40723	60,40	45723	58,68
lemn	90680	31,30	105520	31,50	94465	31,50	101642	33,30	108030	31,48
altele	0	0,00	0	0,00	12	38,70	3	30,00	0	0,00
TOTAL	702307	**56,42**	794695	**56,90**	841184	**62,30**	885846	**62,90**	940275	**60,00**

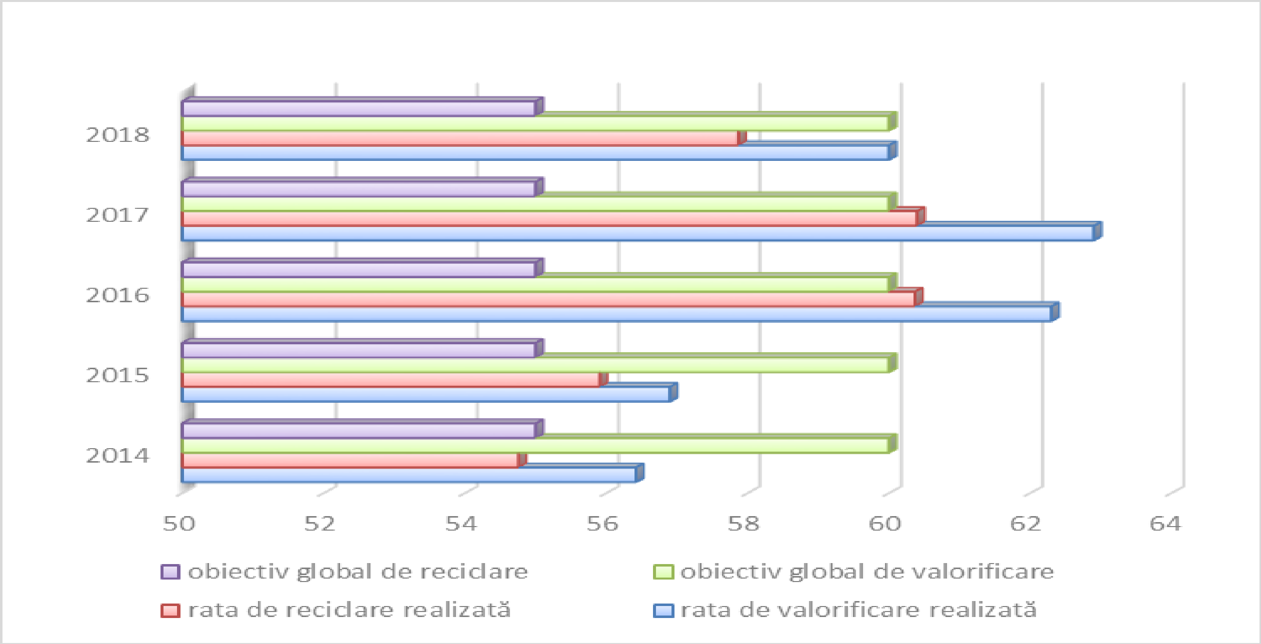
Source: National Environmental Protection Agency

Table VII.12. Recycled packaging waste, by type of material, 2014-2018

Tip materiale	2014		2015		2016		2017		2018	
	tone	%	tone	%	tone	%	tone	%	tone	%
sticla	89103	54,16	79874	41,10	134646	64,10	149608	63,00	166377	61,14
plastic	149769	44,47	167554	46,70	162351	46,50	171603	47,60	168270	42,99
hârtie/carton	323556	83,39	394300	89,30	395378	92,50	396947	90,60	429037	88,91
metal	42147	64,18	42845	64,10	39767	62,10	40723	60,40	45723	58,68
lemn	77071	26,60	96203	28,80	82891	27,60	91739	30,00	97420	28,39
altele	0	0,00	0	0,00	0,00	0,00	0,00	0,00	0,00	0,00
TOTAL	681646	**54,76**	780776	**55,91**	815033	**60,37**	850620	**60,40**	906827	**57,87**

Source: National Environmental Protection Agency

Figure VII.6. Trend in the rates of recovery and recycling of packaging waste



Source: National Environmental Protection Agency

End-of-life Vehicles (ELV)

RO 69

Romania indicator code: RO 69
EEA indicator code:: TERM 11

TITLE: **END-OF-LIFE VEHICLES**

DEFINITION: The indicator shall show the number of end-of-life vehicles and monitor whether the reuse and recovery target and the reuse and recycling target relative to the average empty mass of the treated end-of-life vehicles have been met. The indicator is expressed in units collected / year and percentage.

From 1 January 2015, economic operators are obliged to ensure the achievement of the following objectives, taking into account the average empty mass:

- reuse and recovery of at least 95% of the average mass per vehicle per year for all end-of-life vehicles;
- reuse and recycling of at least 85% of the average mass per vehicle per year for all end-of-life vehicles.

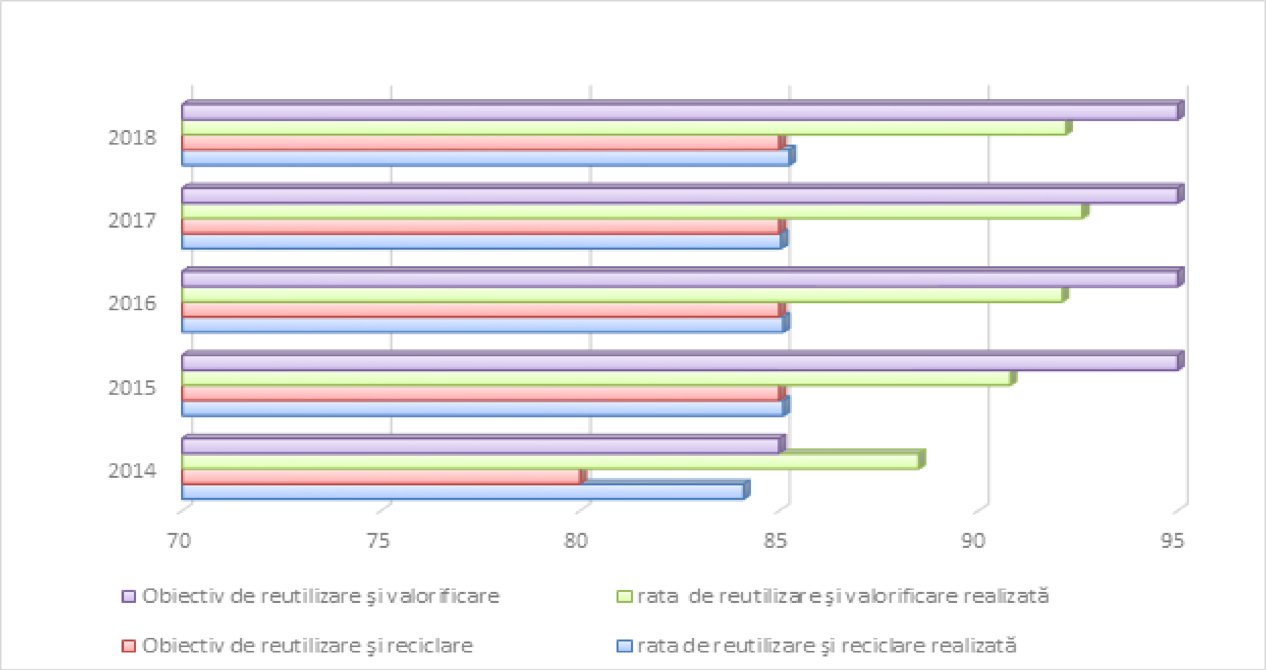
Table VII.13. VSU collected and treated between 2014 and 2018

VSU number	2014	2015	2016	2017	2018
	in pieces	in pieces	in pieces	in pieces	in pieces
VSU collected	43351	43228	44762	49073	72213
VSU treated *	42138	41886	46576	49830	67344

**The difference between the number of end-of-life vehicles collected and the number of end-of-life vehicles treated is due to the fact that not all end-of-life vehicles have been treated in previous years.*

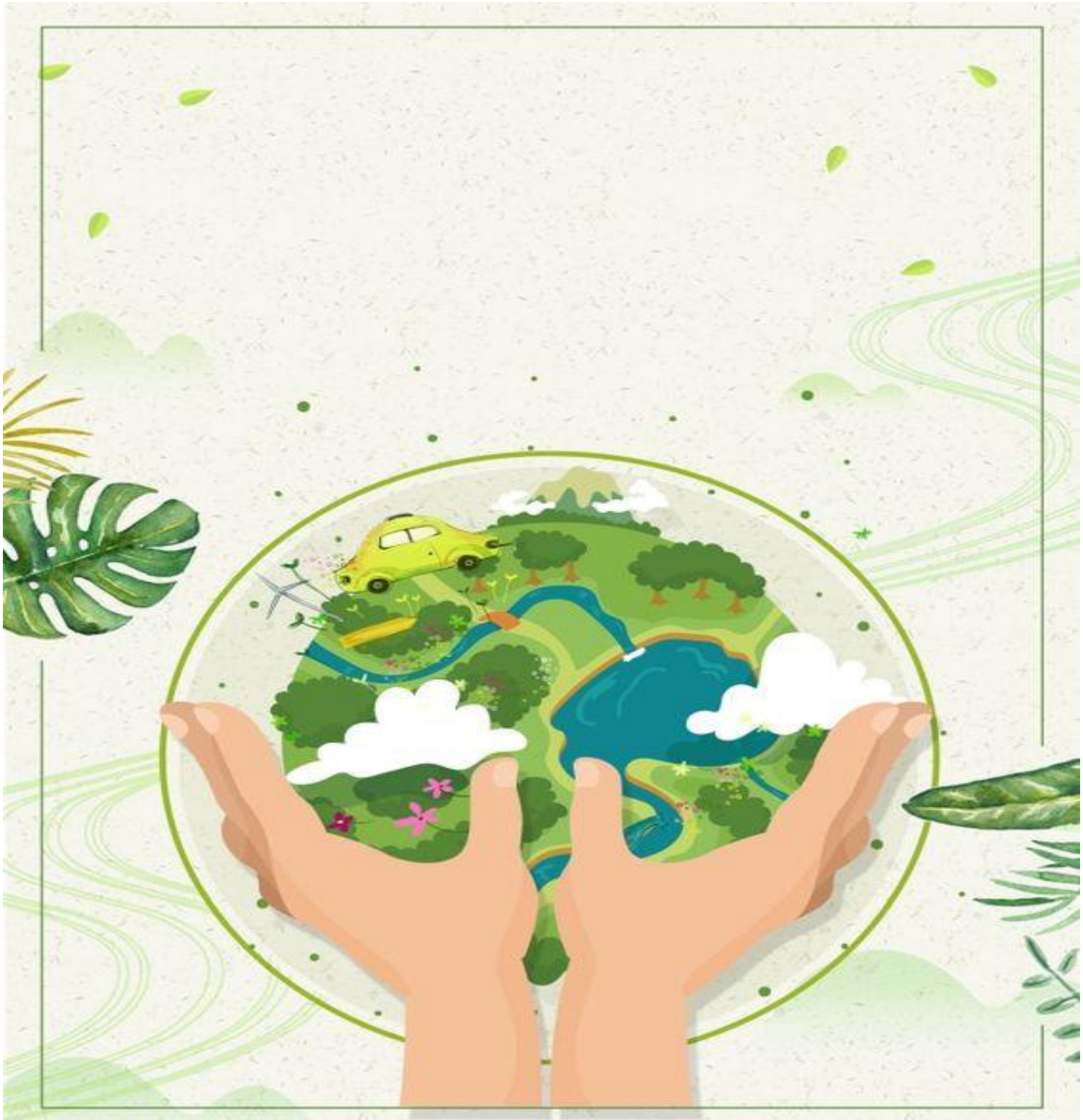
Source: National Environmental Protection Agency

Figure VII.7. Trend of reuse / recycling / recovery rates



Source: National Environmental Protection Agency

CHAPTER VIII
CLIMATE CHANGE



IMPACT OF CLIMATE CHANGE ON NATURAL AND ANTHROPIC SYSTEMS

Changes observed in the Romanian climate regime

RO 12

Romania indicator code: RO 12
EEA indicator code: CSI 012

TITLE: **TEMPERATURE AT NATIONAL LEVEL**

DEFINITION: This indicator shows the absolute changes and the rates of change of the average temperature at national level.

In 2020, the average annual temperature in the country (10.8ºC) was 1.7ºC higher than the standard climatological normal (for the reference period 1981 - 2010). The year 2020 is on the 2nd place in the top of the warmest years from 1961-2020.

Positive deviations were recorded in 11 months of the year, with values between 0.4 ºC (April) and 4.1 ºC (February). May was the only month of the year when the deviation was negative and had a value of 1.3 ºC.

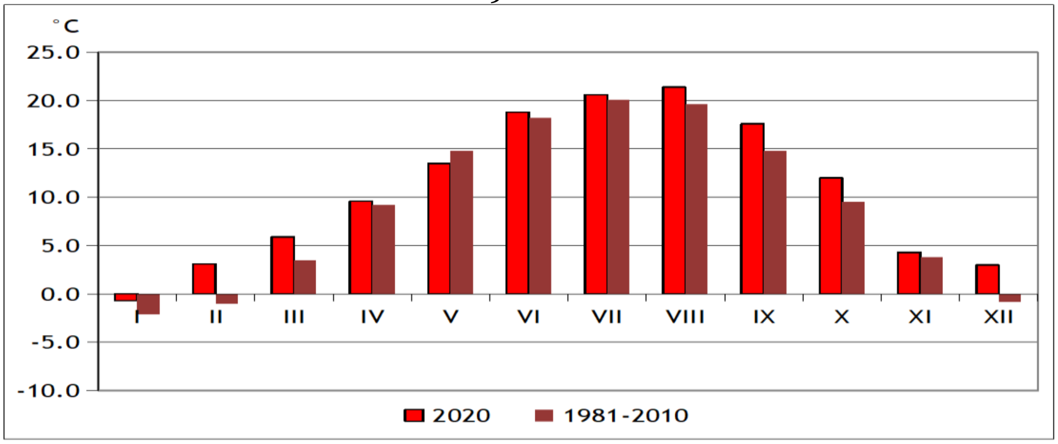
The average annual temperature had values between -0.4 ºC at Omu Peak and 14.4 ºC at Constanța. In most parts of the country, the annual average temperatures exceeded 10 ºC and only in the mountainous area and in the intramontane depressions were below this limit.

Table VIII.1. Average annual temperatures and annual amounts of rainfall mediated in Romania in the last 7 years.

Year	2014	2015	2016	2017	2018	2019	2020
Temperature (in º C)	10.2	10.5	10.4	9.9	10.4	10.9	10.8
Precipitation (in mm)	807.8	630.1	791.5	673.5	698.8	614.2	653.2

Source: National Meteorological Administration

Figure VIII.1. The average monthly temperature in Romania in 2020, compared to the climatological normal of the period 1981-2010

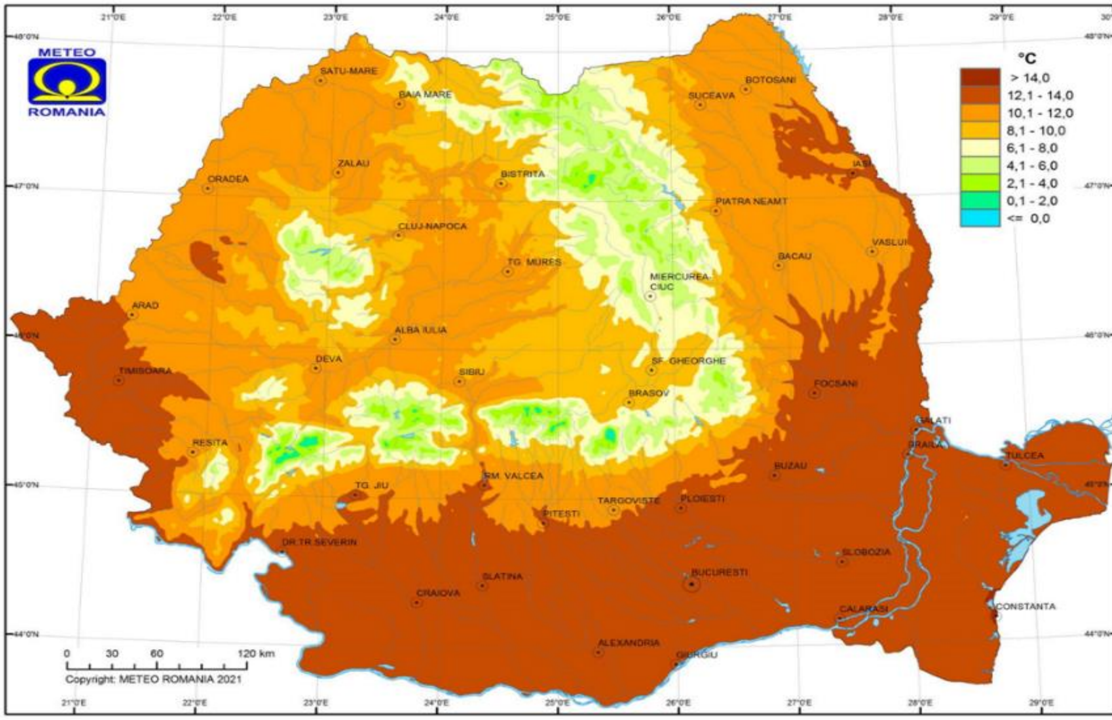


Source: National Meteorological Administration

The deviation of the average annual temperature from 2020 compared to the median of the reference period 1981-2010 was positive in the country, the values being over 1 ºC. Deviations over 2 ºC were registered on large areas in Moldova, Dobrogea, Muntenia and in isolation, in Oltenia. The highest value was 2.5 ºC, at the Galati meteorological station.

Analyzing the classification in severity classes of the thermal anomalies from 2020, compared to the median of the reference interval, it is found that the thermal regime was extremely hot throughout the country.

Figure VIII.2. Average annual temperatures in 2020 (in ºC).



Source: National Meteorological Administration

Climate characterization of the year 2020

RO 47
Romania indicator code: RO 47 EEA indicator code: CLIM 002
TITLE: **AVERAGE OF PRECIPITATION**
DEFINITION: This indicator is defined by: • Trends in annual rainfall recorded at national level • Forecast changes in annual and summer rainfall at national level

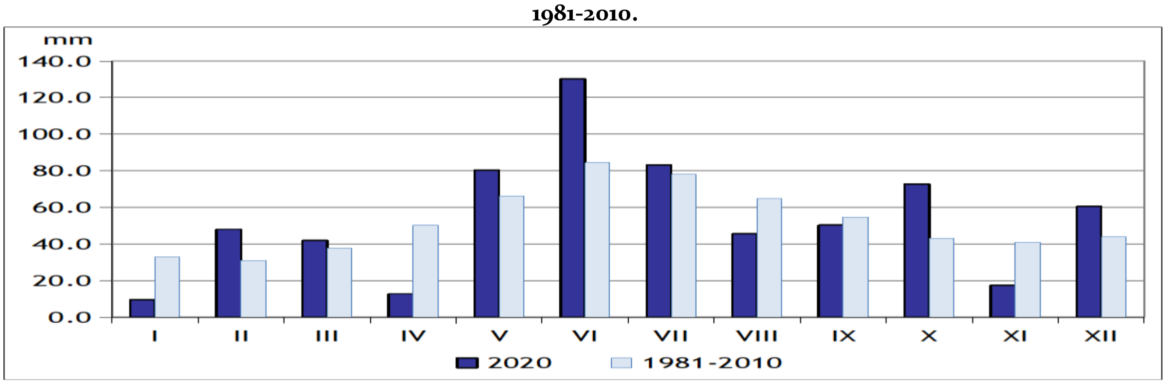
The total annual amount of precipitation, average per country, 653.2 mm, was 4% higher than the climatological normal of the reference period 1981-2010.

Negative deviations were registered in 5 of the 12 months, between 30% in August and 75% in April, and positive deviations were registered in the remaining 7 months, between 6% in July and 69% in October.

The total annual amount of precipitation in 2020 had values below 300 mm on the coast and in the Danube Delta. On the extensive areas in the south and east of the country, in the extreme west and locally in its center, the amounts of precipitation varied between 300 and 600 mm. More significant precipitation, over 1000 mm, was recorded in the mountain area. The maximum annual rainfall was 1723.3 mm and was recorded at the weather station Stâna de Vale.

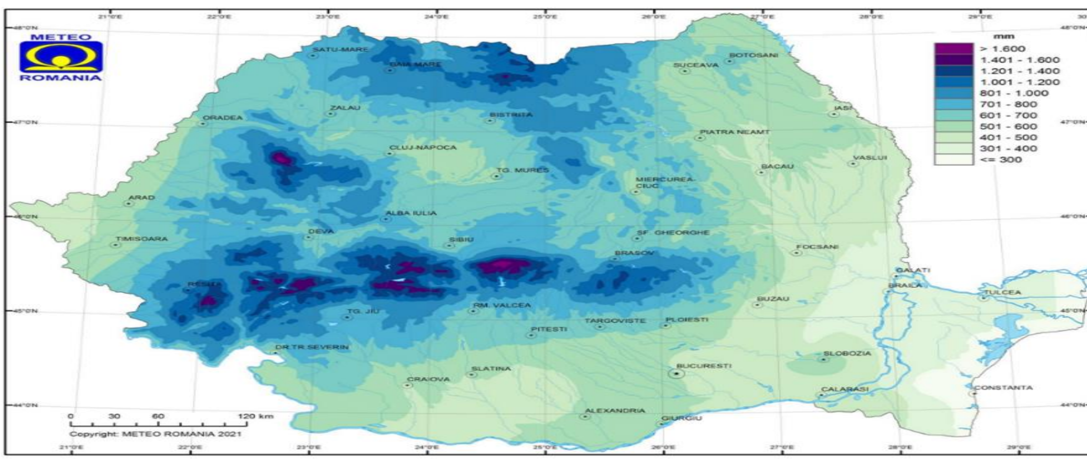
The deviation of the annual amount of precipitation in 2020 from the median of the standard reference range (1981-2010), calculated as a percentage, was negative in the south, east and west of the country, with values below 45%. There were positive deviations in the mountainous areas, in the northwest of Maramureș, in the extreme north of Moldova, in Transylvania and in the south of Banat, but they did not exceed 45% either.

Figure VIII.3. The average monthly amount of precipitation in Romania in 2020, compared to the climatological normal from 1981-2010.



Source: National Meteorological Administration

Figure VIII.4. Annual precipitation amounts in 2020 (in mm)

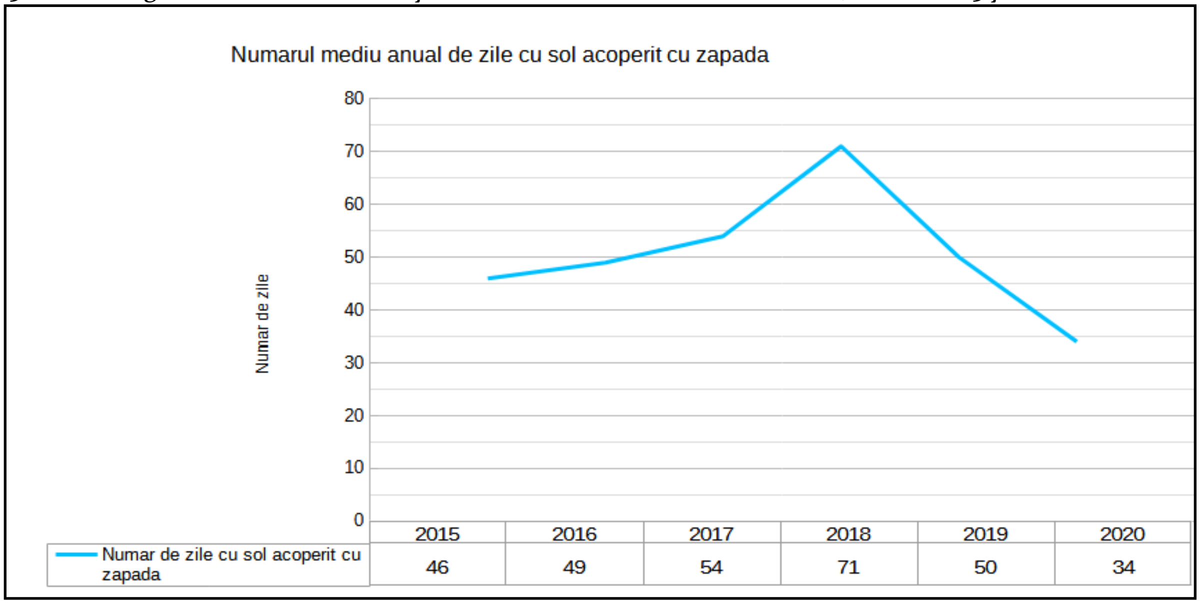


Source: National Meteorological Administration

RO 49
Romania indicator code: RO 49 EEA indicator code: CLIM 08
TITLE: **DEGREE OF SNOW COVERAGE**
DEFINITION: This indicator is defined by: • Evolution of the snow-covered area at national level • Snowfall trend in March (excluding mountain areas) • Forecast changes in the annual number of snow days

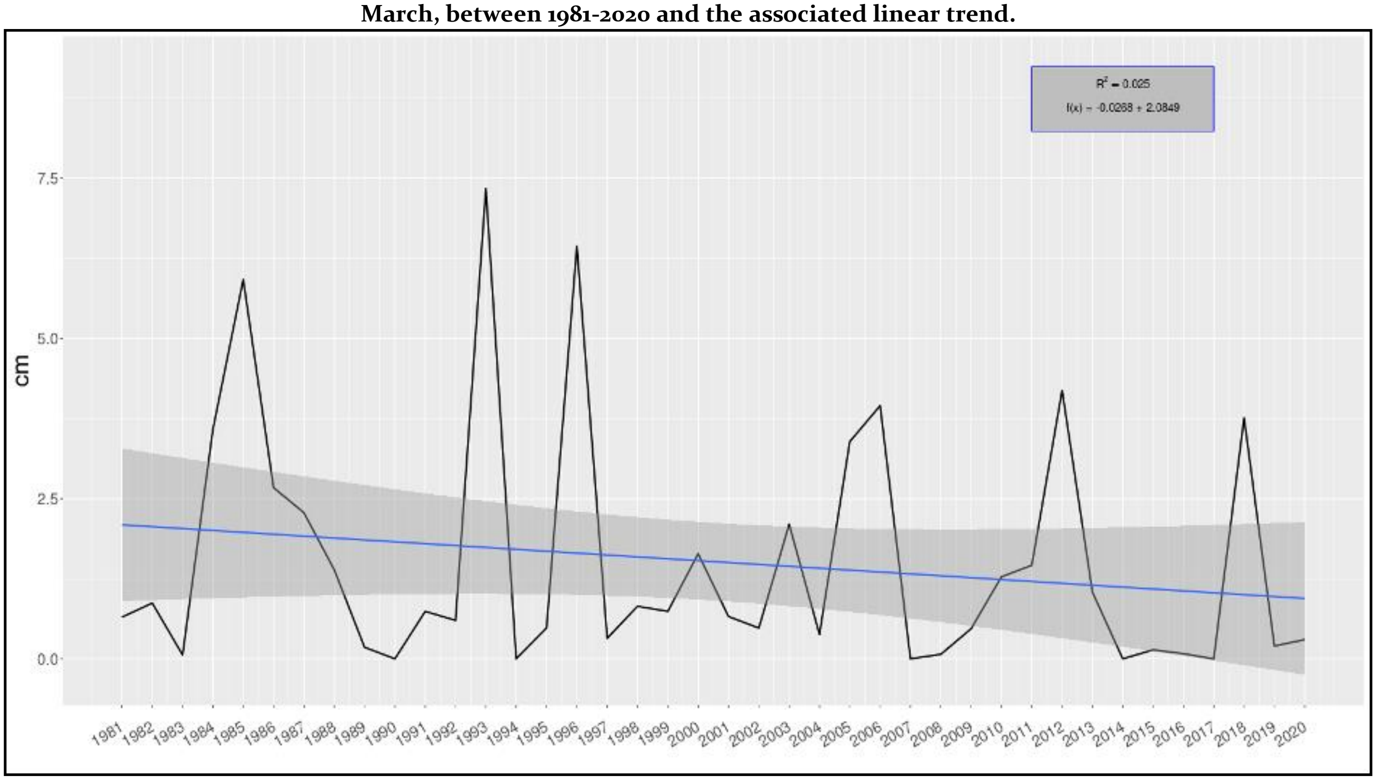
In 2020 there was a decrease in the number of days with snow-covered soil, compared to 2019. It is the lowest value in the last 6 years. The trend of snow layer thickness (excluding mountain stations), highlighted in March, for the period 1981-2020, is a significant reduction, consistent with developments in both Europe and Asia and in line with the global warming signal.

Figure VIII.5. The average annual number of days with snow-covered soil in Romania, in the last 5 years and in 2020.



Source: National Meteorological Administration

Figure VIII.6. The evolution of the average thickness of the snow layer (in cm) in Romania (except for mountain stations) in March, between 1981-2020 and the associated linear trend.



Source: National Meteorological Administration

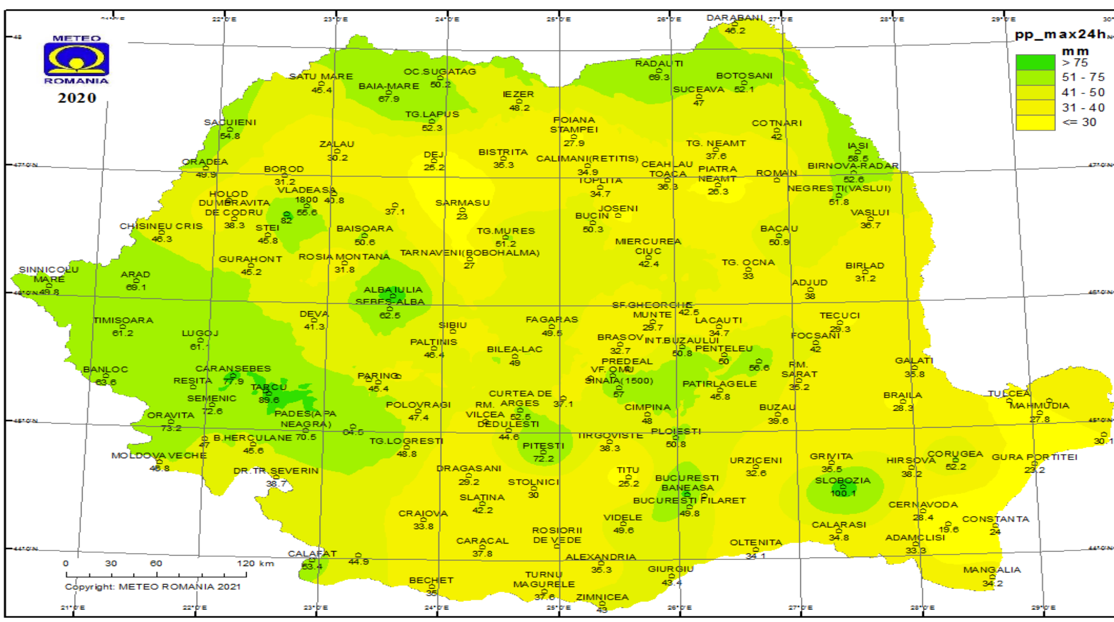
RO 48
Romania indicator code: RO 48 EEA indicator code: CLIM 04
TITLE: **EXTREME PRECIPITATION**
DEFINITION: This indicator is defined by: • Evolution of the number of consecutive days with precipitation (wet periods), respectively without precipitation (dry periods) • Forecasts for the next 20 years on maximum rainfall in summer and winter

Analyzing the classification in severity classes of the pluviometric anomalies from 2020 it is found that in most areas of the east, extreme west and local, in the southern part of Romania, the pluviometric regime was deficient and very deficient.

On the areas of Maramureș, in the extreme north of Moldova, in the south of Banat, in the southwest and east of Transylvania, but also in the mountainous area, the pluviometric regime was surplus, very surplus and locally, extremely surplus.

In 2020, high values of the maximum amount of precipitation accumulated in 24 hours, were recorded especially at meteorological stations in the southwest of the country (e.g. Țarcu). The map of the maximum amount of precipitation recorded in 24 hours from 2020 is consistent with the general characteristics of 2020.

Figure VIII.7. The maximum amount of precipitation accumulated in 24 hours, recorded in 2020, at the meteorological stations covering the territory of Romania (in mm).



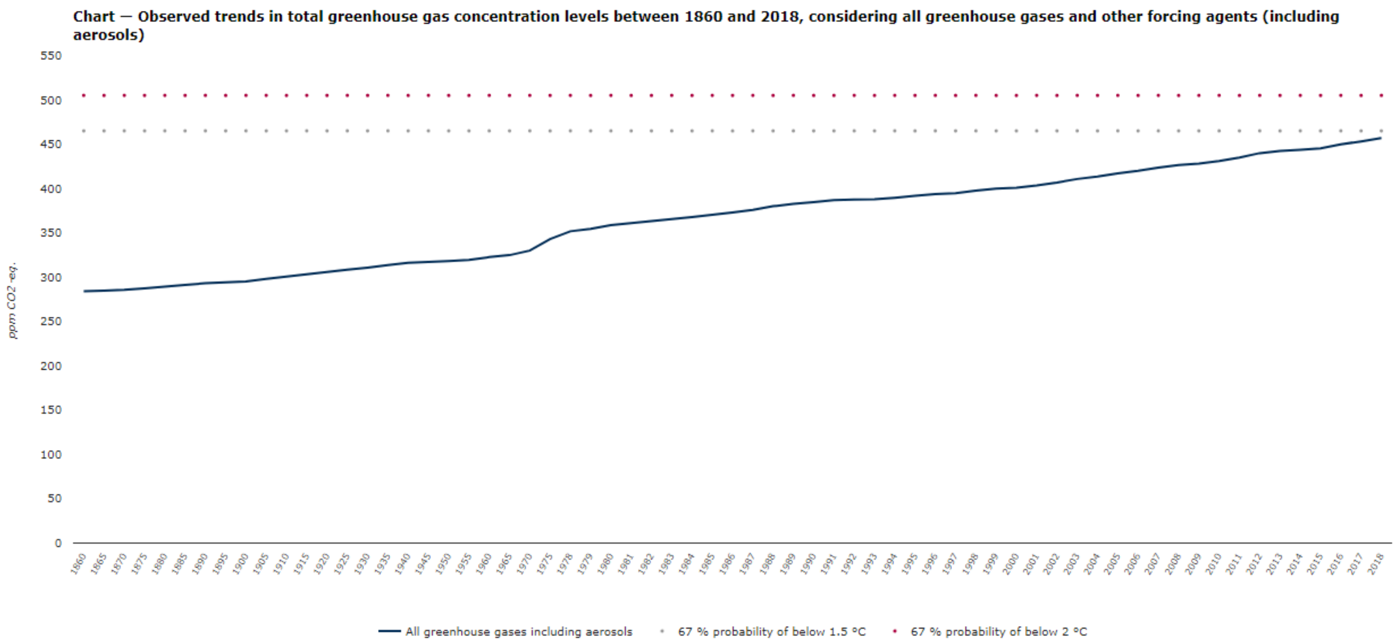
Source: *National Meteorological Administration*

Greenhouse gas concentration in the atmosphere

RO 13
Romania indicator code: RO 13 EEA indicator code: CSI 013
TITLE: **ATMOSPHERIC CONCENTRATIONS OF GREENHOUSE GASES**
DEFINITION: The indicator shows the measured trends and forecasts for greenhouse gas (GHG) concentrations. GHG concentrations included in the Kyoto Protocol (CO_2, CH_4, N_2O, SF_6, HFCs, PFCs and NF_3) are included.

The total concentration of all greenhouse gases and other forcing agents, including cooling aerosols, reached 457 parts per million CO_2 equivalent in 2018. If this concentration continues to increase at the current ten-year rate, the concentrations could, in over the next few years, to exceed the maximum level that the states of the Intergovernmental Panel on Climate Change should not exceed if - with a probability of 67% - the increase in global temperature must be limited to 1.5 ° C above pre-industrial, by the end of the century. Maximum concentrations corresponding to a temperature rise of 2 ° C could be exceeded before 2034.

Figure VIII.8. Observed trends in total greenhouse gas concentrations between 1860 and 2018, taking into account all greenhouse gases and other forcing agents (including aerosols)



Source: https://www.eea.europa.eu/data-and-maps/indicators/atmospheric-greenhouse-gas-concentrations-7/assessment

Note: Data is expressed in CO_2 equivalent (CO_2e) in parts per million (ppm). The figure includes the contribution of gases covered by the Kyoto Protocol (KPG), gases and the Montreal Protocol (MPG) and other coercive agents, such as ozone and aerosols (here called non-protocol gases (NPG)). CO_2e , indicated by the dotted lines orange and blue, correspond to a 67% probability of limiting the increase in global average temperature to 1,5 ° C and 2,0 ° C, respectively, above pre-industrial levels

Given all greenhouse gases and other forcing agents (including aerosols), total CO_2e reached 457 ppm in 2018, an increase of almost 4 ppm compared to 2017 and 30 ppm more than in 2008. The assessment of the contribution of the different groups of greenhouse gases has shown that by far the greatest force is caused by the gases covered by the Kyoto Protocol (KPG), in particular CO_2, whose average annual concentration has reached 408 and 410 ppm in 2018 and 2019, respectively, or more than 125 ppm (+ 145%), above pre-industrial levels (NOAA, 2020). As a group, the gases covered by the Montreal Protocol (MPG) contributed about 25 ppm to the climate signal in 2018.

The contribution of non-protocol gas (NPG) has a net cooling effect as a whole. In 2018, this effect amounted to approximately 39 ppm CO_2e and, as such, offset about 18% of the induced forcing of other greenhouse gases. The trend of forcing (cooling) has been relatively stable in the last 5 years.

Impact of climate change on watercourses

RO 53
Romania indicator code: RO 53 EEA indicator code: CLIM 017
TITLE: **FLOODS**
DEFINITION: This indicator highlights the trend of major floods in Europe, as well as the expected changes in the variation of floods with a recovery period of 100 years.

Table VIII.2. Synthetic table on floods in Romania

No. Crt.	Year	No. event	No. significant events	Affected urban localities
1	2010	94	9	117
2	2011	45	1	19
3	2012	39	6	39
4	2013	74	4	47
5	2014	151	14	72
6	2015	49	2	20
7	2016	171	18	93
8	2017	137	***	68
9	2018	164	***	138
10	2019	154	***	131
11	2020	158	***	111

Source: National Meteorological Administration

During 2020, a number of 158 extreme meteorological phenomena were registered, of which:

- 153 extreme events caused by floods by river overflows or by runoff from slopes;
- 2 events caused by melting snow or due to the freeze-thaw phenomenon;
- 2 extreme events caused by drought;
- 1 extreme event produced by the wind, recorded on 24.02.2020, when wind gusts with speeds of 130 km / h affected the headquarters of the pluviometric station Vlădeasa elevation 1400.

The following events accompanied the flood phenomena:

- 15 extreme events caused by heavy rainfall and puddles;
- 6 extreme events caused by heavy rainfall and hail;
- 10 extreme events caused by heavy rainfall and wind;
- 18 events due to the inability of rainwater to be taken over by the sewerage network;
- 8 events were accompanied by landslides.

A number of 1030 ATUs, respectively a number of 2710 localities, 3714 dwellings were affected by the floods at least once, out of which: 5 destroyed dwellings, 1317 damaged dwellings, respectively 2392 flooded dwellings; population affected by floods: 9285 inhabitants.

*Note: *** Significant historical events are set in Cycle 3 of the implementation of the Flood Directive 2007/60 / EC*

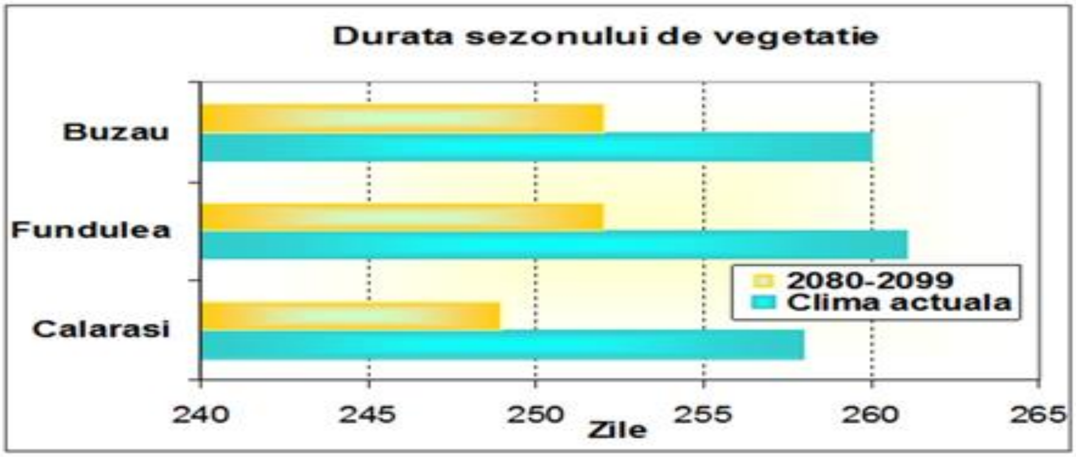
Impact of climate change on socio-economic systems and sectors

RO 56
Romania indicator code: RO 56 EEA indicator code: CLIM 030
TITLE: **THE GROWTH SEASON OF AGRICULTURAL CROPS**
DEFINITION: This indicator is defined by the number of days with positive temperatures in a year.

In Figure VIII.9. the duration of the vegetation season for wheat cultivation is represented both for the present period and for the period between 2080-2099.
The projections were made using the RegCM3 climate model, developed at ICTP, Trieste, under the conditions of the IPCC emission scenario, A1B.
For all three analyzed stations, significant decreases (number of days) of the duration of the vegetation season are observed.

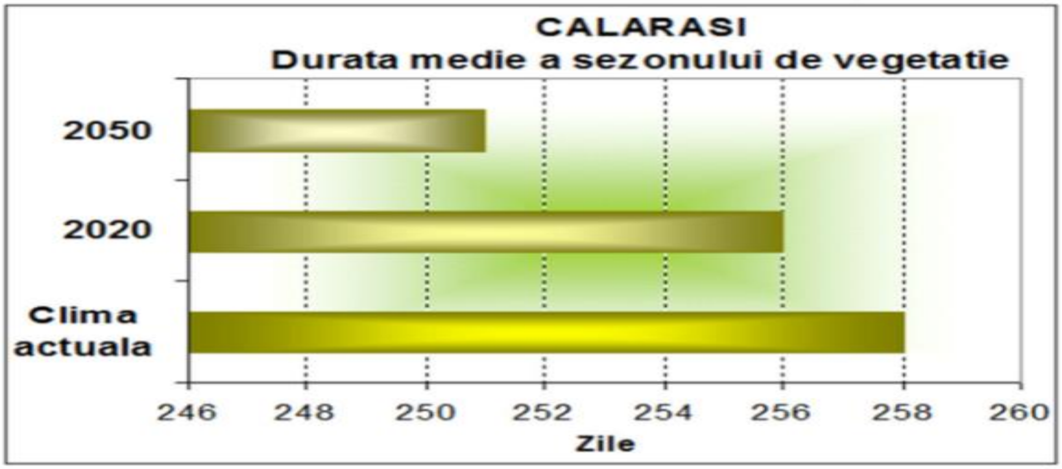
For example, in Călărași (Figure VIII.10.), a decrease of the vegetation season can be observed by 2-14 days, due to the increase of temperature. For the average duration of the vegetation season, the simulations of the HadCM3 climate model were used, for the period 2020-2050, under the conditions of the IPCC A2 emission scenario.

Figure VIII.9. Duration of the vegetation season for wheat cultivation for the current climate and for the period 2080-2099



Source : National Meteorological Administration, Extreme meteorological phenomena in Romania - implications on agriculture, 5th edition ICAR Forum

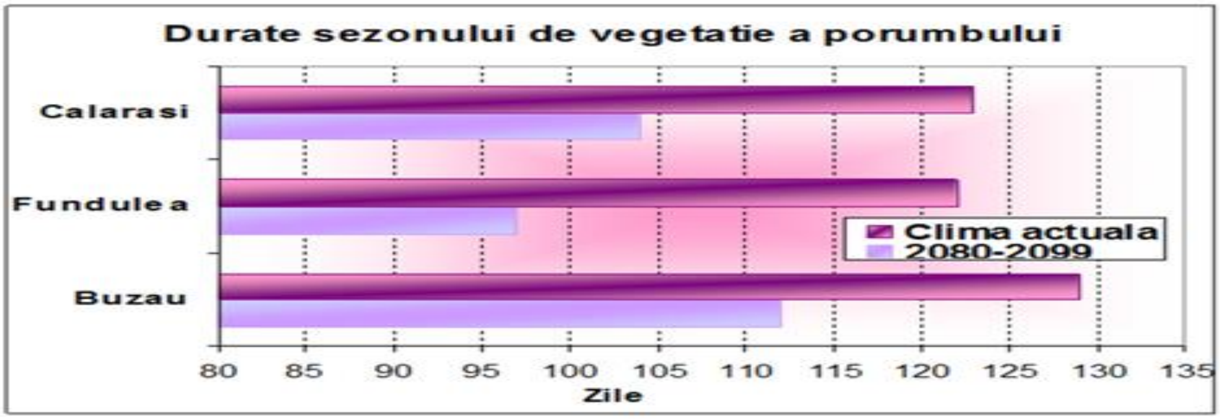
Figure VIII.10. Duration of the vegetation season for wheat cultivation at Călărași station



Source National Meteorological Administration, Extreme meteorological phenomena in Romania - implications on agriculture, 5th edition ICAR Forum

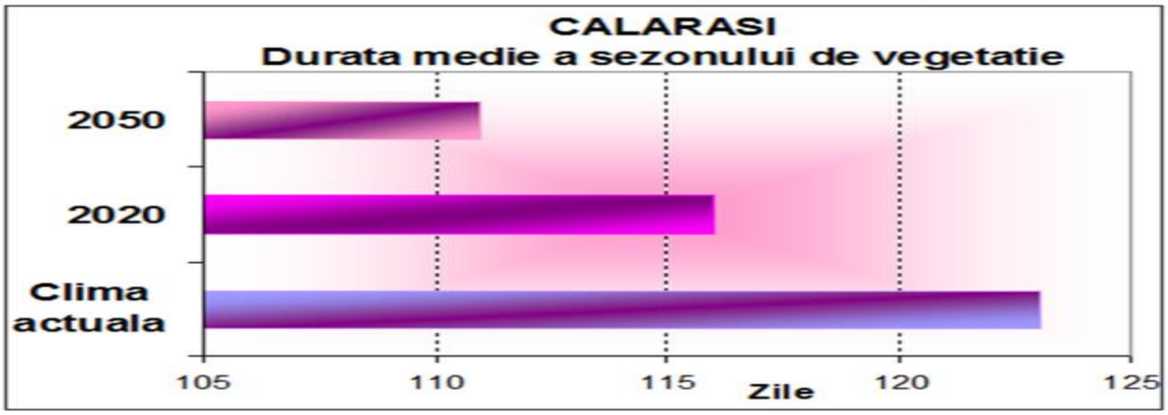
Regarding corn cultivation (Figure VIII.11), there is a decrease in production as a result of increasing water deficits in the soil, especially in the grain filling phase. For the Călărași station (Figure VIII.12.) it is found the shortening of the vegetation season by 7 days in 2020 and respectively, by 12 days in 2050, as a result of the increase of the air temperature.

Figure VIII.11. Duration of the vegetation season for maize cultivation for the current climate and for the period 2080-2099



Source National Meteorological Administration, Extreme meteorological phenomena in Romania - implications on agriculture, 5th edition ICAR Forum

Figure VIII.12. Duration of the vegetation season for corn cultivation at Călărași station



Source National Meteorological Administration, Extreme meteorological phenomena in Romania - implications on agriculture, 5th edition ICAR Forum

Agriculture

RO 57
Romania indicator code: RO 57 EEA indicator code: CLIM 32
TITLE: **PRODUCTIVITY OF AGRICULTURAL CROPS DETERMINED BY LACK OF WATER RESOURCES**
DEFINITION: This indicator can be mainly defined by the yield of agricultural crops determined by the lack of water resources.

Climate change forecasts (air temperature and precipitation) in Romania for the period 2001 - 2030 were constructed by applying two extrapolation methods (dynamic and static) recommended by IPCC and applied to some global models (AOGCM) or regional models (RegCM) and applied to the IPCC prediction A1B (small increases in GHG concentrations in the atmosphere in the 21st century).

The statistical results of the forecasts for the period 2001-2030 compared to the period 1960-1990 show the following:

- the air temperature will increase by 0.7 to 1.1 ° C;

- the average values of precipitation in December and February will decrease, while in October and June they will increase, and for the other months the average values will not have significant changes.

The results of dynamic modeling for the period 2001-2030 compared to the period 1960-1990 show:

- the average temperature will increase more in the eastern part of Romania;
- the winter air temperature outside the Carpathians is expected to decrease by 1.5 ° C, and to increase by 0.2 ° C in summer;
- spring - the temperature will increase by 1.8 ° C;
- autumn - the temperature is expected to rise;
- summer - rainfall will increase especially in the west;
- increase in precipitation in the autumn season;
- decrease in precipitation in the winter season.

Source: 5th National Communication of Romania, Bucharest January 2010

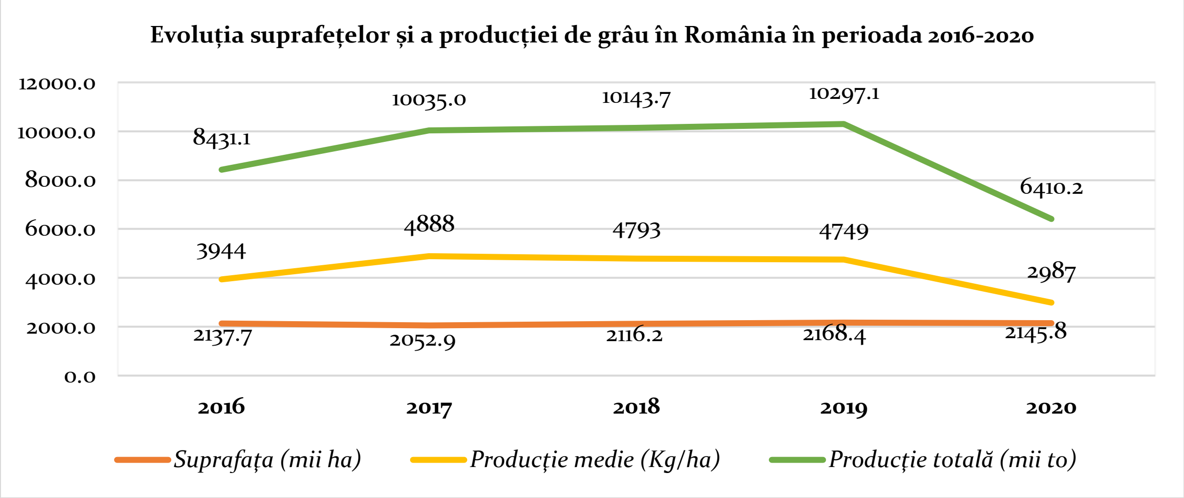
Table VIII.3. Cultivated area and wheat crop production in Romania, period 2016-2020

Year	Cultivated area (thousand hectares)	Production (thousand tons)	Yield (kg / ha)
2016	2137.7	8431.1	3944
2017	2052.9	10035.0	4888
2018	2116.2	10143.7	4793
2019	2168.4	10297.1	4749
2020	2145.8	6410.2	2987

INS data source, TEMPO database

The evolution of wheat crop yield in Romania (kg / ha), period 2016-2020, is illustrated in the figure below.

Figure VIII.13. The evolution of areas and wheat production in Romania during 2016-2020



NIS data source, TEMPO database

Forests and forestry

RO 58

Romania indicator code: RO 58
EEA indicator code: CLIM 34

TITLE: **AREAS OCCUPIED BY FORESTS**

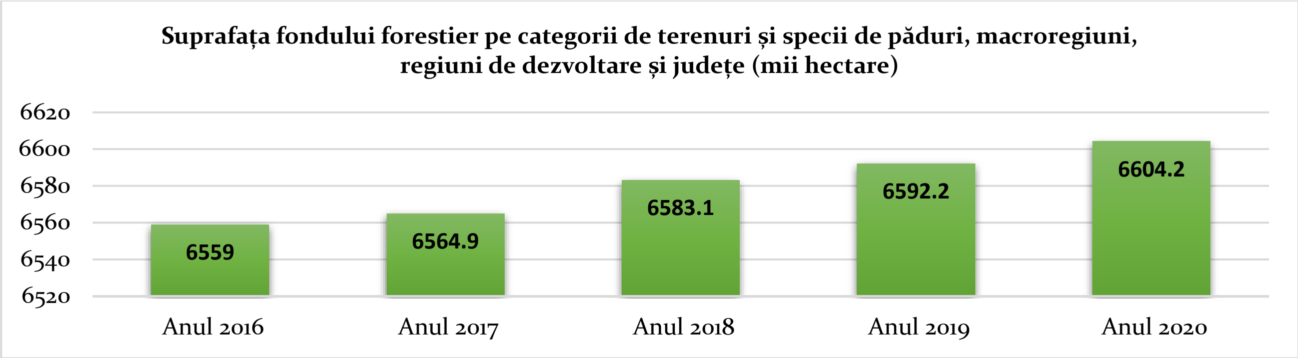
DEFINITION:This indicator is defined by:

- Forest area;

- The volume of forest biomass.

The evolution of the forest fund area in the period 2016-2020, by categories of land and forest species, macro-regions, development regions and counties, is represented in the figure below.

Figure VIII.14. Evolution of the forest fund area



INS data source, TEMPO database

Harvesting the wood mass from the forest fund publicly owned by the state, administered by the National Directorate of Forests - Romsilva

A. The volume of harvested wood

In 2020, a total volume of 9,250 thousand cubic meters of timber was harvested from the state-owned forest fund.

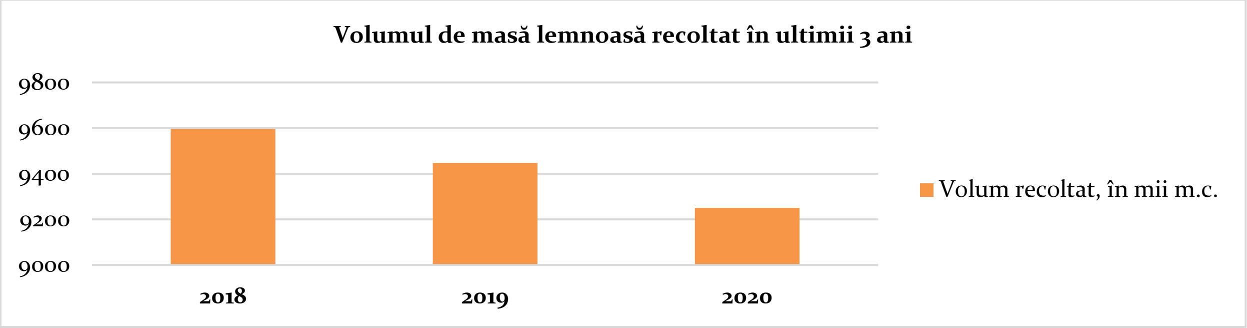
The situation of wood harvesting by ways of capitalization is presented in the table below.

Table VIII.4. Situation of wood harvesting by ways of capitalization (thousand cubic meters)

YEAR	Total volume of harvested wood	from which:		
		capitalized as a standing wood	exploited through the provision of services	exploited on its own
2018	9,595.9	5,622.2	2,005.3	1,968.4
2019	9,447.0	6,497.6	1,048.6	1,900.8
2020	9,250.1	6,469.1	892	1,889

Source: National Directorate of Forests - Romsilva

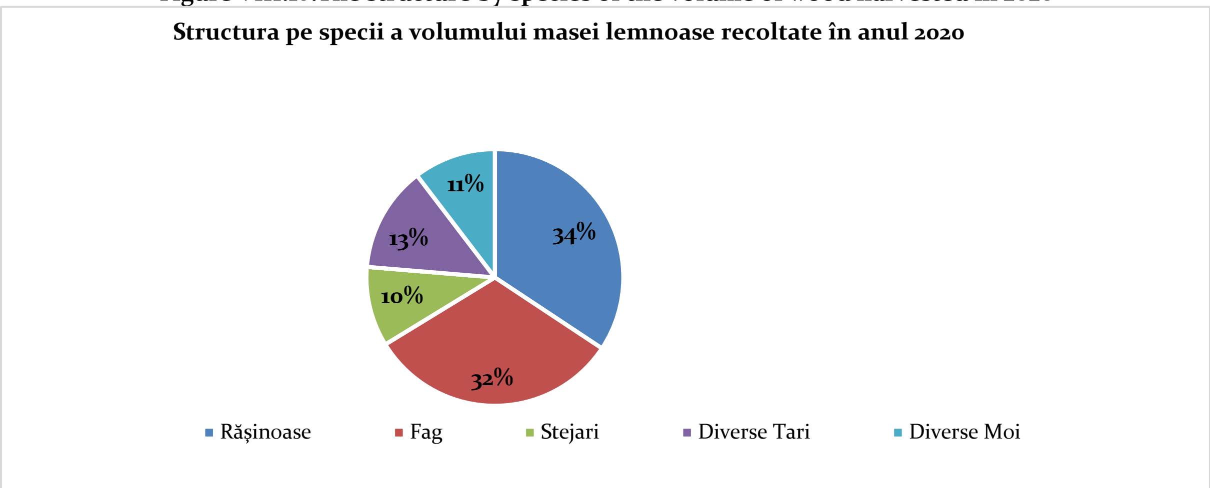
Figure VIII.15. The volume of wood harvested in the last 3 years



Source: National Directorate of Forests - Romsilva

The structure by species of the volume harvested in 2020 is, in general, similar to that of previous years, being represented as follows:

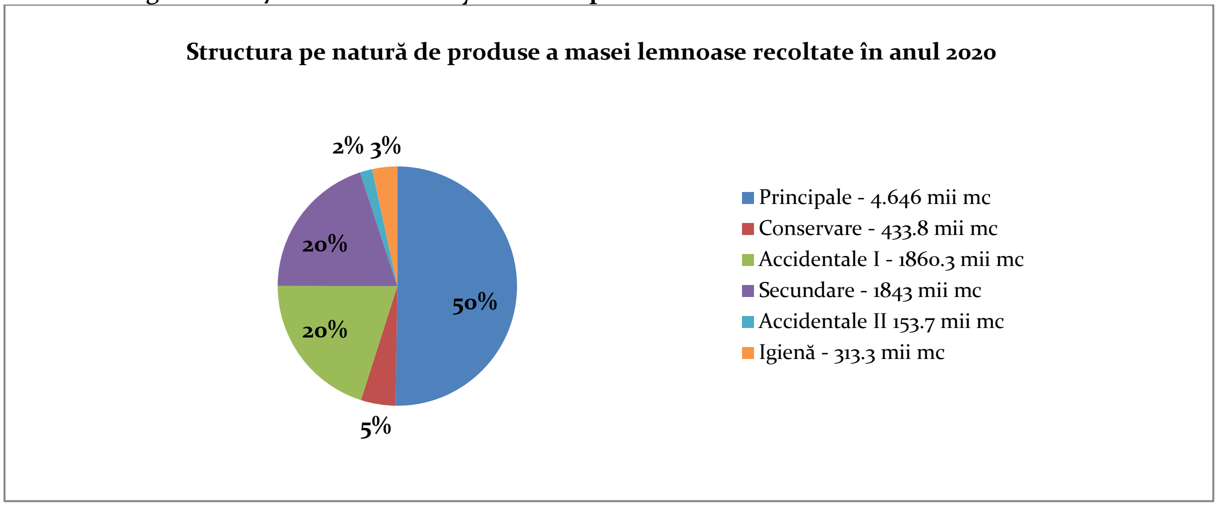
Figure VIII.16.The structure by species of the volume of wood harvested in 2020



Source: National Directorate of Forests - Romsilva

By nature of products, 6,940 thousand cubic meters are the main products and those assimilated to them (canning and accidental products I), 1,997 thousand cubic meters are by-products (including the volume of accidental products II) and 313 thousand cubic meters are hygiene products.

Figure VIII.17. The structure by nature of products of the wood mass harvested in 2020

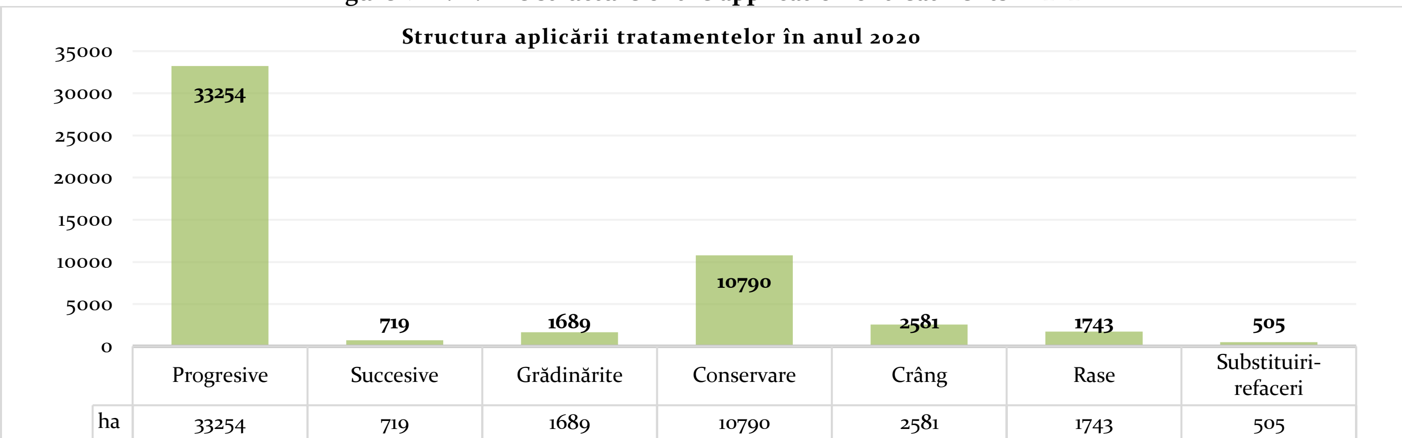


Source: National Directorate of Forests - Romsilva

Due to the action of destabilizing factors, biotic and / or abiotic, during 2020 accidental products were harvested that accumulated a volume of 2,014 thousand cubic meters (22% of the total volume of wood harvested in 2020), of which 1,860 , 3 thousand cubic meters of accidental products I and 153.7 thousand cubic meters of accidental products II.

The share of the application of treatments (methods of regeneration of trees), as area covered, is shown in the graph below.

Figure VIII.18. The structure of the application of treatments in 2020



Source: National Directorate of Forests - Romsilva

B. Care works for young trees

In the forest fund, public property of the state administered by RNP - Romsilva, in 2020, care works were carried out on a total area of 103,715 ha, in accordance with the provisions of the forest arrangements.

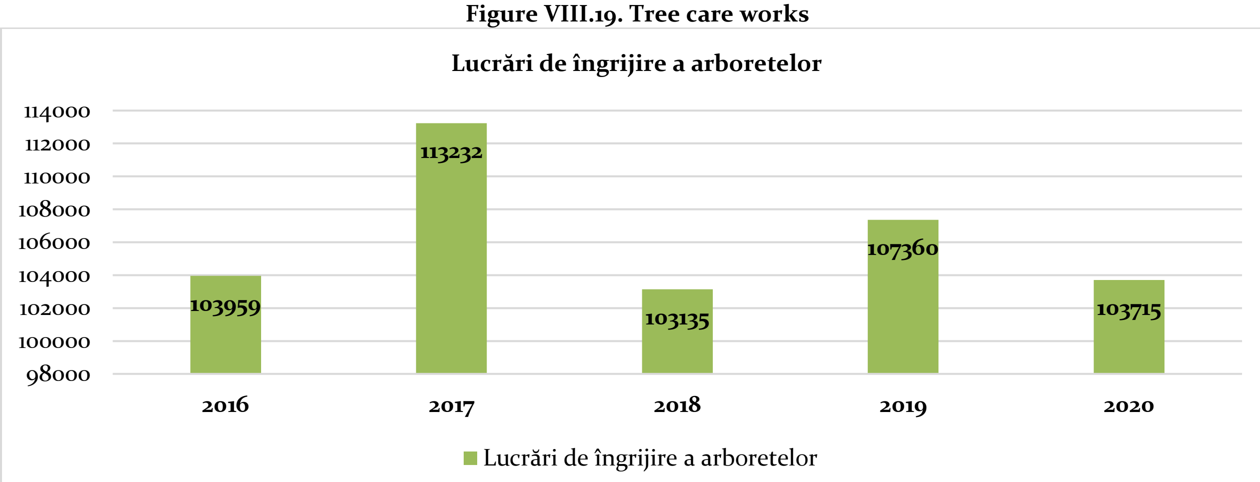
By nature of works, the situation of the care works is presented as follows:

Table VIII.5. Situation of carrying out the care works by nature of works (ha)

The nature of the works	2016	2017	2018	2019	2020
Clearencess	10,220	10,614	12,797	11,334	10,776
Clearings	16,388	17,040	18,723	17,533	17,711
Thinning	75,814	83,067	69,978	76,430	73,506
Artificial pruning	1,537	2,511	1,637	2,063	1,722
TOTAL	**103,959**	**113,232**	**103,135**	**107,360**	**103,715**

Source: National Directorate of Forests - Romsilva

Figure VIII.19. Tree care works



Source: National Directorate of Forests - Romsilva

Based on the forest administration / services contracts concluded with RNP - Romsilva, the forestry departments aimed at carrying out the care works of the young stands and in the forest fund of other owners, in accordance with the provisions of the forest arrangements and the condition of the stands.

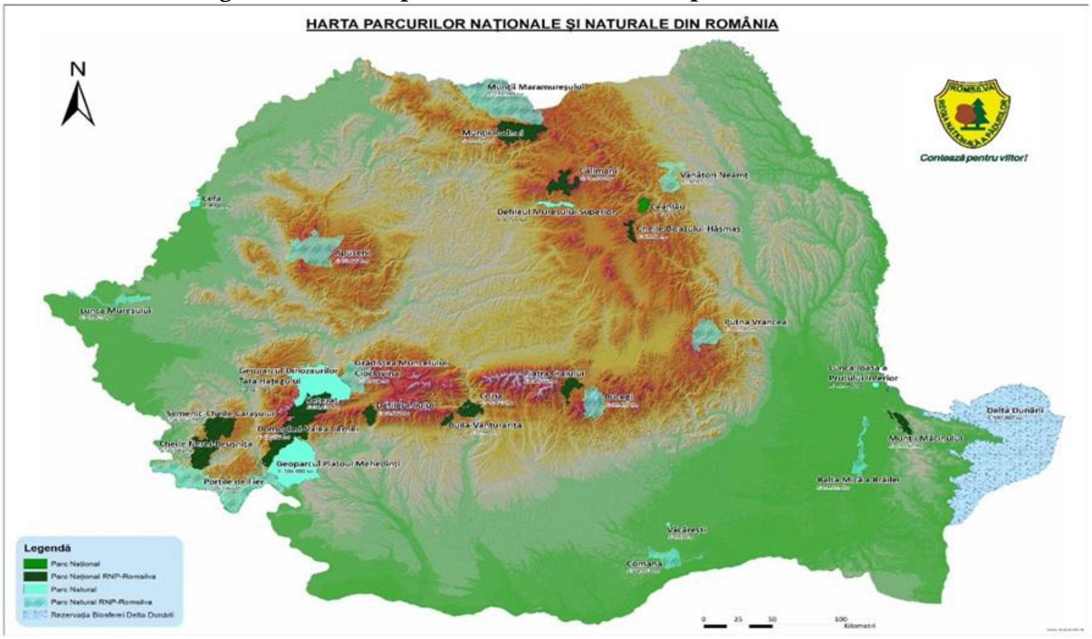
In 2020, in the respective forests, care works were carried out on the young stands on 12,654 ha, of which:

- Clearances 615 ha;
- Cleanings 1,242 ha;
- Thinning 10,797 ha.

C. PROTECTED AREAS

In 2020, out of the total of the 30 major protected natural areas designated at national level, whose total area represents approx. 1.67 million ha, the National Directorate of Forests - Romsilva continued to manage 22 national and natural parks, through the 22 management structures with legal personality in its structure. The total area of the 22 parks in the structure of the company, according to the measurement in GIS made by the park administration staff, is approx. 853 thousand ha, with a total forest area of approx. 599 thousand ha, of which approx. 373 thousand ha of forest fund public property of the state.

Figure VIII.20. Map of national and natural parks in Romania



Source: National Directorate of Forests - Romsilva

Of the total area of the state-owned forest fund in the parks managed by the directorate, approx. 109 thousand ha are found in the strict protection area - (SPA) and the integral protection area - (IPA) (areas where the exploitation of natural resources is prohibited). The situation of the areas in the national and natural parks managed by RNP-Romsilva is detailed in the following table:

Table VIII.6. Situation of areas in national and natural parks managed by RNP-Romsilva

Nr. crt.	NAME OF THE PARK	County	Park area (cf. GIS) (ha)	from which:			
				Forest Fund		of which: state-owned forest fund	
				total	of which:	total	of which:

					SPA + IPA		SPA + IPA
NATIONAL PARKS							
1	Buila - Vânturarița	VL	4,465	3,873	1,459	2,087	532
2	Călimani	BN, SV, MS, HR	24,556	17,933	10,601	10,190	5,462
3	Cheile Bicazului - Hășmaș	NT, HR	7,072	6,644	4,889	2,081	1,878
4	Cheile Nerei-Beușnița	CS	36,661	30,982	13,951	29,372	13,947
5	Cozia	VL	16,813	16,072	8,134	8,661	5,184
6	Defileul Jiului	GJ, HD	10,941	9,443	8,930	1993	1970
7	Domogled - Valea Cernei	CS, MH, GJ	61,211	46,544	20,135	44,278	19,854
8	Munții Măcinului	TL	11,200	11.158	3,839	11,148	3,839
9	Munții Rodnei	BN, MM	47,202	29,116	14,322	2,497	2,198
10	Piatra Craiului	AG, BV	14,766	10,880	6,223	3,771	2,490
11	Retezat	HD	38,259	20,494	11,143	6,989	2,787
12	Semenic – Cheile Carașului	CS	36,052	30,775	11,187	30,091	11,179
TOTAL NATIONAL PARKS			**309,198**	**233,914**	**114,813**	**153,158**	**71,320**
NATURAL PARKS							
13	Apuseni	AB, BH, CJ	76,067	60,447	13,978	26,275	8,434
14	Balta Mică a Brăilei	BR	24,123	13,446	3,453	11,799	1.947
15	Bucegi	BV, DB, PH	32,497	21,411	6,643	10,862	4446
16	Comana	GR	25.107	8,024	870	7,423	856
17	Grădiștea Muncelului - Cioclovina	HD	38,116	26,698	4,672	17,655	2,092
18	Lunca Mureșului	AR, TM	17,420	6,468	811	5,821	528
19	Munții Maramureșului	MM	133,484	86,968	12,638	48,318	7,290
20	Porțile de Fier	CS, MH	128,196	82,089	9,526	73,471	9,497
21	Putna Vrancea	GR	38,116	33,618	7,617	2,710	2,523
22	Vânători Neamț	AR, TM	30,631	26,204	616	15,268	243
TOTAL NATURAL PARKS			**543,757**	**365,373**	**60,824**	**219,602**	**37,856**
GRAND TOTAL			**852,955**	**599,287**	**175,637**	**372,760**	**109,176**

Source: National Directorate of Forests - Romsilva

Regarding the ownership structure of the forest fund in the national and natural parks managed by RNP-Romsilva, we can specify that, at this date, the Romanian state predominates as owner with approx. 65%.

The parks in which the privately owned forest fund represents over 50% are: the national parks Rodna Mountains, Piatra Craiului, Retezat, Cheile Bicazului, Defileul Jiului and the natural parks Putna Vrancea and Bucegi.

The administration of the 22 national and natural parks, together with the Natura 2000 sites and the protected natural areas of national interest that overlap with them is carried out on the basis of management contracts concluded with the central public authority for environmental protection and additional acts concluded with the National Agency for Protected Natural Areas. The number of protected natural areas, which are the subject of these management contracts, is 271.

The main objectives of national and natural parks are the conservation of biodiversity, landscape, cultural identity, as well as the promotion of tourism, traditions, etc. The way of fulfilling the objectives is established by the *management plans* elaborated by the park administration.

From the 22 national and natural parks managed by the National Directorate of Forests - Romsilva:

- 13 parks have an approved management plan.
- In the case of 4 parks, the management plans are in the final stage of approval at the relevant ministry;
- 1 management plan is currently in the approval stage, at the National Agency for Protected Natural Areas;

- 2 management plans are elaborated through POIM projects;
- In the case of 2 parks, the management plans are in the regulatory procedure at the competent environmental authorities.

In 2020, in the context of the Covid-19 pandemic, the park administrations carried out a number of 345 awareness actions and a number of 256 ecological education actions, much reduced in number compared to the previous year.
In order to prevent illegal activities, 10,871 patrol actions were carried out, some of which were carried out with the support of the Gendarmerie, the Romanian Police, the Environmental Guard, the Forest Guard and other institutions.
The basic financing of the 22 parks is provided by the National Directorate of Forests-Romsilva based on the management contracts concluded for a period of 10 years, the total amount provided within them being approx. 13.7 million lei annually. In 2020, RNP-Romsilva provided for the 22 administrations a total budget of approx. 29.22 million lei (without the amounts related to external funds).
The amount attracted by the park administrations during 2020, from different sources of financing, is 22.23 million lei, most of the amounts being attracted through the Large Infrastructure Operational Program, followed by the LIFE program, Interreg etc.

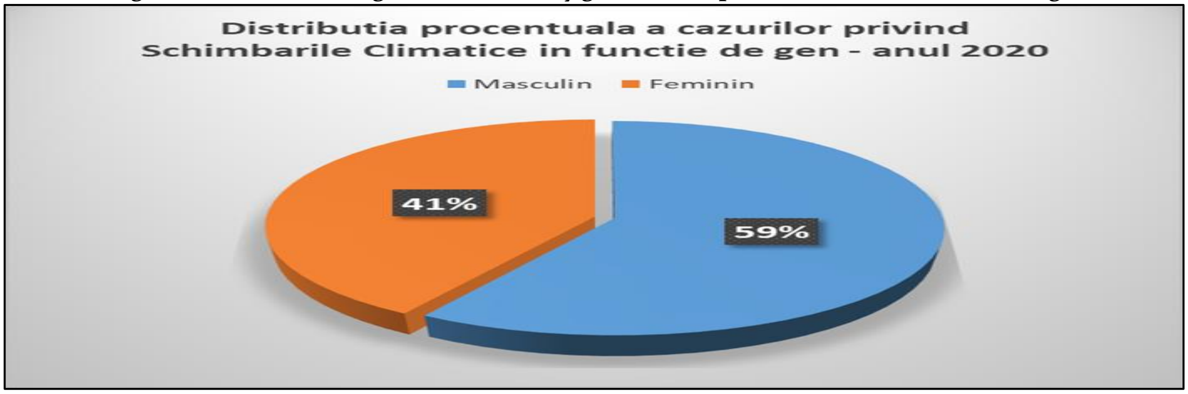
Human health

RO 60
Romania indicator code: RO 60 EEA indicator code: CLIM 36
TITLE: **EXTREME TEMPERATURES AND HEALTH**
DEFINITION: This indicator is defined by the annual national mortality rate caused by extreme summer temperatures.

The National Institute of Public Health, through the National Center for Monitoring Community Risks (CNMRMC), manages the National Electronic Register of Environmental Risks (ReSanMed), as a specific tool at national level, for managing information about the impact of environmental factors on the health of the population.
From the data registered in the electronic platform ReSanMed, corresponding to the module "Climate Change", where there have been cases of disease that can be caused by extreme weather conditions (frost, sunburn, hypothermia, etc.), for 2020, the following results:

- distribution of cases of disease that can be caused by extreme phenomena by gender:
    - Male, with a percentage of 59% (702 cases)
    - Female, with a percentage of 41% (488 cases)

Figure VIII.21. Percentage distribution by gender of reported cases of Climate Change



Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

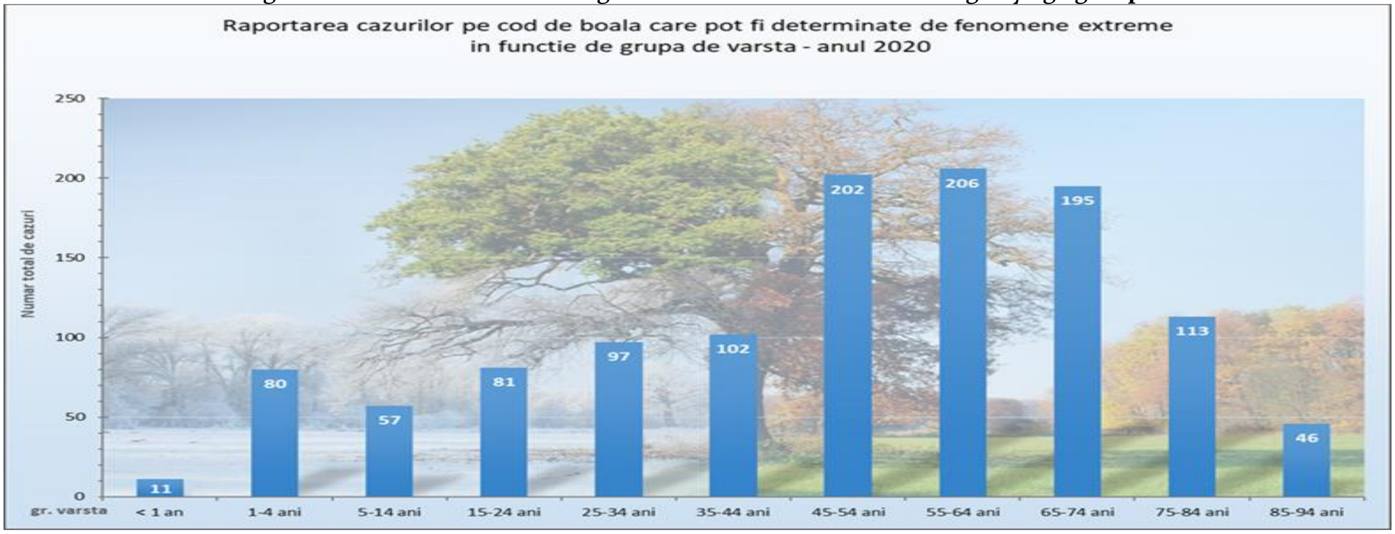
- according to the records from the ReSanMed platform, referring to the *Climate Change* module, for the distribution of cases according to age, 11 age groups were structured as follows:

Table VIII.7. Distribution of age-related cases of Climate Change by age groups

Nr.	*Age group*	*Reported cases*
1	under 1 year	**11**
2	1-4 years	**80**
3	5-14 years	**57**
4	15-24 years	**81**
5	25-34 years	**97**
6	35-44 years	**102**
7	45-54 years	**202**
8	55-64 years	**206**
9	65-74 years	**195**
10	75-84 years	**113**
11	> 85 years	**46**

Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

Figure VIII.22. Distribution of age-related cases of Climate Change by age groups



Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

There is an increase in the number of cases related to age, the most affected age groups are those over 45 years, with a maximum in the age range of 55-74 years.

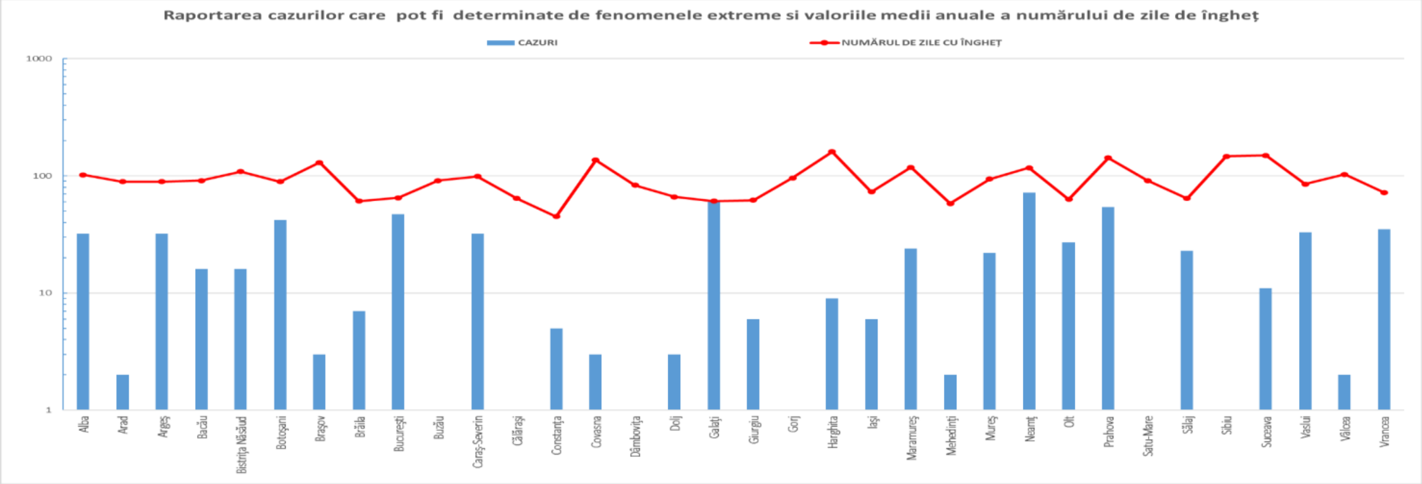
Distribution of reported cases, according to the months of the year (December, January, February and March) and average values annual number of frost days (air temperature ≤0 ° C), data provided by the National Meteorological Administration is presented in the following table and figure.

Table VIII.8. Distribution by counties of reported cases that may be caused by extreme phenomena during the winter

COUNTY	CASES	NUMBER OF FROZEN DAYS
Alba	32	102
Arad	2	89
Argeş	32	89
Bacău	16	91
Bistrița Năsăud	16	109
Botoșani	42	89
Brașov	3	130
Brăila	7	61
București	47	65
Buzău	1	91
Caraş-Severin	32	99
Călărași	1	64
Constanța	5	45
Covasna	3	136
Dâmbovița	1	83
Dolj	3	66
Galați	60	61
Giurgiu	6	62
Gorj	1	96
Harghita	9	161
Iași	6	73
Maramureș	24	118
Mehedinți	2	58
Mureș	22	94
Neamț	72	117
Olt	27	63
Prahova	54	142
Satu-Mare	1	91
Sălaj	2. 3	64
Sibiu	1	147
Suceava	11	149
Vaslui	33	85
Vâlcea	2	103
Vrancea	35	72

Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

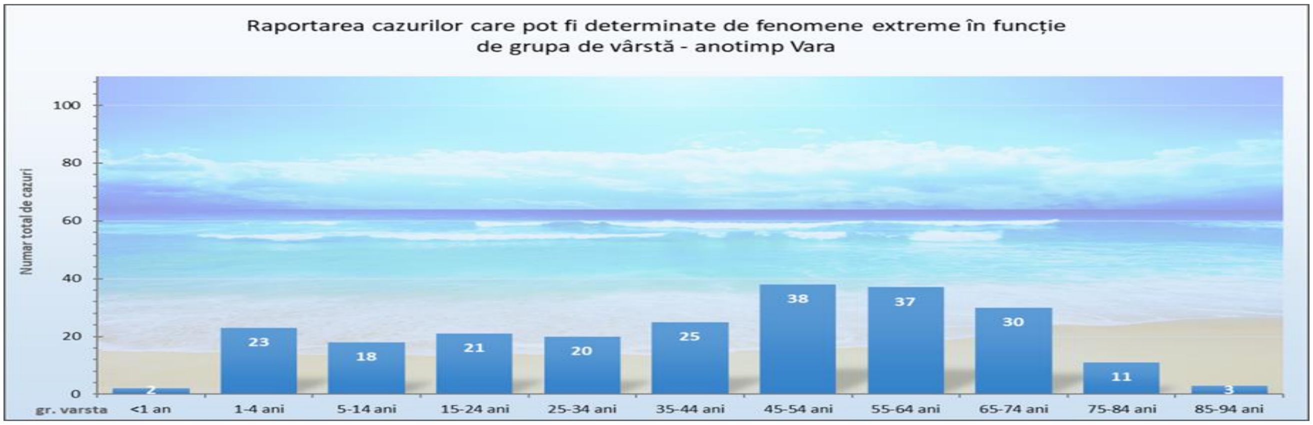
Figure VIII.23. Distribution by counties of reported cases that may be caused by extreme phenomena during the winter



Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

The reporting of cases according to age group during the summer (June, July, August) and the annual average values of the number of days with heat (air temperature ≥35 ° C), data provided by the National Meteorological Administration, are represented later .

Figure VIII.24. Distribution by age groups of reported cases that may be caused by extreme phenomena in the summer



Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

Table VIII.9. Distribution by counties of reported cases that may be caused by extreme phenomena during the summer

COUNTY	CASES	NUMBER OF DAYS WITH HEAT
Alba	6	0
Arad		0
Argeș	9	2
Bacău		1
Bihor		0
Bistrița Năsăud	10	0
Botoșani	22	1
Brașov		0

Brăila		8
București	16	11
Buzău		1
Caraș-Severin	29	0
Călărași		10
Cluj-Napoca	1	0
Constanța	12	6
Covasna		0
Dâmbovița		5
Dolj	1	8
Galați	2. 3	8
Giurgiu		11
Gorj		0
Harghita		0
Hunedoara		0
Ialomița		8
Iași	8	5
Maramureș	8	0
Mehedinți		2
Mureș	10	0
Neamț	15	0
Olt	12	8
Prahova	16	1
Satu-Mare		0
Sălaj	13	0
Sibiu		0
Suceava	5	0
Teleorman	1	11
Tulcea		1
Timiș		1
Vaslui	7	3
Vâlcea		3
Vrancea	4	7

Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

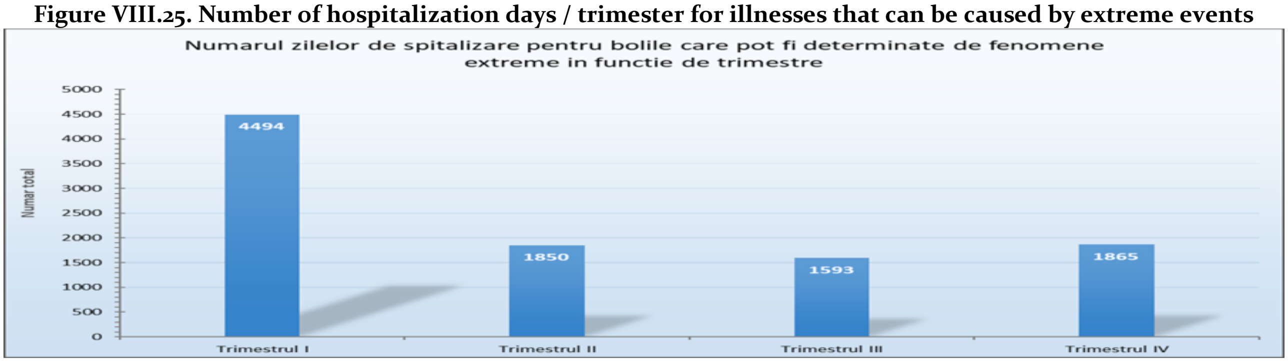
For the cases on *Climate Change*, registered in the electronic platform ReSanMed, in 2020, the most days of hospitalization were in the first trimester.

Table VIII.10. Number of hospitalization days / trimester for illnesses that can be caused by extreme events

No. crt.	No. of hospitalization days	Total
1	First trimester	4494
2	Second trimester	1850
3	Third trimester	1593
4	Fourth trimester	1865

Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

Figure VIII.25. Number of hospitalization days / trimester for illnesses that can be caused by extreme events

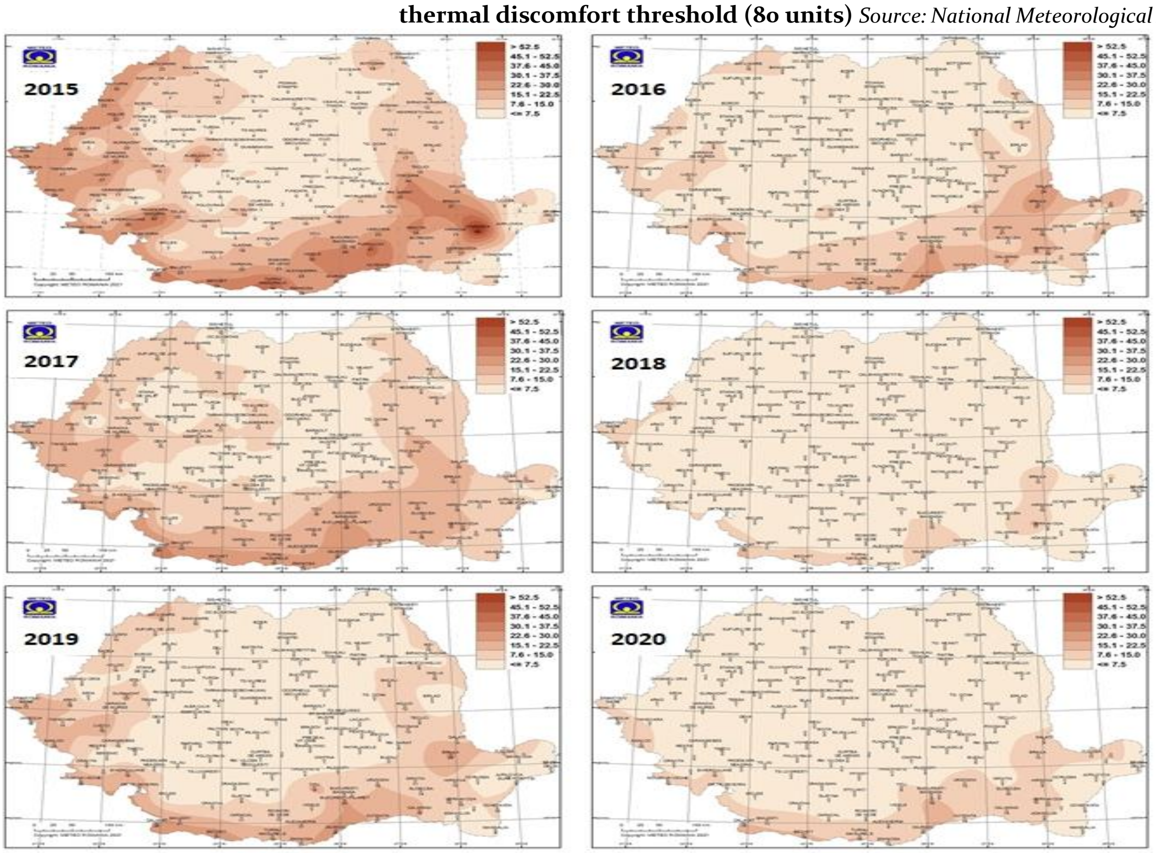


Source: National Institute of Public Health - National Center for Risk Monitoring in the Community

In conclusion, Climate Change has effects on the health of the population, according to the records in the ReSanMed module in 2020, most diseases appearing in the cold season, in people over 45 years.

The summer of 2020 was marked by slightly lower values of the number of days in which the temperature-humidity index ITU exceeded the critical threshold of thermal discomfort (80 units) compared to 2019, but by a higher thermal stress compared to the summer of 2018, when the number of days with thermal discomfort was much lower, in the southern, southeastern and western regions of Romania.

Figure VIII.26. Number of days in 2015-2019 and 2020 in which the ITU temperature-humidity index exceeded the critical thermal discomfort threshold (80 units) *Source: National Meteorological Administration*



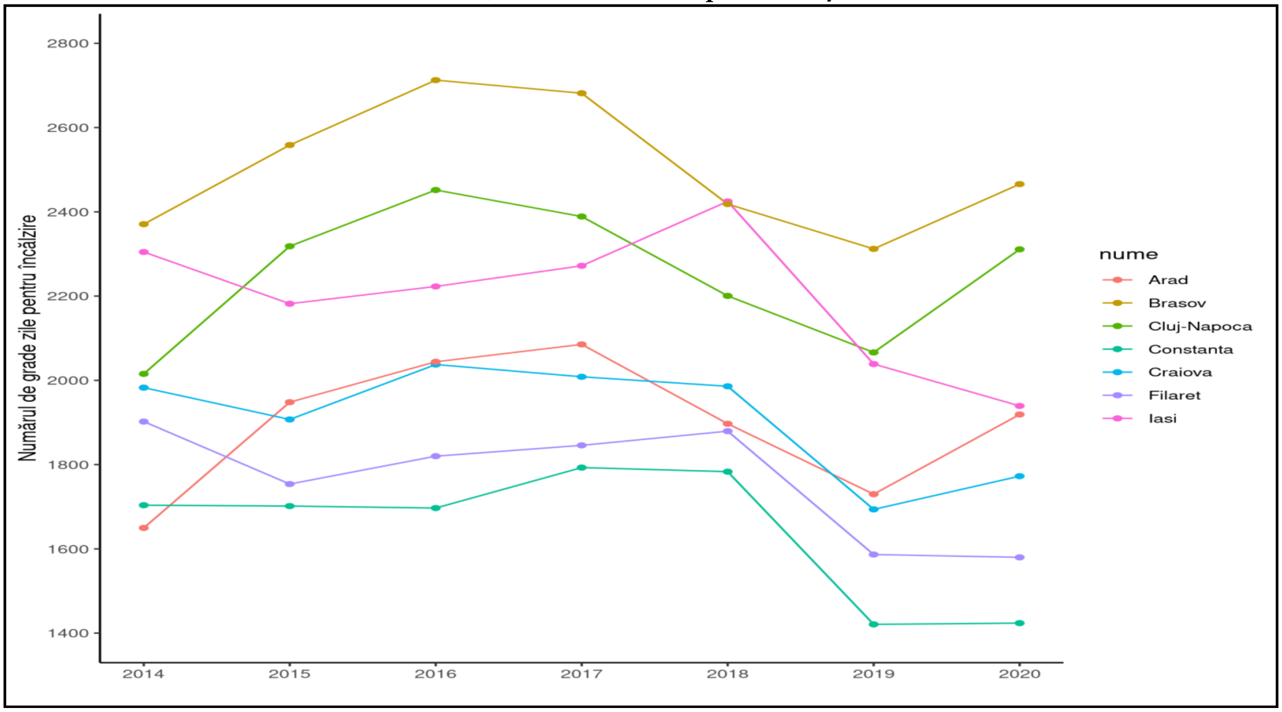
DETERMINANT FACTORS AND PRESSURES ON CLIMATE CHANGE

Determinant factors affecting the climate regime

RO 62
Romania indicator code: RO 62 EEA indicator code: CLIM 47
TITLE: **NUMBER OF DEGREES-DAYS FOR HEATING**
DEFINITION: This indicator shows the national trend in the number of degrees-days for heating.

The year 2020 compared to 2019 is characterized by an increase in the number of degrees-days for heating for Arad, Brașov, Cluj, Craiova and a reduction for Iași, values close to those of 2019 being registered in Bucharest Filaret and Constanța.

Figure VIII.27. Number of degrees-days for heating, corresponding to meteorological data from 7 cities covering the territory of Romania, calculated for the period 2014-2020



Source: National Meteorological Administration:

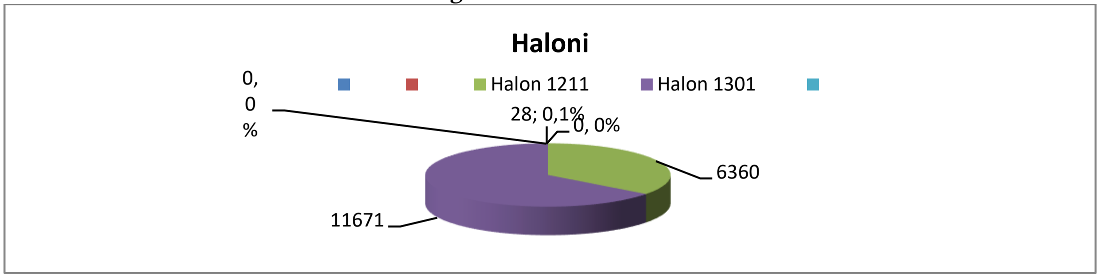
Ozone layer depleting substances

RO 06
Romania indicator code: RO 06 EEA indicator code: CSI 06
TITLE: **PRODUCTION AND CONSUMPTION OF SUBSTANCES LEADING TO THE DESTRUCTION OF THE OZONE LAYER**
DEFINITION: This indicator quantifies the annual production and consumption of ozone-depleting substances (ODS) in Romania. ODS are long-lived chemicals that contain chlorine and bromine and destroy the stratospheric ozone layer.

Consumption of ozone-depleting substances under Regulation 1005/2009 in 2020

- fire extinguishers for aircraft, military off-road vehicles, military ships:
  - H 1301 = 11671 kg
  - H 1211 = 6360 kg

Figure VIII.28. halons



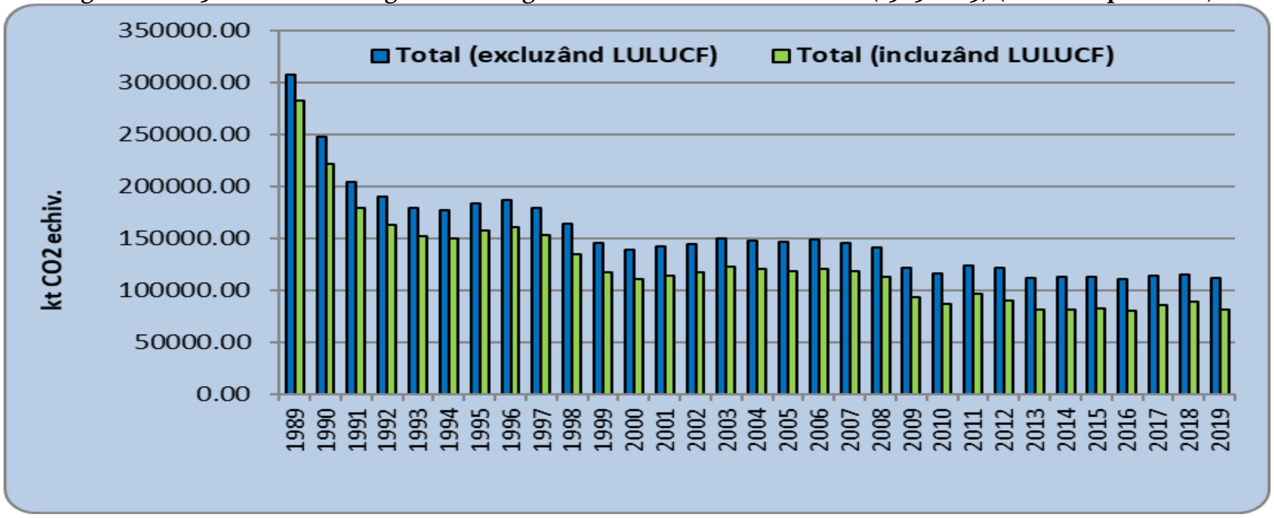
Source: National Agency for Environmental Protection

GREENHOUSE GAS EMISSION TRENDS

RO 10
Romania indicator code: RO 10 EEA indicator code: CSI 10
TITLE: **GREENHOUSE GAS EMISSIONS TREND**
DEFINITION: This indicator shows the trends in greenhouse gas emissions. It analyzes trends (total and by sector) in relation to Member States' obligations to meet the targets of the Kyoto Protocol.

In 2019, total greenhouse gas emissions (excluding the contribution of the sector "Land use, land use change and forestry - LULUCF) decreased by 63.64% compared to the level of emissions in 1989, while net GHG emissions / retentions (taking into account CO2 retentions) decreased by 71.10%. (Figure VIII.29).
The total greenhouse gas emissions in 2019, except for the retention by absorbers, amounted to 111,767.06 kt CO2 equivalent.

Figure VIII.29. Trend of total greenhouse gas emissions at national level (1989-2019) (kt CO2 equivalent)



Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

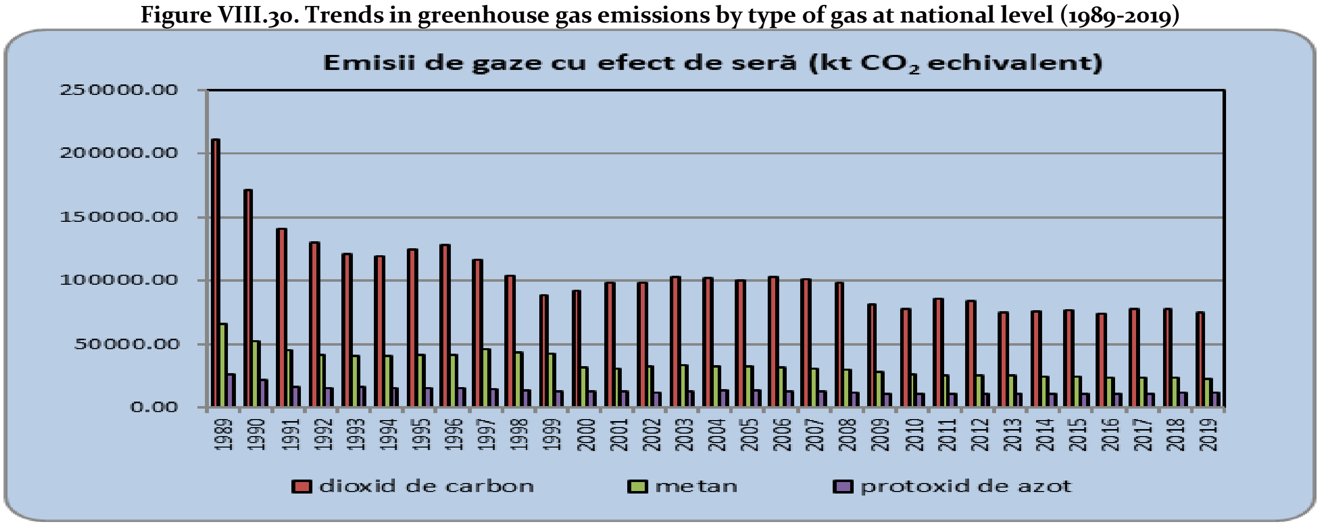
Of the nationally monitored greenhouse gases, carbon dioxide is the most significant pollutant, followed by methane and nitrous oxide (Figure VIII.30.).

Carbon dioxide (CO_2) is the most important anthropogenic greenhouse gas. The decrease of CO_2 emissions in 2019 by 64.52% compared to 1989 (from 210,976.81 kt in 1989 - 68.64% to 74,846.27 kt in 2019 - 66.97%) is caused by the decrease in the amount of fossil fuels burned in the energy sector (especially in the production of electricity and heat, as well as the manufacturing and construction industries) as a result of the decline in activity.

Methane emissions (CH_4), mainly related to fugitive emissions from the extraction and distribution of fossil fuels and livestock, decreased in 2019 by 65.16% compared to 1989 (from 65,806.51 kt CO_2 equivalent in 1989 to 22,929.99 kt CO_2 equivalent in 2019). The decrease in CH_4 emissions in agriculture is due to the decrease in the level of animal husbandry.

N_2O emissions are mainly generated as part of activities in agricultural soils in the agricultural sector and in the chemical industry activities in the Industrial Processes sector. The decline in these activities (decline in animal husbandry, decrease in synthetic fertilizers N applied to soil quantities, decrease in crop production levels) is reflected in the trend of N_2O emissions, and they decreased in 2019 by 55.42% (from 26,141.37 kt CO_2 equivalent in 1989 to 11,653.84 kt CO_2 equivalent in 2019).

Figure VIII.30. Trends in greenhouse gas emissions by type of gas at national level (1989-2019)



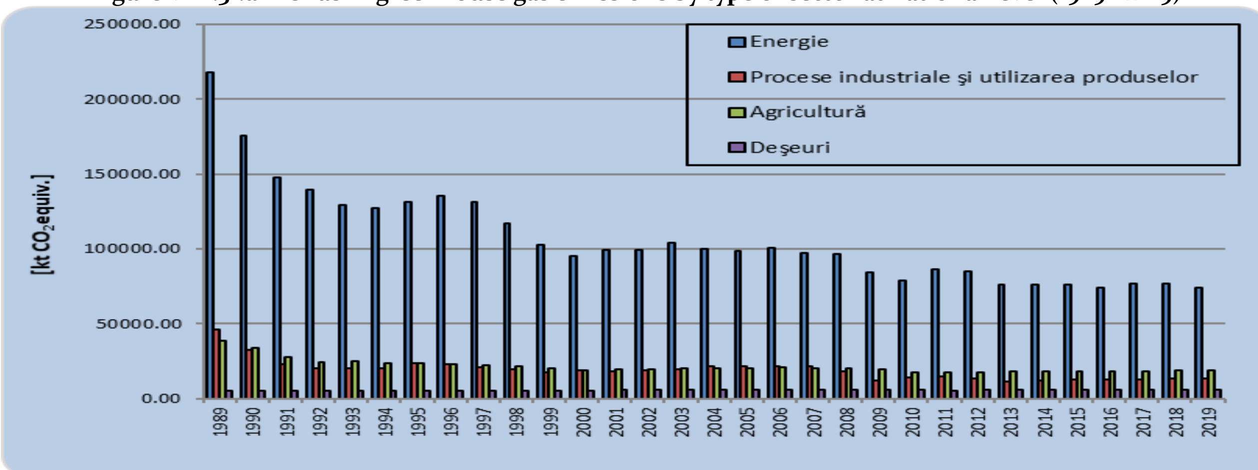
Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

Figure VIII.31.a represents the trends of GHG emissions in each sector of INEGES, excluding the LULUCF sector.

GHG emissions from the energy sector decreased by 66.08% compared to the base year 1989.
A significant decrease of 71.52% of GHG emissions was recorded in the Industrial Processes and Product Use sector in 2019, compared to the level of 1989 due to the decline or cessation of certain production activities.

GHG emissions from the Agriculture sector also decreased in 2019 by 50.91% compared to 1989 emissions, this fact being based on the following causes: the decline of the livestock sector, the decrease of agricultural plant productions, the decrease of fertilizers N-based synthetics applied to the soil.
In the Waste sector, emissions increased in 2019 by 14.53%, compared to the level of 1989.

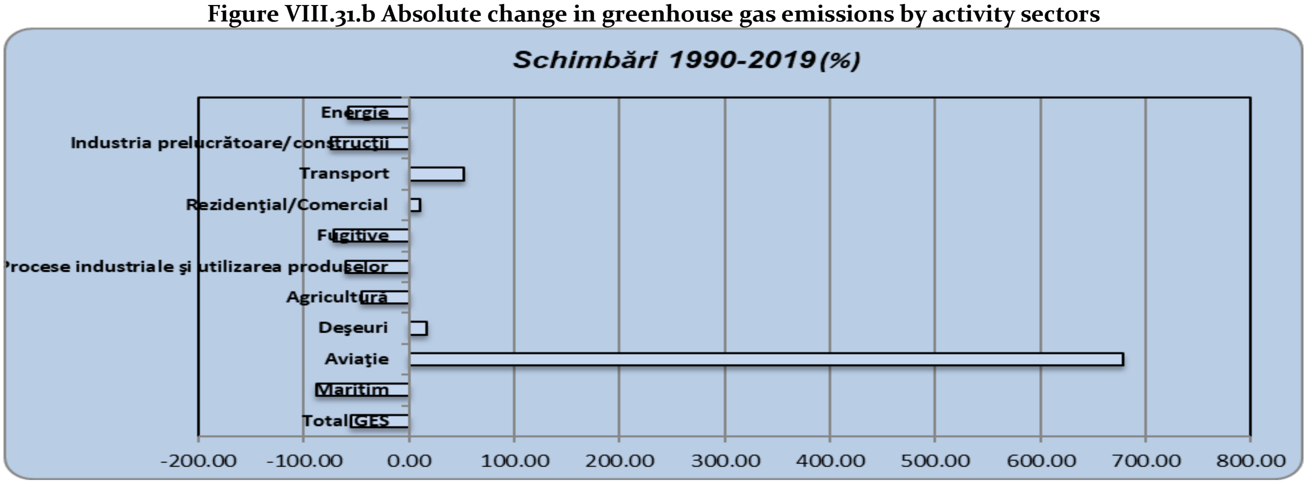
Figure VIII.31.a Trends in greenhouse gas emissions by type of sector at national level (1989 - 2019)



Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

Figure VIII.31.b represents the changes of GHG emissions, on each sector of INEGES, at the level of 2019 compared to 1990.

Figure VIII.31.b Absolute change in greenhouse gas emissions by activity sectors



Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

CLIMATE CHANGE SCENARIOS AND FORECASTS

Aggregated data on projections of GHG emissions

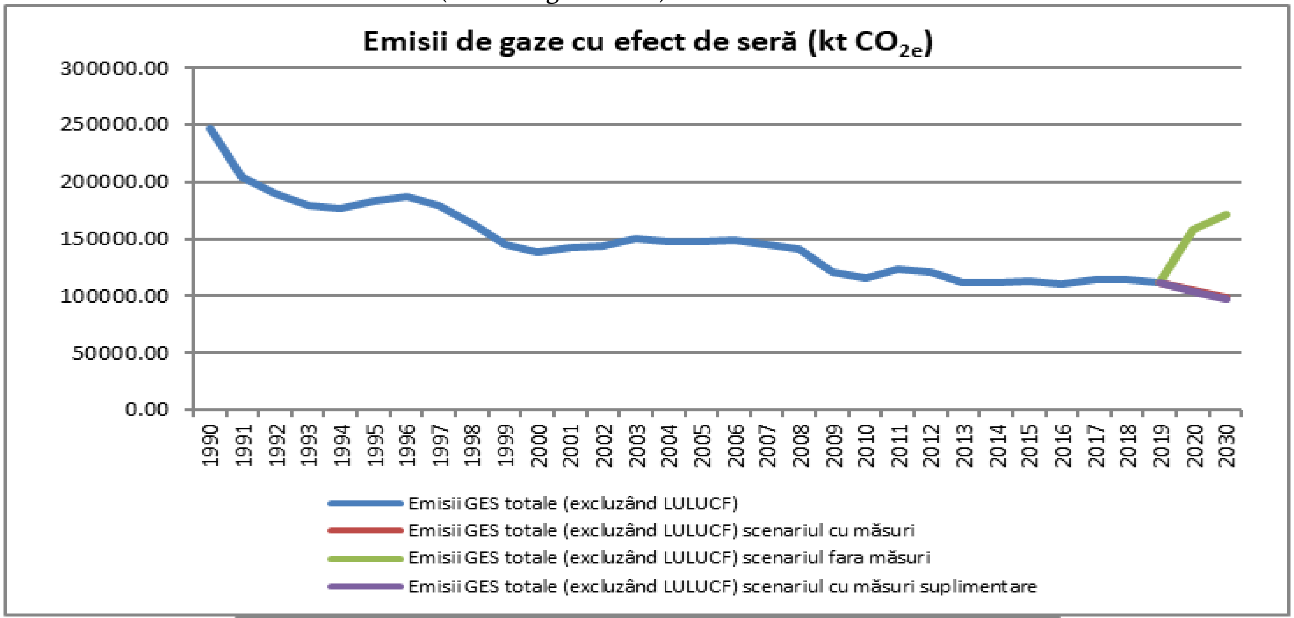
RO 11
Romania indicator code: RO 11 EEA indicator code: CSI 011
TITLE: **GREENHOUSE GAS EMISSIONS PROJECTIONS**
DEFINITION: This indicator illustrates the anticipated trends in anthropogenic greenhouse gas emissions. The purpose of this indicator is to estimate the degree of achievement of the objectives set by climate change policies. Estimated progress is calculated as the difference between the emission projections and the targets set by the Kyoto Protocol. Greenhouse gases are those regulated by the Kyoto Protocol (CO_2, CH_4, N_2O, SF_6, HFCs, PFCs and NF_3).

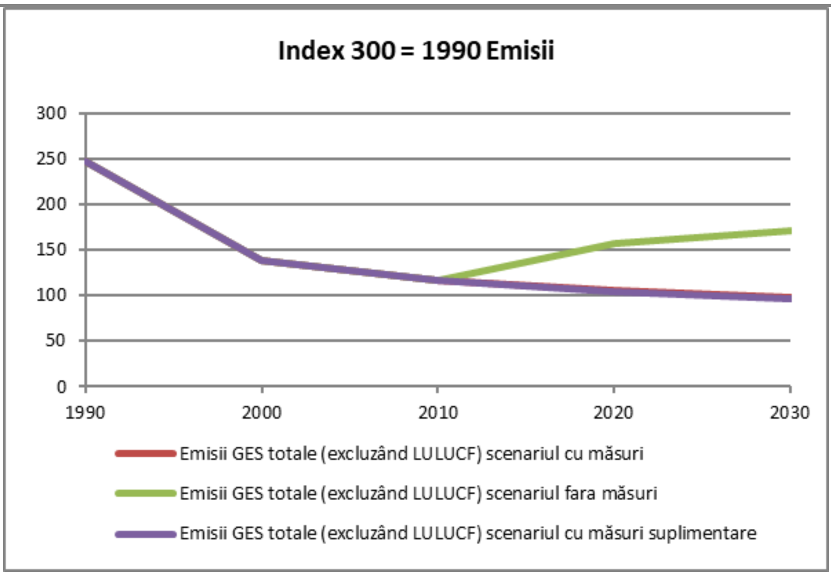
Greenhouse gas emissions forecasts were made for 3 scenarios:

1. The baseline scenario that does not include special activities to reduce greenhouse gas emissions ("no action scenario");
2. The scenario is similar to the reference one in terms of the evolution of economic and social indicators, but which contains policies and programs to reduce greenhouse gas emissions ("scenario with measures");
3. The scenario with additional measures - similar to the reduction scenario, but which contains programs with additional measures for the reduction of greenhouse gas emissions ("scenario with additional measures").

The greenhouse gas emissions projections for the three scenarios show an upward trend in the period 2020-2030

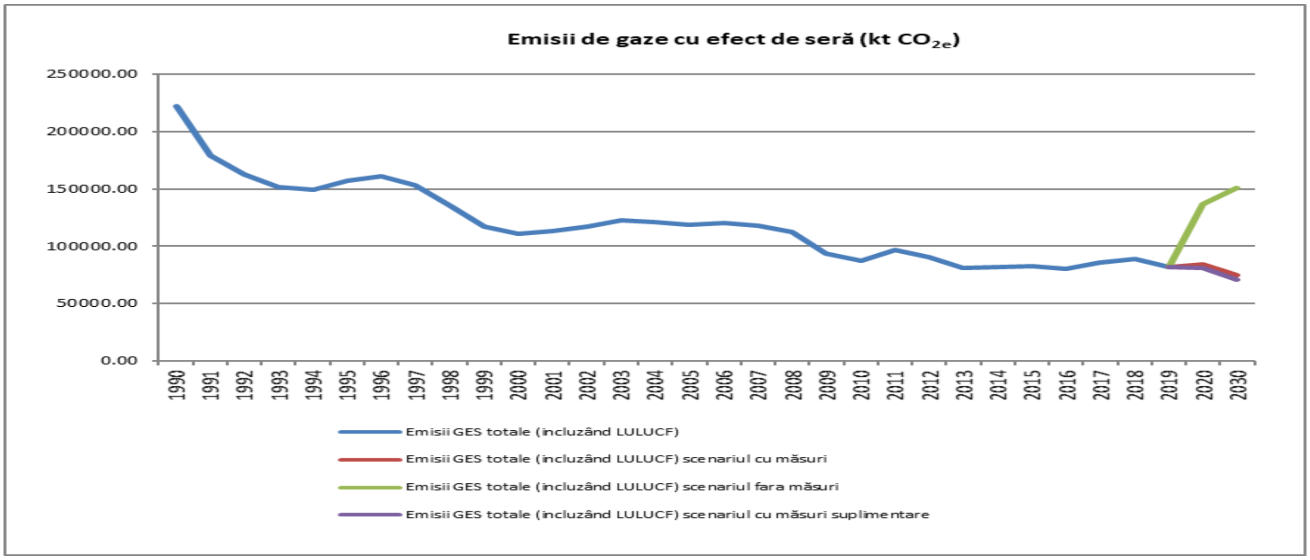
Figure VIII.32. Trends (1990-2019) and projections (2020-2030) of greenhouse gas emissions (excluding LULUCF) at national level





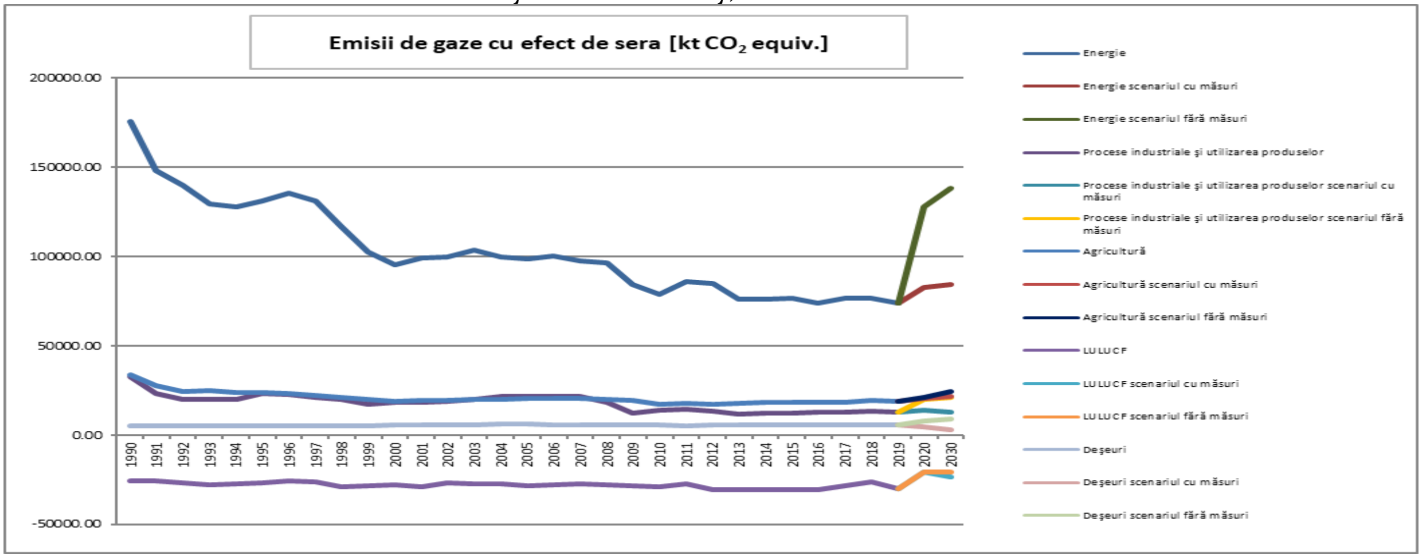
Data source: Ministry of Environment, Waters and Forests - Romania's Fourth Biennial Report under the UNFCCC December 2020

Figure VIII.33. Trends (1990-2019) and projections (2020-2030) of greenhouse gas emissions (including LULUCF) at national level



Data source: Ministry of Environment, Waters and Forests - Romania's Fourth Biennial Report under the UNFCCC December 2020

Figure VIII.34. Trends (1990-2019) and projections (2020-2030) of greenhouse gas emissions by sectors of activity, at national level



Data source: Ministry of Environment, Waters and Forests - Romania's Fourth Biennial Report under the UNFCCC December 2020

ACTIONS FOR MITIGATION AND ADAPTATION TO CLIMATE CHANGE

RO 37

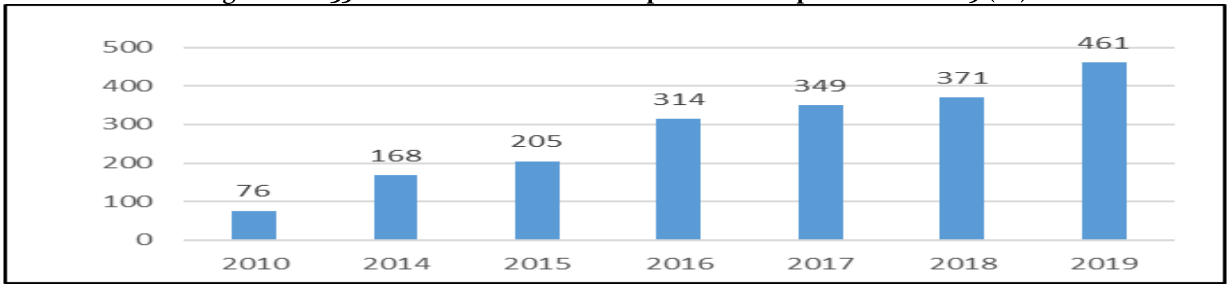
Romania indicator code: RO 37
EEA indicator code: CSI 037

TITLE: **USE OF ALTERNATIVE AND CLEANER FUELS**

DEFINITION: Share of low or zero sulfur fuels and biofuels in total fuel consumption for road transport (in% of fuels traded for transport).

At national level, the data presented in Figure VIII.35. indicates an increase in the use of biofuels in 2019 by 83.51% compared to 2010.

Figure VIII.35. National biofuel consumption for the period 2010-2019 (kt)

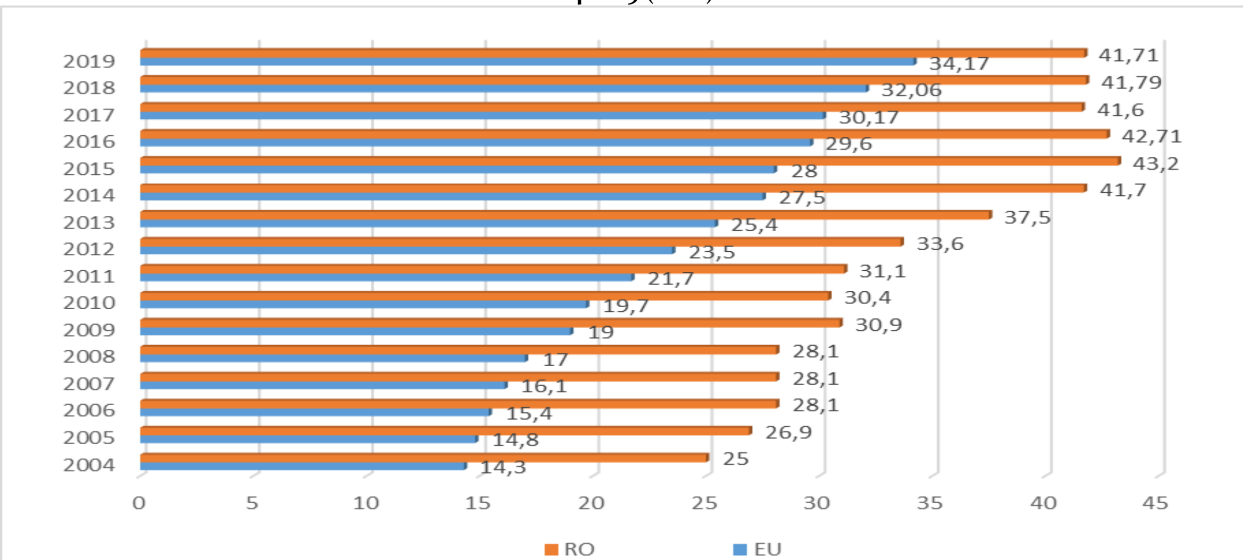


Source: Eurostat Energy Questionnaire - Oil

RO 31
Romania indicator code: RO 31 EEA indicator code: CSI 31
TITLE: **CONSUMPTION OF ELECTRICITY PRODUCED FROM RENEWABLE ENERGY SOURCES**
DEFINITION: The share of electricity produced from renewable energy sources is the ratio between electricity produced from renewable energy sources and gross domestic consumption of electricity, expressed as a percentage. It measures the contribution of electricity produced from renewable energy sources to gross domestic electricity consumption.

In 2019 at national level, 41.71% of the total value of electricity was obtained by capitalizing on renewable energy sources. Supporting environmentally friendly (low environmental impact) solutions for renewable electricity production contributes to reducing greenhouse gas emissions from the energy sector.

Figure VIII.36. Electricity produced from renewable energy sources at national and EU-28 level, for the period 2004-2019 (ktoe)

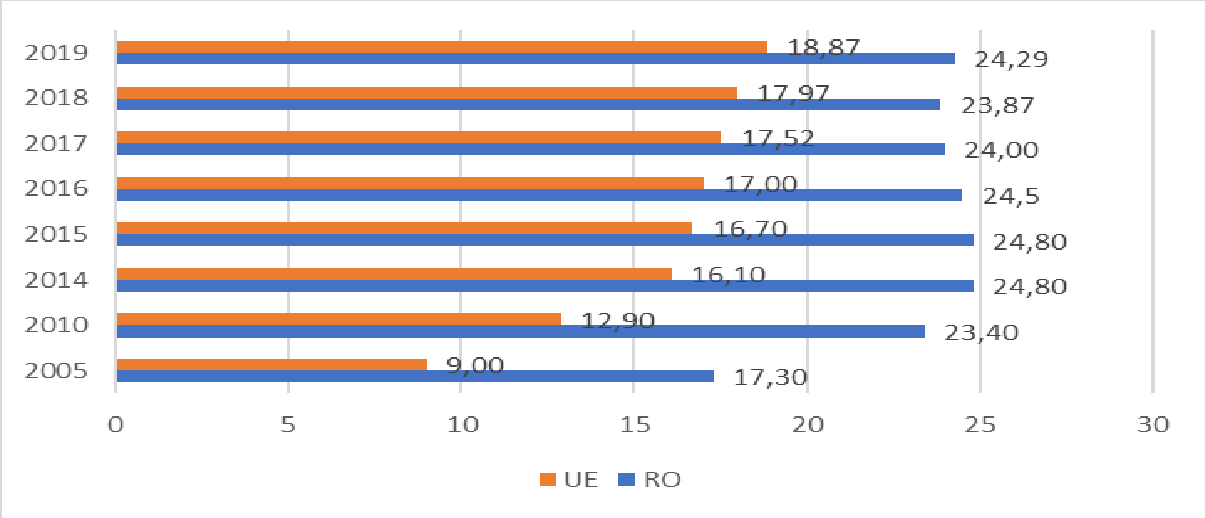


Source: Eurostat https://ec.europa.eu/eurostat/web/energy/data/shares

RO 30
Romania indicator code: RO 30 EEA indicator code: CSI 30 / ENER 29
TITLE: **PRIMARY ENERGY CONSUMPTION PRODUCED FROM RENEWABLE ENERGY SOURCES**
DEFINITION: The share of renewable energy consumption is the ratio between gross domestic energy consumption produced from renewable energy sources and total gross domestic energy consumption, calculated for a calendar year, expressed as a percentage.

At national level, the share of renewable energy in total gross domestic energy consumption for the period 2014-2018 shows a slightly downward trend, and in 2019 there was an increase of approximately 1.17% compared to the value set in the previous year.

Figure VIII.37. Share of renewable energy in total gross domestic energy consumption in Romania and EU-28 (%)



Source: Eurostat https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_ren&lang=en

CHAPTER IX
URBAN ENVIRONMENT, HEALTH AND QUALITY OF LIFE

URBAN ENVIRONMENT AND QUALITY OF LIFE: STATE AND CONSEQUENCES

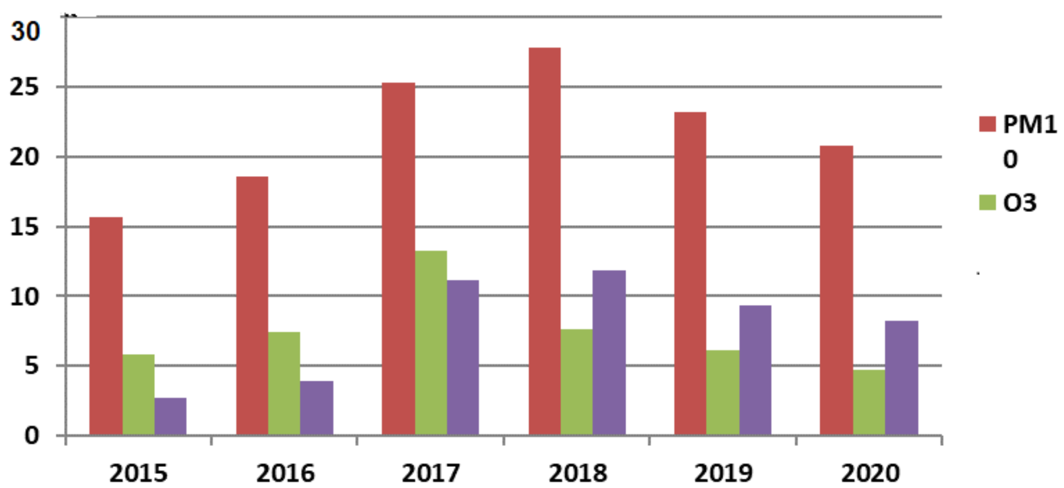
Air quality in agglomerations and health effects

Exceedances of the average annual concentration of PM10, NO2, SO2 and O3 in certain urban agglomerations

RO 04
Romania indicator code: RO 04 EEA indicator code: CSI 04
TITLE: EXCEEDING LIMIT VALUES REGARDING AIR QUALITY IN URBAN AREAS
DEFINITION: The indicator represents the percentage of the urban population potentially exposed to atmospheric concentrations (in µg / m3) of sulfur dioxide (SO_2), suspended particles (PM10), nitrogen dioxide (NO_2) and ozone (O_3) that exceed the limit value set for human health protection.

The National Air Quality Monitoring Network (NAQMN) performs continuous measurements of sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O_3), suspended particles (PM10 and PM2.5), monocyclic aromatic hydrocarbons (benzene, toluene, o, m, p-xylene, ethyl-benzene), polycyclic aromatic hydrocarbons and heavy metals. The air quality for each monitoring station is represented by quality indices, established based on the values of the concentrations of the main measured air pollutants. Also, the concentrations of pollutants expressed in µg / m³ are reported, as well as the number of exceedances of the limit values established for human health, for each station.

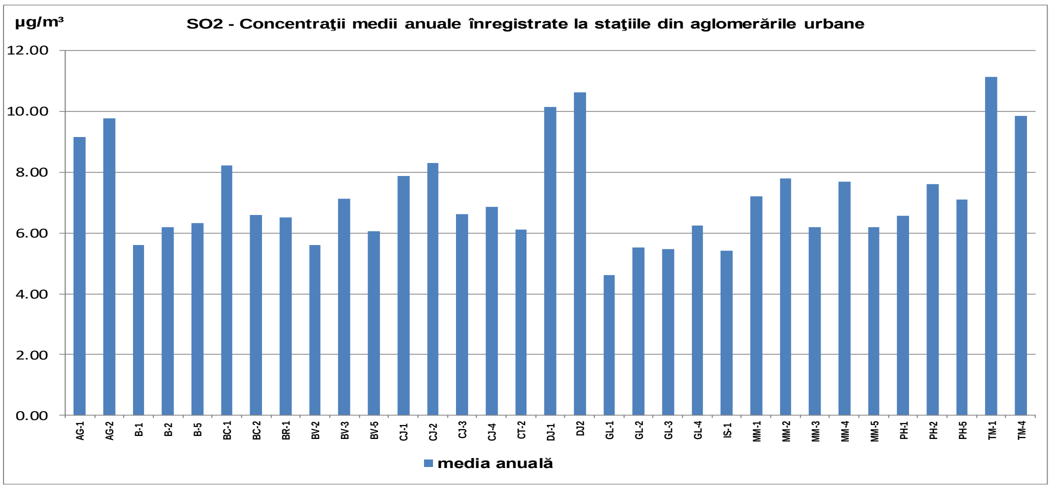
Figure IX.1 Evolution of the percentage of the urban population exposed to concentrations of pollutants exceeding the limit values / target values set for the protection of human health (for NO_2, O_3, PM10)

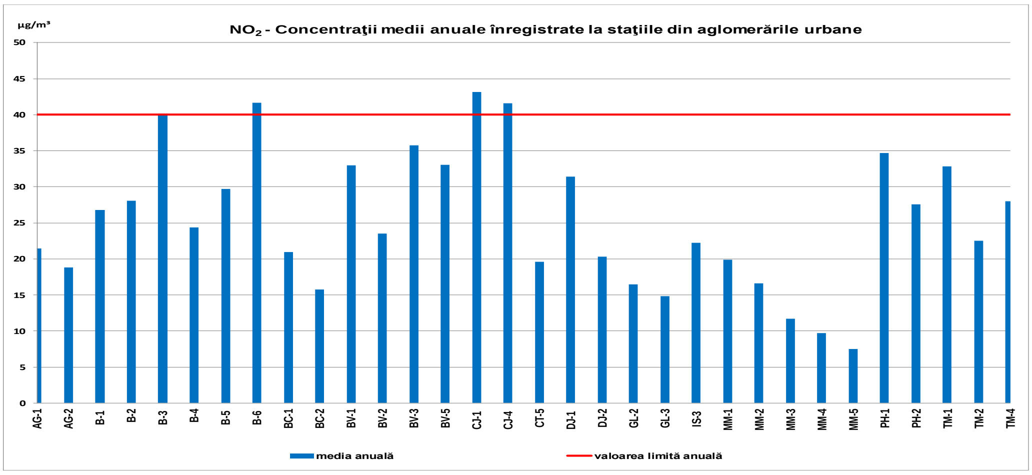


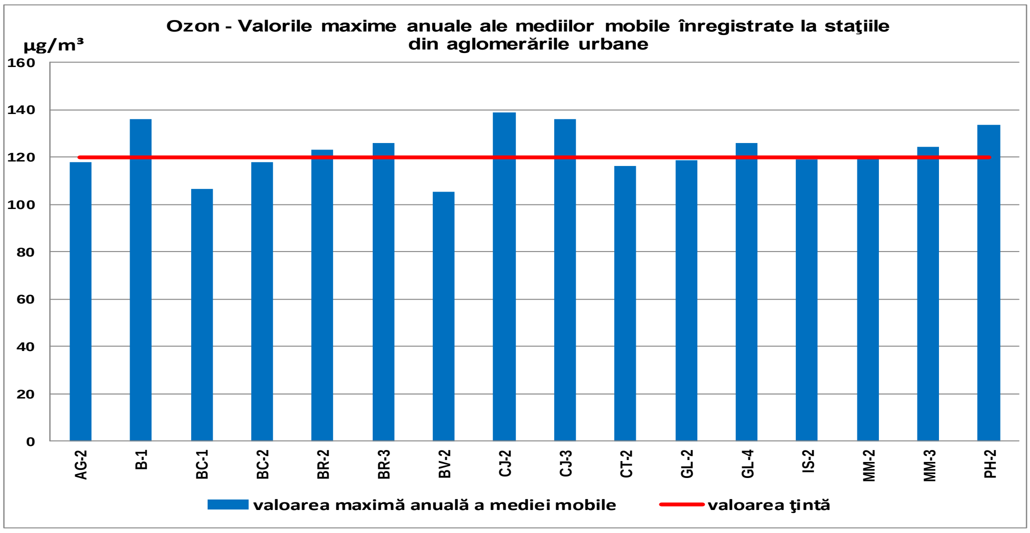
Source: NEPA

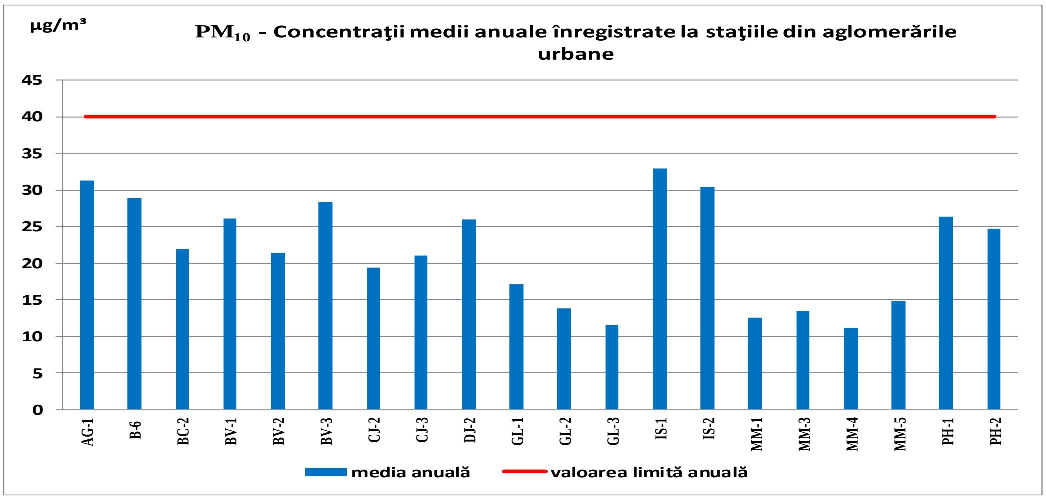
In accordance with the provisions of Law no. 104/2011 on ambient air quality, 13 urban agglomerations were established in Romania (municipalities: Bacău, Baia Mare, Braşov, Brăila, Bucharest, Cluj-Napoca, Constanța, Craiova, Galați, Iași, Pitești, Ploiești and Timişoara). In these agglomerations there are automatic monitoring stations, with the help of which the monitoring and evaluation of the ambient air quality is performed.Next, the data obtained in 2020 from these stations for the most important pollutants are presented graphically: SO_2, NO_2, O_3, PM10.

Figure IX.2 Average annual concentrations of air pollutants recorded at monitoring stations in urban areas in 2020



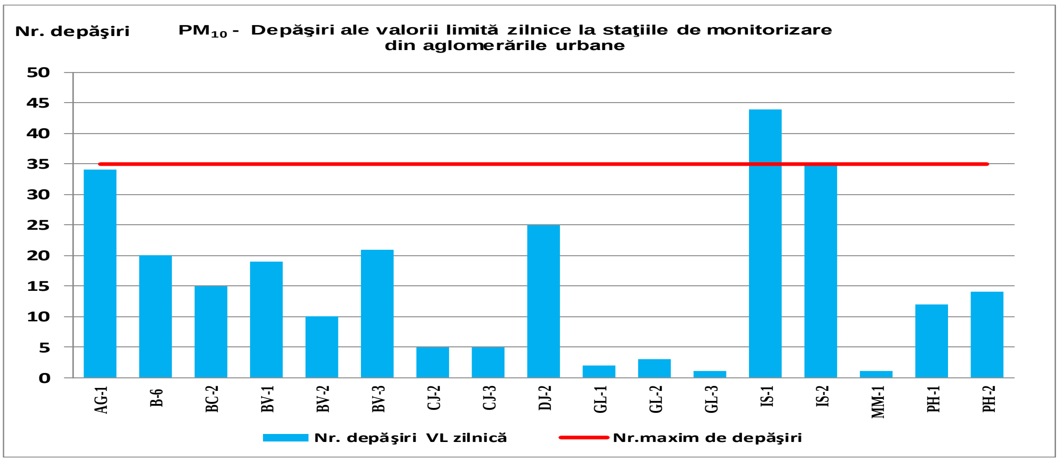






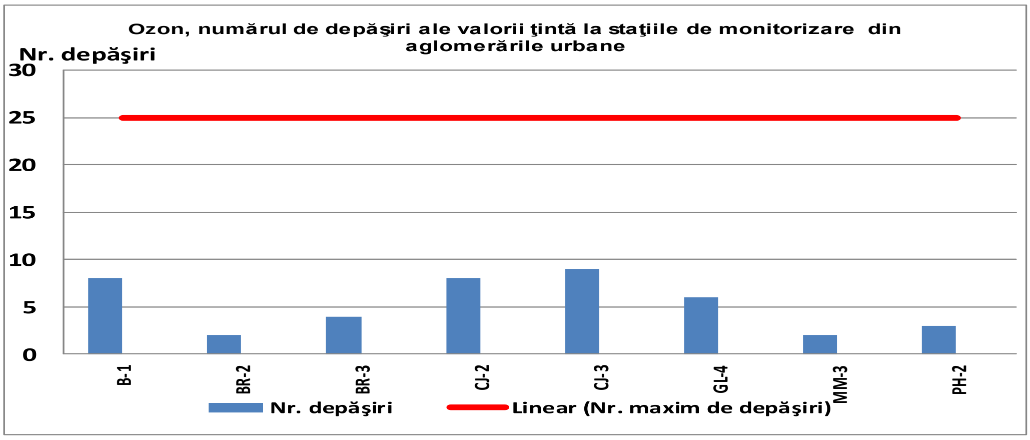
Source: NEPA

Figure IX.3 Number of exceedances of the daily limit value for PM10 suspended particles at monitoring stations in urban agglomerations in 2020



Source: NEPA

Figure IX.4 Number of exceedances of the target value for ozone at monitoring stations in urban agglomerations in 2020



Source: NEPA

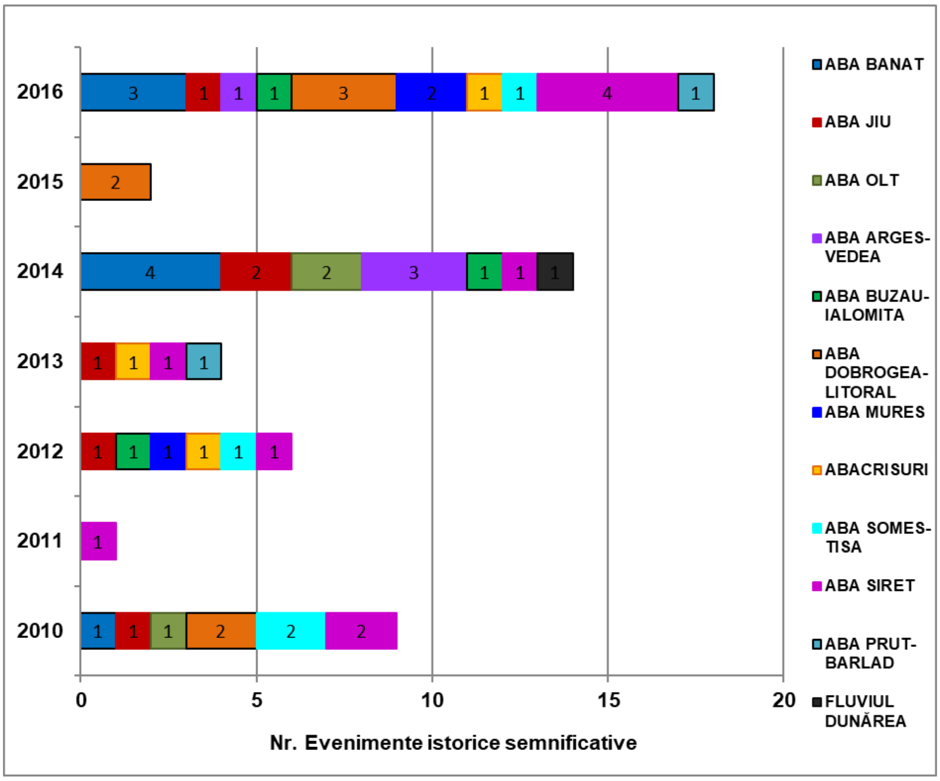
The data presented in the graphs above show that in urban areas in Romania the main and most important pollutants are PM10 suspended particles and nitrogen oxides, generated mainly by traffic and combustion processes in large thermal power plants or for residential heating. The short-term or long-term effects of these pollutants on human health are multiple, affecting the respiratory and cardiovascular systems and causing lung diseases, ENT diseases, allergic diseases, cardiovascular diseases, etc. The most affected risk groups are children, the elderly and people with chronic diseases.

Exposure of the population in urban areas to the risk of floods - Floods and health

RO 61
Romania indicator code: RO 61 EEA indicator code: CLIM 46
TITLE:FLOOD AND HEALTH
DEFINITION: This indicator is defined as the number of people affected by floods per million inhabitants. "Affected persons", as defined in EM-DAT (The International Disaster Database), are persons in need of immediate assistance during an emergency period, including displaced or evicted persons. The unit of measurement is represented by the number of people affected by floods (dead, injured, evacuated, with destroyed homes, cases of illness due to consumption of contaminated water) per million inhabitants.

For the period 2010 - 2016 at the level of the 11 Water Basin Administrations and the Danube River, 54 significant historical flood events presented in Figure IX.5 were designated.

Figure IX.5 Significant historical flood events at the level of the Water Basin Administration and the Danube River for the period 2010 -2016



Source: NMA

The evaluation of the water quality from the total of 50 natural bathing areas identified and reported by Romania to the EC (EIONET platform - EU platform created by EEA) in 2020 was performed for the continuously monitored areas in the last 4 years and the classification assessment was applied, using the database from the current season (2020) and from the previous 3 seasons; this evaluation was performed according to Directive 2006/7 / EC, respectively to the provisions of GD no. 546/2008, art. 18-24, and the provisions of annex no. 2.

Based on the methodology for designating areas with a significant potential risk of floods, new areas with a potentially significant risk of floods, were established in the second cycle of implementation of the Flood Directive 2007/60 / EC. At the level of 2019, 526 areas with significant potential risk of floods established at national level were reported to the European Commission.

The second cycle of implementation of the Flood Directive 2007/60 / EC is underway, and within the 3rd stage the Development of Flood Risk Management Plans will propose concrete measures at the level of areas with significant potential risk for floods for protection of the population and property. After the implementation of the proposed measures, the risk of such unwanted events will be reduced.

The measures that can be taken are complex and require the involvement of several institutions, local authorities, counties, basins, several "actors", of which the most important is the population. Flood Risk Management Plans will support decision-making and contribute to raising awareness and understanding of flood risk, especially in areas with potentially significant flood risk.

During 2019, a number of 131 urban localities were affected by the floods, the second highest value recorded in the last five years and from 2010-2019.

Most cities were affected in Maramureş county (12 cities), followed by Hunedoara county with 10 cities, Prahova county with 8 cities and with 7 cities we have Ilfov, Vâlcea and Suceava counties. In Botoşani county we have 6 affected cities, in Bacău and Caraş-Severin and Mureş counties there are 5 affected cities, and with 4 affected cities are the counties: Argeş, Olt, Iaşi, Neamţ and Vaslui. In the counties of Braşov, Dâmboviţa and Tulcea no urban localities were affected and in the counties of Arad, Cluj, Constanţa, Satu Mare, Timiş and Vrancea an urban locality was affected.

Table IX.1 Periods and brief description of the causes of floods in 2019 and affected localities

	COUNTY (affected localities)	PERIOD (phenomenon produced)
1	ALBA 42 localities **Blaj (Tiur), Teiuş, Zlatna (Feneş, Pătrângeni, Valea Mică, Trâmpoaiele),** Albac, Bistra,Cetatea de Baltă, Ciugud (Hăpria), Crăciunelu de Jos, Cut, Galda de Jos, Ighiu, Jidvei, Lupşa (Lunca, Mănăstire), Horea, Meteş (Meteş, Ampoiţa, Lunca Ampoiţei, Lunca Meteşului, Poiana Ampoiului, Presaca Ampoiului, Tăuţi), Mogoş (Cristeşti), Pianu (Pianu de Sus, Pianu de Jos, Strungari), Poşaga (Săgagea), Rîmeţ (Vlădeşti), Roşia Montană, Sălişte, Săsciori (Săsciori, Laz, Loman, Răchita, Sebeşel), Sîncel, Şona (Biia), Şibot (Balomiru de Câmp), Şugag (Arti, Bârsana)	**Nr. crt.**
2	ARAD 58 localities **Nădlac**, Bata (Bata, Bacăul de Mijloc, Ţela), Bârsa, Bârzava (Bârzava, Bătuţa, Căpruţa, Groşii Noi, Lalasint, Slatina de Mureş), Birchiş (Birchiş, Căpâlnaş), Beliu, Buteni (Buteni, Berindia, Cuied, Păulian), Conop (Conop, Chelmac), Craiva (Ciunteşti, Mărăuş, Stoineşti), Dezna (Dezna, Buhani, Laz), Dieci (Cociuba, Crocna, Revetiş), Gurahonţ (Hontişor, Feniş), Hălmăgel (Hălmăgel, Luncşoara, Târnăviţa, Ţoheşti, cătun Codrineşti, cătun Ienăşeşti, cătun Vojdogi), Hăsmaş (Clit), Ignăteşti (Manead),	1-2.05.2019 - torrential rains, runoff from slopes, torrents and streams 6-8.05.2019 - torrential rains, runoff from slopes, torrents and streams -fast flood on: Beliu valley 29.05-6.06.2019 - torrential rains, runoff from slopes, torrents and unregistered streams -reflow: v. Bârzava, v. Lalasint -internal waters 10-11.06.2019 - torrential rains, runoff from slopes, torrents and unregistered

	Moneasa, Petriş (Petriş, Ilteu, Selişte), Plescuţa (Dumbrava, Gura Văii, Rostoci, Talagiu), Săvârşin (Săvârşin, Hălăliş, Pârneşti, Troaş), Tauţ, Vărădia de Mureş (Vărădia de Mureş, Baia, Juliţa, Nicolae Bălcescu, Stejar)	streams -fast flood on the Sebiş Valley **21-24.06.2019** - torrential rains, runoff from slopes, torrents and unregistered streams **31.07-1.08.2019** -torrential rains, runoff from slopes, torrents -fast flood on pr. Petriş, pr. Moneasa
3	**ARGEŞ** **160 localities** **Piteşti, Câmpulung, Curtea de Argeş, Topoloveni,** Albeştii de Argeş (Albeştii Pământeni, Albeştii Ungureni, Brăteşti, Dobrotu, Ungureni), Albeştii de Muscel (Albeşti), Aninoasa (Aninoasa, Broşteni, Slănic, Valea Siliştii), Babana, Bascov (Bascov, Brăileni, Schiau, Uiasca, Valea Ursului), Băbileşti (Băjeşti, Priboaia, Poieniţa, Uliţa, Valea Mare), Beleti Negreşti (Beleti, Zgripceşti), Berevoieşti (Berevoieşti, Brătia, Gămăceşti), Bogaţi (Bogaţi, Glambocu, Suseni), Boteni (Boteni, Muscel), Boteşti (Moşteni Greci), Brăduleţ (Brăduleţ, Brădetu, Galeşu), Bughea de Sus, Călineşti (Călineşti, Gorganu, Urlucea, Valea Corbului), Cepari (Cepari Pământeni, Cepari Ungureni, Sendruleşti, Urluieşti, Valea Măgurii), Ciofrângeni (Burluşi, Ciofrângeni Sat, Lacurile, Piatra, Schitu Matei), Cicăneşti (Cicăneşti, Bărăşti, Urecheşti), Corbeni (Oeştii Pământeni, Turburea), Cocu (Bărbăteşti, Groşi), Davideşti (Davideşti, Conteşti, Voroveni), Dobreşti, Dragoslavele (Dragoslavele, Valea Hotarului), Hârseşti, Leordeni (Bantău, Glambocata Deal, Glodu, Schitu Stoiceşti), Măluren(Măluren, Pauleasca, Topliţa), Miceşti (Miceşti, Brânzari, Pauleasca, Purcăreni), Mihăeşti (Mihăeşti, Drăghici, Furnicoşi, Ruda, Văcarea, Valea Popii), Mioarele (Matău), Merişani (Borleşti, Crâmpotani, Dobrogostea, Vâlcele), Muşateşti (Robaia, Stroieşti, Valea Muscelului), Mozăceni, Negraşi, Nucşoara (Slatina), Poienarii de Argeş (Ceaureşti), Răteşti (Mavrodolu), Rucăr, Sălătrucu, Schitu Goleşti (Lăzăreşti, Loturi), Stâlpeni (Stâlpeni, Livezeni, Opreşti, Pitigaia, Rădeşti), Stoeneşti (Stoeneşti, Slobozia), Ştefan Cel Mare (Ştefan Cel Mare, Glavacioc), Ştefăneşti (Enculeşti, Valea Mare), Titeşti (Valea Mănăstirii), Tigveni (Tigveni, Bârseştii de Jos, Bârsestii de Sus, Blaju, Vlădeşti), Uda (Uda, Cotu, Greabăn, Săliştea), Valea Danului (Valea Danului, Băniceşti, Bolculeşti, Borobăneşti, Verneşti), Valea Iaşului (Valea Iaşului, Borovineşti, Cerbureni, Ungureni), Vlădeşti (Vlădeşti, Coteasca, Putina), Vedea (Bondoci, Dincani, Vetişoara), Vulturesti (Vultureşti, Bârzeşti, Huluba),	**5-21.05.2019** -abundant precipitation, runoff from the slopes -fast floods on: r. Vâlsan, r. Doamnei, r. Brătia, v. Bădilei, pr. Sub Dos, pr. Păuleasca, pr. Teascului, pr. Teiş, pr. Troislav, pr. Valea Albă,pr. Purcăreanca, pr. Valea lui Alb, pr. Valea Hotarului, pr. Valea Neagră, pr. Valea Robaia, pr. Valea Badii, pr. Valea Iaşului, pr. Vîrtej, pr. Valea Vanoaiei, -landslide, -exceeding the transit capacity of street gutters **1-30.06.2019** -abundant precipitation, runoff from the slopes -fast flood on: . Bratia, r. Vâlsan, r. Doamnei, r. Argeşel, r. Bughea, r. Cârcinov, r. Topolog, r. Bascov, pr. Nebunului, Valea Moşului, Valea Turbată, pr. Dobreşti, pr. Uiasca, pr. Uita, pr. Valea Satului, pr. Făgeanca, Valea lui Bau, pr. Boaba, pr. Valea Seacă, Valea Grecilor, pr. Baboia, pr. Solea, Valea Romanestilor, pr. Râncaciov, Valea Corbului, Valea Cicăneşti, Valea Urechească, pr. Valea Mare, r. Cârcionovel, Valea Grecilor, Valea Izvorului, Valea Teascului, pr. Purcăreanca, Valea Teişului, Valea lui Alb, Valea Budeasa, Valea Pauleasca, pr. Drăghici, pr. Zamfireşti, pr. Mănăstirea, pr. Stoeneasca, Valea Bădilii, pr.Huluba,Valea Ilalei, pr. Cătina, pr. Vetişoara, Valea Ceparilor, Valea Schitului, valea Cicăneşti, pr. Sub Dos, Valea Badilei,Valea Belului, Valea lui Nuţă, Valea Topliţa , Valea Iaşului, Valea Măgurei, Valea Urluieşti -inability to transport sewerage exceeding the transit capacity of street gutters -landslide - ANIF channel clogging -clogging Valea Radului canal - storm -hail **1-31.07.2019** -abundant precipitation, runoff from the slopes -exceeding the rainwater collection capacity -clogging the rainwater drainage channel from the ANIF administration -fast floods on: r. Dâmboviţa, r. Bughea, pr. Valea Iaşului, pr. Valea Frasinului, pr. Valea Naca, pr. Valea Caselor, pr. Valea Hotarului, pr. Valea Stanecii - landslide
4	**BACĂU** **245 Localities** **Bacău, Moineşti, Oneşti, Comăneşti, Târgu Ocna,** Ardeoani (Ardeoani, Leontineşti), Bârsăneşti (Bârsăneşti, Albele, Brăteşti, Caraclau), Bereşti Tazlău (Bereşti-Tazlău, Bosoteni, Prisaca, Româneşti, Tescani), Berzunţi, Blăgeşti (Blăgeşti, Buda, Poiana Negustorului, Tardenii Mari, Valea lui Ioan, Tardenii	**6.05-15.06.2019** -torrential rains, significant runoff from slopes, torrents and streams; - exceeding the transport capacity of the riverbed: r. Tazlăul Sărat, pr. Bejeneşti, pr. Calmuş, pr. Frasin, pr. Ardeoani, pr. Mârzăneşti, pr. Haţaş, pr. Băhnăşoaia, pr. Drumul Sondei, pr. Dospinescu, pr. Olaru, pr. Velniţa, pr. Tulburea, pr. Zeletin, pr. Seaca, pr. Dofteniţa, pr. Drăgugeşti, pr. Valea Rea, pr.Orsa, pr. Negel, pr.

	Mari), Brusturoasa (Brusturoasa, Buruieniș, Buruienișu de Sus, Cuchiniș, Hăngănești), Buhoci (Buhoci, Bijghir, Coteni), Colonești, Corbasca (Corbasca, Bacioiu, Marvila, Poglet, Rogoaza, Scărișoara, Vâlcele), Damienești (Damienești, Călugăreni, Drăgești, Pădureni), Dealu Morii (Dealu Morii, Banca, Blaga, Bodeasa, Negulești, Tavadarești), Dofteana (Dofteana, Cucuieți, Haghiac , Seaca, Ștefan Vodă), Faraoani, Filipeni (Filipeni, Balaia, Brad, Mărăști, Slobozia, Valea Botului), Filipești (Filipești, Boanta, Cîrligi, Galbeni), Gârleni (Lespezi), Glăvănești (Frumușelu), Ghimeș-Făget (Răchitiș, Făget), Gura Văii (Gura Văii, Păltinata), Hemeiuș (Hemeiuș, Fântânele), Helegiu (Helegiu, Brătila, Deleni, Drăgugești), Horgești (Horgești, Recea), Huruiești (Huruiești, Capotești, Florești, Fundoaia, Ocheni, Perchiu, Prădaiș), Ițești (Ițești, Ciumași, Făgețel), Izvorul Berheciului (Izvorul Berheciului, Antohești, Baimac, Obîrșia, Oțelești), Lipova (Lipova, Maloșu, Satu Nou, Valea Hogei), Livezi (Livezi, Orasa), Măgirești (Stănești), Măgura (Măgura, Crihan, Sohodol), Mărgineni (Mărgineni, Barati, Luncani, Pădureni, Podiș, Poiana, Trebeș, Valea Budului), Negri (Negri, Călinești, Poiana, Ursoaia), Nicolae Bălcescu (Nicolae Bălcescu, Galbeni, Valea Seacă), Oituz (Marginea), Oncești (Oncești, Barboasa, Dealu Perjului, Onceștii Vechi, Tarnița, Taula), Orbeni (Orbeni, Scurta), Palanca (Ciugheș, Popoiu), Pângărești (Pângărești, Bahna, Nicorești, Pârâul Boghi, Satu Nou), Pancești (Pancești, Fundu Văii, Petrești, Soci, Răcătău), Parava (Parava, Radoaia, Teiuș), Parincea (Mileștii de Jos, Năstășeni, Valeni, Vladnic), Plopana (Plopana, Budești, Dorneni, Fundu Tutovei, Ițcani, Rusenii de Sus, Rusenii Răzeși, Straminoasa), Podu Turcului (Podu Turcului, Balanești, Căbești, Fichitești, Giurgioana, Lehancea, Plopu, Sârbi), Poduri (Poduri, Cernu, Cornet, Valea Sosii), Prăjești, Răcăciuni (Răcăciuni, Fundu Răcăciuni, Gâșteni, Gheorghe Doja), Răchitoasa (Răchitoasa, Barcana, Bucșa, Buda, Burdusaci, Danaila, Dumbrava, Farcașa, Fundătura, Haghiac, Magazia, Movilița, Oprișești, Putini,Tochilea), Racova (Iliești), Sărata (Sărata, Baltata), Saucești (Saucești, Schineni, Siretu, Șerbești), Solonț (Solonț, Sărata), Stănișești (Belciuneasa, Crăiești, Slobozia Nouă, Văleni), Ștefan cel Mare (Bogdana, Gutinaș, Rădeana), Strugari (Strugari, Cetățuia, Iaz, Nadișa, Pietricica, Răchitiș), Tamași (Tamași, Chetriș, Furnicari), Târgu Trotuș (Târgu Trotuș, Tuța, Viișoara), Tătărăști (Tătărăști, Cornii de Jos, Cornii de Sus, Drăgești, Gherdana, Giurgeni, Ungureni), Traian (Bogdanești, Herțioana de Jos, Herțioana Răzeși, Zapodia), Ungureni (Ungureni, Bartești, Bibirești, Botești, Gârla Anei, Viforeni), Urechești, Valea Seacă (Cucova), Vultureni (Ghilvănești, Godineștii de Jos, Lichișteni, Tomozia, Țigănești, Valea Lupului), Zemeș	Urminiș, pr. Hangani, pr. Păcurilor, pr. Mora, pr. Bahna, pr. Valea Seacă, pr. Păltiniș, pr. Buda, pr. Valea Sosii, pr. Sopa, pr. Fundu Răcăciuni, pr. Sărata, pr. Solonț, pr. Calmuș, pr. Bogdana -flow increases with alluvium transport: râu Siret, râu Trotuș, pr. Rotii, pr. Berzunți, pr. Dragomir, pr. Sugura, pr. Docuța, pr. Fulgeriș, pr. Valea Mare, pr. Turbata, pr. Bistricioara, pr. Turbata, pr. Precista, pr. Tulburea, torent Beleu, pr. Boghii, pr. Soci, pr. Vladnic, pr. Petrești, pr. Tamași, pr. Racova, pr. Fuioaga, pr. Văratec, pr. Ruși, - exceeding the transport capacity of the gutters -clogged riverbeds -shore erosions -blocks in the riverbed **15-30.06.2019** - torrential rainfall, runoff from the slopes -flow increases on torrents -very high wind -exceeding the transport capacity of the riverbed -abundant precipitation with alluvial material transport, exceeding the transport capacities of CES channels -increases in level and flow on the Trotuș river and tributaries exceeding the defense quotas
5	**BIHOR** **130 Localities**	**22.05-11.06.2019** -abundant rains, significant runoff from the slopes,

	Beiuş, **Vaşcău** (Vaşcău, Câmp Moţi, Vărzarii de Jos, Vărzarii de Sus), **Ştei**, Borod (Borod, Borozel, Cetea, Cornițel, Şerani, Valea Mare de Criş), Bratca (Beznea, Valea Crişului), Brusturi (Brusturi, Cuieşd, Ţigăneşti de Criş), Bulz (Bulz, Munteni, Remeţi), Bunteşti (Bunteşti, Brădet, Dumbrăvani, Ferice, Leleşti, Poienii de Sus, Săud, Stânceşti), Ceica (Ceica, Bucium, Corbeşti, Duşeşti, Inceşti), Cetariu (Şuştorogi), Cîmpani (Valea de Sus), Cherechiu (Cherechiu, Cheşereu, Târguşor), Criştioru de Jos (Criştioru de Jos, Poiana, Sălişte de Vaşcău), Dobreşti (Dobreşti, Crânceşti, Hidişel, Luncasprie, Topa de Jos, Topa de Sus), Drăgeşti (Drăgeşti, Dicăneşti, Stracoş, Tăşad, Topeşti), Finiş (Finiş, Fiziş, Ioaniş), Holod (Dumbrava, Dumbrăviţa, Forosig, Lupoaia, Vintere), Ineu (Ineu, Botean), Lazuri de Beiuş (Lazuri de Beiuş, Băleni, Cusuiuş, Hinchiriş), Lugaşu de Jos (Lugaşu de Jos, Lugaşu de Sus, Urvind), Măgeşti (Dobricioneşti, Josani, Ortileag), Pietroasa (Pietroasa, Chişcău, Cociuba Mică, Gurani, Moţeşti), Pomezeu (Pomezeu, Câmpani de Pomezeu, Coşdeni, Hidiş, Lacu Sărat, Sitani), Remetea (Remetea, Drăgoţeni, Meziad, Petreasa, Şoimuş), Sâmbăta (Sâmbăta, Ogeşti, Rogoz, Rotăreşti, Zăvoiu), Sârbi (Sârbi, Almaşu Mic, Burzuc, Chioag, Fegernic, Sarcău), Spinuş (Spinuş, Gurbeşti, Sălişte), Şoimi (Şoimi, Borz, Codru, Dumbrăviţa de Codru, Pocluşa de Beiuş, Sânicolau de Beiuş, Ursad, Urviş de Beiuş), Şuncuiuş (Zece Hotare), Tărcaia (Tărcaia, Tărcăiţa), Tileag (Tileag, Bălaia, Călătani, Poşoloaca, Tilecuş, Uileacu de Criş), Toboliu, Ţeţchea (Ţeţchea, Hotar, Subpiatră, Telechiu), Uileacu de Beiuş (Forău, Priseaca), Vadu Crişului (Vadu Crişului, Birtin, Tomnatic, Topa de Criş), Vârciorog,	- overflow: Valea Topa, Valea lui Vasile, Valea Vlad, Valea Flontii, Valea Pesişului, Valea Fiziş, Valea Zărgaz, Valea Fieghiu, Valea Sohodol, Valea Ursad, Valea Lupoaia, Valea Hodişel, Valea Vintere, Canal colector Izvor, Valea Hinchiriş, Valea Mare, Valea Hidiş, Valea Viduieşti, Valea Coleştilor, Valea Dosului, Valea Stracoş, Valea Ostaşilor, Valea Ţenţ, Valea Topa, Valea Clocea, Valea Hotar, Valea Rece, Valea Rotonda, Valea Berzei, Valea Ţulii, Valea Birtin, Valea Huta, Valea Măguranului, Valea Beznea, Valea Borod, Valea Butiş, Valea Măgurii, Valea Chicerii, Valea Mare de Criş, Valea Răchita, Valea Fânaţelor, Valea Loranta, Valea Brusturi, Valea Şişterea, Valea Buşteni, Valea Almaş, Valea Sarcău -significant increases in debts: Crişul Negru, pr. Valea Botean -inability to take over the rainwater network - puddles of inland waters 16-22.06.2019 -abundant rains, significant runoff from the slopes, - overflow: Valea Leurdeasa, Valea Inaru, Valea Crăiasa, Valea Măguran, Valea Borod, -inability to take over the rainwater network -puddles 27-28.06.2019 -abundant rains, significant runoff from the slopes, -increases in levels and flows on Crişul Pietros - overflow: Valea Crăiasa, Valea Meziad, Valea Drăgoteni -muddles 31.07-1.08.2019 -abundant rains, significant runoff from the slopes, -increases in levels and flows -shore erosions -clogged ditches
6	BISTRIŢA-NĂSĂUD 82 Localities **Bistriţa (Bistriţa, Unirea)**, **Năsăud (Năsăud, Luşca)**, **Sângeorz-Băi**, Bistriţa Bârgăului (Bistriţa Bârgăului, Miţa), Budacul de Jos (Budacul de Jos, Buduş, Jelna, Monariu, Simioneşti), Cetate (Orheiul Bistriţei, Pietriş, Satu Nou), Coşbuc, Dumitra (Dumitra, Cepari, Tărpiu), Dumitriţa (Dumitriţa, Budacu de Sus, Ragla), Feldru (Feldru, Nepos), Galaţii Bistriţei (Albeştii Bistriţei), Ilva Mică, Lechinţa, Leşu (Leşu, Lunca Leşului), Livezile (Cuşma, Dorolea), Mărişelu (Mărişelu, Bârla, Domneşti, Jeica, Măgurele, Sântioana), Miceştii de Câmpie, Monor (Monor, Gledin), Nuşeni (Nuşeni, Beudiu, Rusu de Sus, Viţa), Parva, Poiana Ilvei, Prundul Bârgăului (Prundul Bârgăului, Susenii Bârgăului), Rebra, Rebrişoara, Romuli (Romuli, Dealu Ştefăniţei), Şieu (Şieu, Ardan, Şoimuş), Spermezeu (Spermezeu, Dobricel, Şesuri Spermezeu Vale), Şieu Măgheruş, Şieuţ (Şieuţ, Lunca, Sebiş, Ruştior), Şintereag (Şintereag, Blăjenii de Jos, Blăjenii de Sus, Cociu, Şieu-Sfântu), Târlişua (Târlişua, Agrieş, Agrieşel, Lunca Sătească, Oarzina, Răcăteşu, Şendroaia), Teaca, Telciu (Telciu, Bichigiu, Telcişor), Tiha Bârgăului, Zagra	15-17.05.2019 and 20-24.05.2019 -Abundant rainfall, runoff from slopes, -activating torrents - overflow of watercourses: rr. Someşul Mare, r. Sălăuţa, r. Ilva, r. Rebra, r. Şieu, r. Leşu, pr. Bârgău pr.Brujeni,pr. Secu, pr. Valea Ciorii, pr.Sărata de Sus, pr. Sărata de Jos , pr. Telcişor, pr. Bichigiu, pr. Rosua, pr. Valea Morii, pr. Borcut, pr. Budac, pr. Buduş, pr. Buduşel, pr. Strâmba, pr. Gersa pr. Dealul Târgului, pr. Luţ, pr. Obârşiei, pr. Picui, pr. Dipşa, pr.Pintic -landslides 30.05-1.06.2019 -Abundant rainfall, runoff from slopes, -activation of Dolina torrents -reflow: r. Bistriţa, r. Sălăuţa, r. Şieu, pr. Valea Ciorii, pr. Sărat de Sus, pr. Dobricel, pr. Valea Hagi, Valea Prislop, Valea Blidăreasa, Pietroasa, Valea Slătiniţa, Valea lui Toader, Valea Jeica Albeşti, pr. Barajului, pr. Oltoaia, pr. Jitold, pr. Colibilor, pr. Valea Glodului, pr. Poderiei, pr. Valea Tinoasei, pr. Grădinari, pr. Buduşel, pr. Petrişpr. La Râpă, pr. La Dip, pr. La Biro, pr. Meleş, pr. Apatiu, pr. Vita, pr. Luţ, pr. Obârşiei, pr. Picui, pr. Muşa, pr.Cuşma, 12-16.06.2019 -Abundant rainfall, runoff from slopes, -activating torrents -flow of non-cadastral watercourses: Valea Fraua, Valea Budi, Valea Merilor, Valea Bistra, Valea Domnească, Valea Branişti,

		Valea Ciorii, Valea Mănişului, pr. Mestecinilor, pr. Frijna -reflow: râu Şieu, pr. Ivăneasa, pr. Şendroaia, pr. Agrieşel, Valea Lunca, Leşu, Strâmba, 22.06-3.07.2019 - heavy rains, significant runoff from the slopes -exceeding the drainage capacity of ditches and gutters - sewer discharge in Bistriţa municipality -erosion piles bridges and pedestrian bridges -re-flow: pr. Mălin, pr. Beudiu -activating torrents: Blidar, Ierboşeaua, Husadis, Valea Boului, Valea lui Samson, Şoimu de Jos, Şoimu de Sus and Stegea
7	BOTOŞANI 129 localities **Botoşani, Dorohoi, Dărăbani, Flămânzi (Flămânzi, Bosanceni, Chitovani, Nicolae Bălcescu, Prisacani, Poiana), Săveni (Săveni, Bozieni, Chişcăreni, Petricani), Ştefăneşti (Ştefăneşti, Badiuţi, Stanca),** Avrămeni (Avrămenii, Panaitoaia, Timuş), Băluşeni (Băluşeni, Buzeni, Draxini, Lunca, Zăiceşti), Călăraşi (Călăraşi, Libertatea, Pleşani), Conceşti (Conceşti, Movileni), Cotuşca (Crasnaleuca), Cristeşti (Cristeşti, Ghilăneşti, Oneaga, Schit Orăşeni), Cristineşti (Fundu Herţii), Curteşti (Curteşti, Agafton, Hudum, Mănăstirea Doamnei), Dângeni (Dângeni, Hulub, Iacobeni, Strahotin), Dersca, Dobărceni (Dobărceni, Brăteni), Drăguşeni (Drăguşeni, Podriga, Sărata), Frumuşica (Frumuşica, Boscoteni, Rădeni, Storeşti, Şendreni, Vlădeni Deal), Gorbăneşti (Gorbăneşti, Bătrâneşti, George Coşbuc, Silişcani, Socrujeni, Vânători), Hliplicenі (Hlipiceni, Dragălina, Victoria), Hudeşti, Ibăneşti, Lunca (Lunca, Baznoasa, Stroieşti, Zlătunoaia), Manoleasa (Manoleasa, Flondura, Sadoveni), Mileanca (Mileanca, Codreni, Scutari, Seliştea), Mihai Eminescu (Ipoteşti, Baiasa, Cătămărăşti Deal, Cătămărăşti, Manoleşti, Stănceşti), Mihălăşeni (Mihălăşeni, Caraiman, Năstase, Negreşti, Păun, Sărata), Mitoc (Mitoc, Horia), Păltiniş (Păltiniş, Cuzlău), Prăjeni (Prăjeni, Câmpeni, Lupăria, Miletin), Rădăuţi Prut (Rădăuţi Prut, Miorcani, Rediu), Răuseni (Răuseni, Pogoreşti,Rediu, Stolniceni), Ripiceni, Suharău, Suliţa (Suliţa, Cheliş, Drăcşani), Todireni (Todireni, Cerneşti, Floreşti, Garbeşti, Iureşti), Truşeşti (Truşeşti, Drislea), Ungureni (Ungureni, Călugărenii Vechi, Epureni, Mândreşti, Sapoveni, Ungureni), Vârful Câmpului (Vârfu Câmpului, Dobrinăuţi-Hapai), Vlădeni (Vlădeni, Brehuieşti), Vlasineşti (Vlasineşti, Miron Costin, Sârbi)	6-8.05.2019 -precipitations, runoff from slopes, -hail, storms - riverbed overflow 15-20.05.2019 -abundant rainfall, runoff from slopes, May.2019 -repeated floods Prut river 24.05-7.06.2019 -precipitations, runoff from the slopes -hail 10-23.06.2019 -precipitation, runoff from slopes, -hail 2.07.2019 -precipitations, runoff from the slopes -storms -hail
8	BRAŞOV 16 localities Augustin, Bod, Comăna (Comăna de Jos, Crihalma), Cristian, Hoghiz (Dopca), Homorod (Mercheşa), Jilbert, Mândra (Mândra, Şona), Şercaia (Şercaia, Vad), Voila (Cincşor), Vama Buzăului (Vama Buzăului, Acriş, Buzăiel),	6-9.05.2019 -abundant precipitation; runoff from slopes, -fast flood on: r. Olt, pr. Comana 1-10.06.2019 -abundant precipitation; runoff from slopes, -fast floods on: r. Olt, r. Bârsa, r. Buzău, pr. Comăna, pr. Valea Mare, pr. Valea lui Pavel, pr. Homorod, pr. Mândra, pr. Şercaia, pr. Cincu, pr. Acriş, pr. Buzoel
10	BUZĂU	19.05-7.06.2019

	68 localities **Nehoiu (Bâsca Rozilei, Chirlești, Lunca Pripor, Mlajet, Păltineni, Valea Nehoiașului, Vinetișu), Pătârlagele (Pătârlagele, Crâng, Fundăturile, Muscel, Sibiciu de Sus, Valea Sibiciului),** Beceni (Arbanași), Bisoca, Bozioru, Brăești (Brătilești, Ivănetu), Calvini (Calvini, Băscenii de Jos, Băscenii de Sus, Frăsinet, Olari), Cănești (Cănești, Suchea), Cătina (Cătina, Slobozia, Valea Cătinei, Zeletin), Cernătești (Cernătești, Aldeni, Băiești, Fulga, Manasia, Zărneștii de Slănic), Chiliile (Bădeni, Trestioara), Chiojdu (Chiojdu, Bâsca Chiojdului, Cătiașu, Lera, Pleștioara), Cislău (Buda, Crăciunești), Cozieni (Pietraru, Trestia, Tulburea), Gura Țeghii (Varlaam), Lopătari (Pestrițu, Ploștina,Săreni), Măgura (Măgura, Ciuta), Mânzălești (Mânzălești, Bâsceni, Poiana Vîlcului), Odăile, Panatău, Pardoși, Pârscov (Curcănesti, Runcu), Scorțoasa, Tisău (Tisău, Strezeni, Pădureni), Viperești (Viperești, Tronari),	-abundant rainfall and runoff from the slopes.
11	**CARAȘ-SEVERIN** **77 localities** **Reșița, Caransebeș, Oravița (Oravița, Ciclova Montană), Băile Herculane, Moldova Nouă,** Armeniș (Feneș, Sat Bătrân), Berliște (Ruscova Nouă), Berzeasca, Bolovașnița (Bolovașnița, Vârciorova), Brebu (Apadia), Buchin, (Buchin, Poiana), Bucoșnița (Bucoșnița, Petroșnița), Carașova, Cărbunari , Ciuchici (Macoviște, Nicolinți, Petrilova), Ciclova Română (Ciclova Română, Ilidia), Constantin Daicoviciu (Cărăvan, Peștere), Copăcele (Zorile), Cornereva (Cornereva, Bojia, Borugi, Costiș, Dobraia, Hora Mare, Izvor, Pogara, Pogara de Sus, Poiana Lungă, Prislop, Rustin, Strugasca, Sub Crâng, Sub Plai, Topla, Zoina), Doclin, Fârliug (Fârliug, Scăiuș), Glimboca, Goruia, Lăpușnicu Mare, Marga, Măureni (Măureni, Șoșdea), Naidaș, Obreja, Oțelu Roșu, Păltiniș (Cornățel, Rugi), Ramna (Valea Pai), Sacu (Tincova), Sasca Montană (Sasca Montană, Bogodinț, Potoc, Slatina Nera, Saca Română), Slatina Timiș (Slatina Timiș, Ilova, Sadova Veche), Șopotu Nou, Târnova, Teregova, Ticvaniu Mare, Turnu Ruieni (Turnu Ruieni, Borlova, Cicleni), Zăvoi, Zorlențu Mare	**2-4.02.2019** - landslides due to rain and melting snow **1-05.02 and 11-12.02.2019** -abundant precipitation, rapid melting of snow **18.02. 2019** -snow loads, repeated freeze-thaw phenomenon **22-23.02 and 1.03. 2019** -slides due to the repeated freeze-thaw phenomenon -wind intensifications with the appearance of a storm **26.04-08.05.2019** -abundant rains, runoff from the slopes -flow increase on: r. Sebeș, r.Caraș, r. Nera, r. Bistra, r. Timiș, pr. Armeniș, pr. Lung, pr. Bolovașnița, pr. Valea Mare, pr. Petroșnița, pr. Vălișor, pr. Goruița, pr. Lăpușnic, pr. Mărguța, pr.Mânzu, pr. Valea Mare, pr. Boșneag, pr. Zbag,pr. Valea Mare, pr. Valea Radului, pr. Sadovița, pr. Ilovița, pr. Slatina,pr. Valea Stefii -reflow: r. Timiș, r. Bistra, pr. Berzeasca, pr. Valea Satului, pr. Măceșu, pr. Scoarța, pr. Taif, pr. Slatina, - inability to take over the flow of sewerage networks -activating torrents **15-16.05.2019** -abundant rains, runoff from the slopes **1.05-12.06.2019 and 16.06.2019** -abundant rains, runoff from the slopes -reflow: pr. Măcicaș -increase flow pr. Valea Satului, pr. Teregovița **28.05-4.06.2019** -torrential rains, runoff from the slopes **15.05-5.06, 23.06 and 27-28.06. 2019** -torrential rains, runoff from the slopes -storm, strong wind with the appearance of a storm **12.06, 17.06 and 19.06. 2019** -torrential rains, runoff from the slopes -storm, hail **13-14.07. 2019** -abundant rains, puddles for long periods -increase in flows with exceeding the transport capacity of the riverbed: pr. Secăș, pr. Slatina, pr Ilova

		-shore erosions and riverbed clogging
12	CLUJ 77 localities **Dej**, Aghireşu (Inucu, Macău, Ticu), Aiton (Rediu), Baciu (Mera), Beliş (Beliş, Gircuţa de Sus, Poiana Horea), Căpuşu Mare (Căpuşu Mare, Agârbiciu, Bălceşti, Căpuşul Mic, Dângăul Mare, Dângăul Mic, Dumbrava, Pănicei, Straja), Cătina, Căşeiu, Câţcău, Chinteni (Chinteni, Feiurdeni), Ciucea (Ciucea, Vânători), Ciurila (Ciurila, Filea de Sus, Pădureni, Pruniş, Sălişte, Şuţu), Cuzdrioara, Fizeşu Gherlei, Gârbău (Viştea), Gilău, Iara (Iara, Cacova Ierii, Ocolişel, Surduc), Iclod (Iclozel), Izvorul Crişului (Nadăşu, Nearşova), Negreni (Negreni, Bucea), Margău (Ciuleni), Mărişel, Mica (Mănăstirea, Sânmărghita), Mihai Viteazu (Corneşti), Mociu, Moldoveneşti (Moldoveneşti, Bădeni, Plăieşti, Pietroasa, Podeni), Poieni (Poieni, Morlaca, Tranişu, Valea Drăganului), Rîşca (Rîşca, Lăpuşeşti), Săcuieu (Rogojel, Vişagu), Sâncraiu, Sânmartin (Sâmboieni, Târguşor), Sânpaul (Sânpaul, Şardu), Suatu, Tureni (Tureni, Ceanu Mic, Mărtineşti), Unguraş (Unguraş, Batin, Sicfa), Vad (Cetan, Valea Groşilor),	1.05.2019 -abundant precipitation, runoff from the slopes -increase in debts on: pr. Valea Lungii, pr. Valea Vişagului - the overflow pr. Valea Lungii -landslide 14.05.2019 -abundant precipitation, runoff from the slopes -increase in debts on: Fr. Valea Mare, Fr. SARDU 05.-7.05 and 21.05.2019 -abundant precipitation, runoff from the slopes -reflow: v. Chinteni -increase in debts: r. Someşul Mic, r. Crişul Repede, v. Poicu, v. Egherişte, v. Negrea, v. Semeni, pr. Shorten -lifting the groundwater 20-22.05.2019 -abundant precipitation, runoff from the slopes -increase in debts on: Someş district, Sălătruc district, Fr. Macau, Fr. Suatu, pr. Cătina, Fr. Bandău, Fr. Mociu -reflow: r. Someş, v. Sub Hăngaş, pr. Bandău, Fr. Băl's valley - puddles of inland waters 29.05-07.06.2019 -abundant precipitation, runoff from the slopes -reflow: pr. Bădeni, pr. Plăieşti -increases of flows on: pr. Căpuş, pr. Agârbiciu, pr. Straja, pr. Viştelaie, pr. Iara, pr. Cacova Ierii, pr. Ocolişel, pr. Feceşti, pr. Iegrii, pr. Valea Mare, pr. Făgădău, pr. Şoimului, pr. Maghiar -wind and hail -puddles, inland waters -landslides 17-27.06.2019 - heavy rainfall, runoff from the slopes -reflow: pr. V. Grebanului -increase in flows on: v. Lodbei, v. Agârbiciu, v. Râşca Mare, pr. Budu, pr. Nearşova, v. Aluniş, v. Ciulii -strong wind
13	CONSTANŢA 22 Localities **Hârşova,** Aliman (Aliman, Dunăreni, Florii, Vlahii), Castelu, Ciobanu (Mioriţa), Costineşti, Deleni (Petroşani, Pieleni), Dobromir (Cetate, Lespezi, Văleni), Ghindăreşti, Grădina, Horia (Horia, Cloşca), Lipniţa (Cuiugiuc), Mihai Viteazu (Sinoie), Saraiu, Seimeni (Seimeni, Seimenii Mici),	November 2018-February 2019 - coastal erosion due to waves 31.05-2.06. 2019 - heavy rainfall, runoff from slopes, puddles 15-25.06. 2019 - heavy rainfall, runoff from slopes, puddles 26-27.09. 2019 - heavy rainfall, runoff from slopes,
14	COVASNA 20 Localities **Sfântu Gheorghe, Târgu Secuiesc, Întorsura Buzăului,** Barcani, Belin (Belin, Belin Vale), Boroşneu Mare (Boroşneu Mare, Boroşneu Mic), Brăduţ (Braduţ, Filia), Bretcu, Chichiş (Băcel), Ghelinţa, Ozun (Sântionlunca), Sita Buzăului (Sita Buzăului, Crasna, Zăbrătău), Sânzieni, Turia, Valea Mare	6.05-2.06.2019 -abundant precipitation, runoff from slopes -flow on: r. Olt, r. Buzău, Râul Negru, pr. Caşin, pr. Turia, pr. Barcani, pr. Belinu Mare, pr. Valea Mare, pr. Cormoş, pr. Bretcu, pr. Ghelinţa, pr. Crasna, pr. Zăbrătău, pr. Turia - landslide reactivated following heavy rains in Valea Mare commune

15	<u>**DÂMBOVIȚA**</u> <u>**17 localities**</u> Bezdead (Bezdead, Măgura), Buciumeni (Buciumeni, Valea Leurzii), Dragomirești (Decideni, Râncaciov), Iedera (Iedera de Jos), Ocnița, Runcu (Runcu, Bădeni, Ferestre, Piatra), Valea Lungă (Valea Lungă Ogrea), Băi Vulcana (Băi Vulcana, Nicolăești, Vulcana de Sus), Pandele Vulcana (Toculești),	<u>**11.05.2019**</u> -abundant precipitation, runoff from the slopes -the inability to take rainwater by the ditches and street gutters <u>**31.05-04.06.2019**</u> - heavy rainfall, runoff from the slopes -reflow: pr. Ocnita, Fr. Valea Dulce, Fr. Cricovul Dulce -increased debits on: r. Dâmbovița, pr Ruda, pr. Strâmbu, pr. Valea lui Nat, pr. Vulcana, pr. Cricovul Dulce, pr. Sticlărie -shore erosions -the inability to take rainwater by the ditches and street gutters <u>**10-11.06.2019**</u> -abundant precipitation, runoff from the slopes -increased flows on: pr. Bizdidel, pr. Ialomicioara II, Valea Tonțea, Valea Giurculeț -erosions <u>**01.08.2019**</u> -abundant precipitation,runoff from the slopes -increased flows onpr. Valea lui Coman, Valea Bîrzii, Valea Leurzii, - landslides -shore erosions
	<u>**GALAȚI**</u> <u>**76 Localities**</u> **Berești, Tg. Bujor (Tg. Bujor, Moscu, Umbrărești),** Băneasa (Băneasa, Roșcani), Balabanești (Balabanești, Bursucani, Lungești, Zimbru), Bălășești (Bălășești, Ciurești, Ciureștii Noi, Pupezani), Berești Meria (Berești Meria, Aldești, Prodănești, Săseni, Slivna, Șipote), Buciumeni (Buciumeni, Tecucelul Sec, Vizurești), Cavadinești (Cavadinești, Comănești, Gănești, Văděni), Cerțești (Cerțești, Cârlomănești, Cotoroaia), Corod (Corod, Blânzi, Brătulești, Cărăpăcești), Cudalbi, Drăgușeni (Adam, Cauiești, Fundeanu, Ghinghești, Nicopole, Stietetești), Foltești (Foltești, Stoicani), Frumușița (Tămăoani), Ghidigeni, Gohor (Gohor, Narteşti), Ivești (Ivești, Bucești), Jorăști (Jorăști, Zărnești), Liești, Matca, Munteni (Munteni, Ungureni), Negrilești, Piscu (Piscu, Vameș), Poiana (Poiana, Vișina), Priponești (Priponești, Ciorăști, Priponeștii de Jos), Rădești (Rădești, Cruceanu) , Schela (Schela, Negrea), Smulți, Suceveni (Rogojeni), Tulucești (Tulucești, Sivița, Tatarca), Țepu, Valea Mărului (Valea Mărului, Mîndrești), Vârlezi	<u>**30.04-1.05 and 6-7.05.2019**</u> -abundant precipitation, runoff from the slopes -inability to take over the gutters <u>**30.05-9.06.2019**</u> -abundant precipitation, runoff from the slopes <u>**14-28.06.2019**</u> -abundant precipitation, runoff from the slopes -reflow: r. Corozel <u>**26-27.09.2019**</u> -abundant precipitation, runoff from the slopes
17	<u>**GORJ**</u> <u>**42 localities**</u> **Novaci (Bercești, Pociovaliștea), Motru (Ploștina), Tismana (Tismana, Celei, Gornovița, Pocruia, Racoți, Sohodol, Topești, Vâlcele, Vânăta),** Bălănești (Bălănești, Glodeni, Voiteștii din Deal), Bălești (Bălești, Ceauru, Cornești, Tămășești), Bengești-Ciocadia (Bengești), Bustuchin, Godinești (Arjoci, Chiliu, Ratez), Mușetești (Mușetești, Arșeni, Stăncești, Stăncești Larga), Polovragi (Polovragi, Racovița), Samarinești (Samarinești, Bazavani, Boca, Duculești, Larga, Tirioi, Valea Bisericii, Valea Mică, Valea Poienii), Turburea (Corcova, Poiana, Spahii),	<u>**11.02.2019**</u> -abundant rainfall, water release from the snow layer <u>**25.02.2019**</u> -abundant rainfall, water release from the snow layer - landslide with the blocking of the Amaradia river section <u>**8.05.2019**</u> -abundant precipitation, runoff from the slopes -reflow: pr. glen -fast floods <u>**6.06.2019**</u> -abundant precipitation, runoff from the slopes - torrent runoff -flow increase: pr. Ploștina, -strong wind -inability of street ditches to take rainwater <u>**5-10.06.2019**</u>

		-abundant precipitation, runoff from the slopes -reactivation of landslides -increase flow pr. Ratezel -puddles **19-21.06.2019** -abundant precipitationrunoff from the slopes **24.06.2019** -abundant precipitation, runoff from the slopes, activation of torrents -increase flow pr. Iaz -puddles
18	**HARGHITA** **48 localities** **Gheorgheni, Odorheiu Secuiesc, Cristuru Secuiesc,** Bilbor, Brădești, Ciucsângeorgiu, Corbu, Cozmeni, Dănești, Dealu, Frumoasa, Gălăuțaș, Lăzarea, Lueta (Lueta, Băile Chirui), Lunca de Jos (Baratcos, Poiana Fagului, Valea Rece), Lupeni (Păuleni), Joseni, Mădăraș, Mărtiniș (Aldea, Chinușu, Comănești, Locodeni), Merești, Mihăileni (Mihăileni, Livezi, Nădejdea, Văcărești), Plăieșii de Jos (Plăieșii de Jos, Iacobeni), Remetea, Satu Mare, Sărmaș, Sâncrăieni, Sândomnic, Sânmărtin (Sânmărtin, Ciucani), Sânsimion (Cetațuia), Siculeni, Suseni, Şimonești (Chedaia Mică), Tulgheș (Tulgheș, Hagota), Tușnad (Tușnadu Nou), Vârșag,Voșlăbeni,	**29.01-1.02.2019** - heavy rainfall - the yielding of the water coming from the melting of the snow layer -landsliding - significant quantity of snow -strong wind **10.03.2019** - heavy rainfall - the yielding of the water coming from the melting of the snow layer **1-07.05.2019** - heavy rainfall, runoff from the slopes -flow on pr. Casin -reflow pr. Gubas -landsliding **20-31.05.2019** - heavy rainfall, runoff from the slopes -reflow pr. Racu **20.05-06.06.2019** -abundant precipitation,runoff from the slopes -reflow: r. Mureș, pr. Tușnad, pr. Ravaszpatak, pr. Rotpatak, pr. Vale, pr. Gălăuțaș, pr. Lăzarea, pr. Strâmba, **2-6.06.2019** - heavy rainfall, runoff from the slopes -reflow: Olt river, r. Mureș, pr. Tușnad, pr. Ravaszpatak, pr. Rotpatak, pr. Vale, pr. Gălăuțaș, pr. Lăzarea, pr. Strâmba, **17-23.06.2019** -runoff from the slopes -reflow: pr. Fântâna Mare, pr. Izvoraș, pr. Egerszek, pr. Szentegyhaza, pr. Mortonos, pr. Sadokut, pr. Uz, pr. Ciucani, pr. Bistricioara, pr. Vamanu -inflow increase: r. Olt pr. Sosarok, pr. Fisag, pr. Frumoasapr. Putna, pr. Fígheș, pr. Rezu Mare **22-27.06 and 8.07.2019** -runoff from the slopes -reflow: pr. Brădești, pr. Apa Roșie, pr. Keckan, r. Valea Rece, pr. Muhos, r. Baratcos, -strong wind **3-8.07.2019** -abundant precipitation, runoff from the slopes -reflow: pr. Racu -increase in flow pr. Vârghiș
19	**HUNEDOARA** **91 localities** **Deva (Deva, Archia, Cristur), Petroșani, Brad (Brad, Mesteacăn, Ruda Brad), Geoagiu (Geoagiu, Bozeș, Cigmău, Homorod), Hațeg (Silivașu de**	**1-8.05.2019** -abundant precipitation, runoff from the slopes -reflow: r. Orăștie, r. Cerna, r. Strei, r. Crișul Alb, pr. Sibișel, pr. Valea Mare, pr. Mihăileasca, pr. Valea Loancii, pr. Sârbi, pr. Dumești

	Sus), Lupeni, Orăștie, Simeria (Simeria,Simeria Veche), Uricani, Vulcan, Baia de Criș (Rîșca, Țebea), Baru (Baru, Livadia, Petros), Băcia (Totia), Bănița (Bănița, Crivadia, Merișor),Beriu (Beriu, Căstău, Sibișel), Boșorod (Boșorod, Alun, Cioclovina, Luncani), Brănișca (Bărăștii Iliei, Boz, Furcușoara), Buceș (Grohățele, Tarnița, Mihăileni), Bunila (Poienița Voinii), Cârjiți (Popești), Certeju de Sus (Certeju de Sus, Nojag, Toplița Mureșului, Vărmaga), Densuș (Densuș, Ștei), Lăpugiu de Jos (Lăpugiu de Jos, Lăpugiu de Sus), Lelese (Lelese, Runcu Mare), Lunca Cernii de Jos (Lunca Cernii de Jos, Negoiu), Luncoiu de Jos (Podele, Stejărel), Orăștioara de Sus (Costești, Grădiștea de Munte, Ocolișu Mic), Pui (Federi, Ohaba Ponor, Ponor, Rușor, Șerel, Uric), Răchitova (Răchitova, Ciula Mare), Rapoltu Mare (Bobâlna), Sălașu de Sus (Sălașu de Sus, Coroiești, Mălăiești, Paroș), Șoimuș (Căinelu de Jos, Fornădia), Toplița (Dăbâca, Vălari), Vălișoara (Săliștioara, Stoieneasa), Vața de Jos (Căzănești, Vața de Sus), Vețel (Căoi), Vorța (Vorța, Certeju de Jos, Coaja, Dumești, Luncșoara, Visca), Zam (Zam, Cerbia, Pogănești, Tămășești),	-increasing levels: pr. Lăpugiu, pr. Luncanilor, pr. Hondol, pr. Nojag, pr. Vărmaga, pr. Boz, pr. Bărasca, pr. Tămășești, pr. Almaș, pr. Almășel, pr. Arțan, pr. Valea Satului, pr. Vața, pr. Vățișoara, **20-30.05.2019** -abundant precipitation, runoff from the slopes -reflow: pr. Gujii, - inability to take over of the sewerage network **28.05-5.06.2019** -abundant precipitation, runoff from the slopes -reflow: pr. Homorod,pr. Poieni, pr. Valea Fierului, pr. Romos, pr. Valea Satului, pr. Valea Mielului, pr. Rusești -water puddle -inability to take over of the sewerage network **4-21.06.2019** -torrential precipitation, runoff from the slopes -reflow: pr. Ocoliș, pr. Rușor, pr. Valea Babii, pr. Valea Ursului, pr. Căoi, pr. Vărmaga, **23-26.06.2019** -torrential precipitation, runoff from the slopes -reflow: r. Bobâlna, r. Cristur, r.Cerna, r. Slivuț, pr. Nojag **07-8.07.2019** -torrential precipitation, runoff from the slopes **31.07-2.08.2019** -torrential precipitation, runoff from the slopes -the undersized sewerage system at Orăștie and Simeria which could not take over the rainwater.
20	**IAȘI** **274 localities** **Iași, Pașcani (Pașcani, Blăgești, Boșteni, Gâștești, Lunca, Sodomeni), Hîrlău (Hîrlău, Pârcovaci), Podul Iloaiei,** A. I. Cuza (A.I.Cuza, Kogălniceni, Volintirești), Andrieșeni (Andrieșeni, Buhăieni, Drăgănești, Fântânele, Glăvănești, Spineni), Balș (Balș, Boureni, Coasta Măgurii), Bălțați (Podișu, Sârca, Valea Oilor), Bârnova (Bârnova, Cercu, Păun, Pietrăria, Todirel, Vișan), Belcești (Belcești, Liteni, Munteni, Satu Nou, Tansa, Ulmi), Bivolari (Bivolari, Tabăra), Brăiești (Brăiești, Albești-Rediu, Buda, Cristești) Ceplenița (Buhalnița, Poiana Mărului, Zlodica), Ciohorani, Ciortești (Ciortești, Coropceni, Deleni, Rotăria, Șerbești), Ciurea (Ciurea, Curături, Dumbrava, Hlincea, Lunca Cetății, Piciorul Lupului), Coarnele Caprei (Coarnele Caprei, Arama, Petroșica), Comarna (Comarna, Osoi), Costești (Costești, Giurgești), Cotnari (Cotnari, Bahluiu, Cârjoaia, Cireșeni, Făgat, Hodora, Valea Racului, Zbereni), Cozmești (Cozmești, Podolenii de Jos, Podolenii de Sus), Cristești (Cristești, Homița), Cucuteni (Cucuteni, Băiceni, Bărbătești, Săcărești), Dagâța (Dagâța, Piscu Rusului), Deleni (Deleni, Federeni, Maxut, Poiana, Slobozia), Dobrovăț, Dolhești (Dolhești, Brădicești, Pietriș), Dumești (Dumești, Banu, Chilișoaia, Hoisești, Păușești), Erbiceni (Erbiceni, Bârlești, Spinoasa, Totoiești), Fântânele, Focuri, Gorban (Gorban, Gura Bohotin, Podul Hagiului, Scoposeni), Grajduri (Grajduri, Bordea,	**15.01-4.03.2019** -abundant rainfall and runoff from the slopes. -sudden melting of the snow layer **25.01-12.02.2019** -abundant rainfall and runoff from the slopes. -sudden melting of the snow layer **30.04-1.05.2019** - heavy rainfall and runoff from the slopes **6-7.05.2019** - heavy rainfall and runoff from the slopes -erosion on the right bank of the Pietroaia river due to flow fluctuations in Ciohorani locality, - erosion left bank Bahlueț river, due to flow fluctuations in Costești commune Giurgești village -clogging c.a.Rediu, Ciric, Vămășoaia, Sacovăț, Răchitoasa, Călina **18-19.05.2019** - heavy rainfall and runoff from the slopes **24.05-10.06.2019** -abundant rainfall and runoff from the slopes -reflow: r. Miletin, pr. Voinești, -flooding the dam area along the river Prut **17-25.06.2019** -abundant rainfall and runoff from the slopes **27-28.06.2019** -abundant rainfall and runoff from the slopes **5-6.07.2019** - heavy rainfall and strong wind-storm

	Cărbunari, Corcodel, Pădureni, Valea Satului), Gropnița (Gropnița, Bulbucani, Forăști, Mălăiești, Săveni, Sîngeri), Grozești, Hărmănești (Hărmăneștii Vechi, Boldești), Heleșteni (Heleșteni, Hărmăneasa, Movileni, Obroceni), Horlești (Horlești, Bogdănești), Ion Neculce (Ion Neculce, Buznea, Dădești, Gănești, Prigoreni, Războieni), Ipatele (Alexești, Bicu, Cuza Vodă), Lespezi (Buda, Bursuc Deal, Dumbrava, Heci), Mădârjac (Mădârjac, Bojila, Frumușica), Mironeasa (Mironeasa, Urșița), Miroslovești, Mogoșești (Mogoșești, Budești, Hadâmbu, Mânjești), Mogoșești-Siret (Mogoșești Siret, Muncelu de Sus), Moțca, Movileni (Movileni, Iepureni, Larga Jijia, Potângeni), Oțeleni (Oțeleni, Hândrești), Plugari (Plugari, Borosoaia, Onești), Popești (Popești, Doroșcani, Hărpășești, Obrijeni), Popricani, Probota (Probota, Bălteni, Perieni), Răducăneni (Răducăneni, Bohotin, Roșu), Rediu (Rediu, Breazu, Horlești, Tăuțești), Românești (Românești, Avântu, Ursoaia), Roșcani (Roșcani, Rădeni), Ruginoasa (Ruginoasa, Dumbrăvița, Rediu, Vașcani), Scânteia (Scânteia, Bodești, Borosești, Lunca Rateș, Rediu, Tufeștii de Sus), Schitu Duca (Schitu Duca, Blaga, Dumitreștii Gălății, Poiana, Pocreaca), Scobinți (Scobinți, Bădeni, Fetești, Sticlăria, Zagavia), Sinești (Stornești, Osoi), Sirețel (Sirețel, Berezlogi, Humosu, Satu Nou, Slobozia), Stolniceni Prăjescu (Stolniceni Prăjescu, Cozmești), Strunga (Crivești, Gura Văii, Fărcășeni), Șcheia (Șcheia, Căuești, Poiana Șcheii, Satu Nou), Șipote (Șipote, Chișcăreni, Iazu Nou, Iazu Vechi, Hălceni, Mitoc), Tansa (Tansa, Suhuleț), Tătăruși (Tătăruși, Iorcani, Pietrosu, Uda), Todirești (Todirești, Băiceni, Stroiești), Țibana (Țibana, Domnița, Moara Ciornei, Oproaia, Poiana de Sus, Runcu, Vadu Vejii), Țibănești (Țibănești, Glodenii Gândului, Griești, Jigoreni, Răsboieni, Recea, Tungujei, Văleni), Tomești (Tomești, Chicerea, Goruni, Vlădiceni), Țigănași (Cârniceni, Mihail Kogălniceanu), Țuțora (Chiperești), Ungheni (Coada Stâncii, Mânzătești), Valea Seacă (Valea Seacă, Conțești, Topile), Vânători (Vânători, Crivești, Hârtoape, Vlădnicuț), Victoria (Icușeni), Vlădeni (Vlădeni, Alexandru cel Bun, Borșa, Broșteni, Vâlcele), Voinești (Voinești, Lungani),	
21	ILFOV 28 localities **Buftea, Bragadiru, Chitila, Măgurele, Pantelimon, Popești-Leordeni, Otopeni,** BaloteștiCernica,1 Decembrie, Afumați, Ciorogârla (Ciorogârla, Dârvari), Corbeanca, Chiajna, Clinceni, Cornetu, Dărăști-Ilfov, Dobrotești (Fundeni), Domnești, Dragomirești-Vale, Găneasa, Glina, Jilava, Nuci, Periș, Ștefăneștii de Jos, Tunari	May-June 2019 -abundant precipitation in the form of rain - inability to take over of the sewerage network, ditches and gutters for collecting and evacuating rainwater -blocking the riverbed of the Banu Valley-non-cadastral flow -hail
22	MARAMUREȘ 71 localities **Baia Mare, Sighetu Marmației, Baia Sprie, Borșa, Cavnic, Dragomirești, Tăuții Măgherăuș (Tăuții Măgherăuș, Bușag, Merișor), Săliștea de Sus, Șomcuta Mare (Șomcuta Mare, Buteasa, Ciolt,**	10-11.03.2019 -discharge of water from the existing snow layer -runoff from the slopes -reflow r. Dobric 1-8.05.2019 - heavy rainfall, runoff from the slopes

	Codru Butesei, Finteuşu Mare), Târgu Lăpuş, Ulmeni (Arduzel, Mânău, Ţicău), Vişeu de Sus, Ardusat,Bârsana, Bistra (Bistra, Crasna Vişeului), Bogdan Vodă, Cerneşti, Coaş (Coaş, Intrerâuri), Coltău (Coltău, Cătălina), Copalnic Mănăştur (Copalnic Mănăştur, Berinţa, Copalnic, Copalnic Deal, Lăschia, Ruşor), Cupşeni (Libotin, Ungureni), Groşi (Groşi, Ocoliş), Ieud, Leordina, Mireşu Mare (Remeţi pe Someş, Stejera, Tulghieş), Moisei, Onceşti, Poienile de Sub Munte, Recea (Mocira), Remetea Chioarului, Repedea, Rozavlea, Ruscova, Satulung (Mogoşeşti, Hideaga), Săcel, Săpânţa, Strâmtura (Strâmtura, Glod, Slătioara), Suciu de Sus, Şieu, Şişeşti (Şişeşti, Bontăieni, Cetăţele, Dăneşti, Negreia, Plopiş, Surdeşti), Valea Chioarului (Fericea), Vişeu de Jos	-puddling -reflow: V. Criminesii, V. Satului, V. Cârstea, V: Muntelui, V. Caselor, r. Frumuşeaua, V. Senderchi **15-30.05.2019** - heavy rainfall, runoff from the slopes -puddling -overflow -reflow: v. Chisuta, v. Drăguiasa, pr. Bocicoiel, pr. Valea Spinului, v. Vântului, V. Furului, v. Homii, v. Hotarului, v. Văşcoaiei, v. Dănceni, v. Paroşii, v. Muntelui, v. Caselor, v. Mare, pr. Frumuşeaua, v. Senderschi -shore erosions - inability to take over of the sewerage network -clogging: v. Şugău, v. Făget, v. Iapa, v. Mare **12-23.06.2019** -abundant precipitation, runoff from the slopes -overflowv. Breaza, v. Vinului, v. Cetăţele, v. Socilor, v. Luncii -inability to take over by the sewerage network of rainwater -reflow: v. Iapa **28.06-8.07.2019** -abundant precipitation, runoff from the slopes -overflow: v. Morii, v.Repedea, **31.07-1.08.2019** -abundant precipitation, runoff from the slopes -inability to take over of the sewerage network - overflowValea Râului **26.09.2019** -abundant precipitation, runoff from the slopes -inability to take over of the sewerage network
2. 3	**MEHEDINŢI** **119 localities** **Drobeta Turnu Severin, Strehaia (Hurduceşti), Baia de Aramă (Brebina, Dealu Mare, Mărăşeşti, Negoieşti, Pistriţa),** Balta (Preajna), Bâla (Bâla de Sus, Brateşul, Comăneşti, Molani, Rudina, Vidimireşti),Bîcleş (Corzu, Podu Grosului), Căzăneşti (Gârbovăţu de Sus, Govodarva, Păltinişu, Roşia), Cireşu (Cireşu, Bunoaica, Jupăneşti), Devesel (Dunărea Mică, Scăpău), Dumbrava (Albuleşti, Brîgleasa, Higiu, Rocşoreni, Valea Marcului, Vlădica), Godeanu (Godeanu, Marga, Păuneşti, Şiroca), Hinova (Bistriţa), Husnicioara (Husnicioara, Celnata, Marmanu, Peri), Ilovăţ (Racova), Iloviţa (Iloviţa, Bahna, Moiseşti), Isverna (Isverna, Buşeşti, Cerna Vîrf, Drăgeşti, Nadanova, Seliştea), Izvoru Bârzii (Baloteşti, Puţinei, Schitul Topolniţei de Jos, Schitul Topolniţei de Sus), Jiana (Dănceu), Livezile (Livezile, Izvorălu de Jos, Izvorul Aneştilor, Pietriş, Ştefan Odobleja), Malovăţ (Malovăţ, 23 August, Bârda, Bobaiţa, Colibaşi, Lazu, Negreşti), Obîrşia Cloşani (Obîrşia Cloşani, Godeanu), Pătulele (Pătulele, Viaşu), Podeni (Podeni, Gornenţi, Malarişca), Ponoarele (Ponoarele, Băluţa, Bârâiacu, Brînzeni, Ceptureni, Cracu Muntelui, Delureni, Gheorgheşti, Priteşti, Răiculeşti, Şipotu), Poroina Mare (Poroina Mare, Stigniţa), Prunişor (Prunişor, Arvăteşti, Balota, Bâltanele, Dragoteşti, Gârniţa, Ghelmegioaia, Guţu, Igiroasa, Mijarca, Zegaia), Şimian (Cerneţi, Dedoviţa	**15.05-04.06.2019** -abundant precipitation, runoff from the slopes **5 - 18.06.2019** -abundant precipitation, runoff from the slopes **23 - 24.06.2019** -abundant precipitation, runoff from the slopes -reflow: pr. Bistriţa, ogaş Racova, pr. Pleşuva,

	Veche, Dudaşu, Erghevița, Poroina, Valea Copcii), Şişeşti (Şişeşti, Corcova, Crăguieşti, Noapteşa), Tâmna (Colareț, Cremenea, Valea Ursului), Vlădaia (Vlădaia, Almăjel, Scorila, Ştircovița), Voloiac (Lac, Ruptura, Țițirig, Valea Bună)	
24	<u>MUREŞ</u> <u>70 localities</u> **Târgu Mureş, Reghin, Iernut (Cipău, Lechința, Sfântu Gheorghe), Sărmaşu, Ungheni (Ungheni, Şăuşa, Vidraslău),** Adămuş (Corneşti, Crăieşti, Dâmbău), Aluniş (Aluniş, Fițicău), Band (Fânațe), Batoş (Batoş, Coreni, Debrad, Goreni, Uila), Bălăuşeri, Beica de Jos (Beica de Jos, Nadăşa), Bereni, Brâncoveneşti (Brâncoveneşti, Idicel, Şacalu de Pădure), Coroisânmărtin (Coroisânmărtin, Şoimuş), Cuci (Cuci, Dătăşeni, Orosia), Deda (Pietriş), Ernei, Fântânele, Găneşti, Glodeni, Gorneşti, Gurghiu (Orşova), Hodoşa (Hodoşa, Ihod, Isla, Sâmbriaş), Ideciu de Jos (Ideciu de Jos, Deleni, Ideciu de Sus), Ogra (Ogra, Vaideiu), Lunca, Lunca Bradului, Măgherani (Torba), Mica (Deaj), Petelea, Sânger (Sânger, Cipăieni, Pripoare), Sânpaul (Sânpaul, Chirileu, Dileul Nou, Sânmarghita), Solovăstru (Solovăstru, Jabenița), Suplac (Laslău Mic), Suseni (Suseni, Luieriu), Vătava (Vătava, Dumbrava, Rîpa de Jos), Voivodeni, Zau de Câmpie,	<u>06-25.05.2019</u> -abundant precipitation, runoff from the slopes -reflowr. Mureş, r. Târnava Mică, pr. Deleni, pr. Bungarului, pr. Idicel, pr. Saca, pr. Siregna, pr. Bisericii, pr. Beica, pr. Hodoşa, pr. Pietriş -reflow: rain ditches and non-permanent valleys -increasing the level on pr. Fițicău, pr. Orşova -inability to take over of the sewerage network -puddles, wind, hail <u>15.05.-2.06.2019</u> -abundant precipitation, runoff from the slopes -reflowr. Mureş, pr. Beica, pr. Luieriu, pr. Bodogaia, pr. Lunca, pr. Luț -puddles <u>4.06.-03.07.2019</u> -abundant precipitation, runoff from the slopes -reflow: pr. Luț, -puddling -hail -strong wind <u>11.07.2019</u> -abundant precipitation, runoff from the slopes -hail, strong wind
25	<u>NEAMȚ</u> <u>172 localities</u> **Piatra Neamț (Piatra Neamț, Doamna, Văleni), Târgu Neamț (Târgu Neamț, Blebea, Humuleştii Noi), Bicaz (Izvorul Muntelui), Roznov (Chintinici),** Alexandru cel Bun (Bistrița, Agîrcia, Scăricica, Vădurele, Viişoara), Bahna (Bahna, Băhnişoara, Broşteni, Izvoare, Țuțcanii din Vale),Bârgăuani (Bălăneşti, Dârloaia, Ghelăieşti, Hârtop, Homiceni, Vlădiceni), Bicaz Chei (Bicaz Chei, Bîrnadu, Gherman, Ivaneş),BicazuArdelean (Bicazu Ardelean, Telec),Boghicea (Boghicea, Căuşeni, Nistria, Slobozia), Borca (Borca, Pârâul Cârjei, Mădei, Pârâul Pântei, Sabasa, Soci), Bozieni (Crăieşti), Cândeşti (Cândeşti, Bărcăneşti, Pădureni, Țărdenii Mici, Vădurele), Ceahlău (Bistricioara), Costişa, Damuc (Damuc, Huisurez, Trei Fântâni), Dochia (Dochia, Băluşeşti), Doljeşti (Doljeşti, Buhoanca, Buruieneşti), Dragomireşti (Borniş, Hlăpeşti, Mastacan, Unghi, Vad), Dumbrava Roşie, Fărcaşa (Fărcaşa, Buşmei, Popeşti, Stejaru), Făurei (Făurei, Budeşti, Climeşti), Gâdinți, Gârcina (Gârcina, Almaş, Cuejdiu), Ghindăoani, Girov (Girov, Boteşti, Căciuleşti, Doina, Gura Văii, Popeşti, Turtureşti), Grințieş(Grințieş, Poiana), Grumăzeşti (Grumăzeşti, Curechiştea, Netezi, Topolița), Hangu (Hangu, Buhalnița, Rugineşti), Horia, Icuşeşti (Icuşeşti, Băluşeşti, Spiridoneşti, Tabăra), Ion Creangă (Ion Creangă,	<u>11-14.04.2019</u> -abundant rainfall, runoff from slopes, <u>6-7.05.2019</u> - heavy rainfall, runoff from slopes, -increases in levels and flows -alluviumtransport, tributaries, streams - increase of flows and levels, discharge over the high water discharger at the Crăieşti accumulation - bridge section on DN blocked by floats <u>18.05.2019</u> - heavy rainfall, runoff from slopes, leaks -increase in flows and levels <u>28.05-10.06.2019</u> - heavy rainfall, runoff from slopes, leaks -overflow, erosions -increases in flows and levels <u>17-26.06.2019</u> - heavy rainfall, runoff from slopes, -flow increases and levels <u>3-8.07.2019</u> - heavy rainfall, runoff from the slopes, alluvial transport, leaks -increases in levels and flows, <u>15-28.08.201</u> - heavy rainfall, runoff from the slopes, alluvial transport -increases in flows and levels

	Avereşti, Izvoru, Stejaru), Oniceni (Oniceni, Gorun, Linşeşti, Lunca, Mărmureni, Pietrosu, Poiana Humei, Pustieta, Solca, Valea Enei), Pânceşti (Pânceşti, Ciurea, Holm, Patricheni, Tălpălăi), Pângăraţi (Pângăraţi, Pângărăcior), Păstrăveni (Rădeni), Petricani (Petricani, Boiştea, Tărpeşti, Ţolici), Piatra Şoimului (Piatra Şoimului, Luminiş), Pipirig (Pipirig, Boboieşti, Dolheşti, Pîţîlgeni, Pluton, Stânca), Podoleni (Podoleni, Negriţeşti), Poiana Teiului, (Poiana Teiului, Poiana Largului, Roşeni, Topliceni), Poienari (Poienari, Săcăleni), Răuceşti (Răuceşti, Oglinzi), Români (Români, Goşmani, Siliştea), Ruginoasa, Secuieni (Secuieni, Bârjoveni, Bogzeşti, Butnăreşti, Giuleşti, Prăjeşti, Unceşti), Răuceşti (Răuceşti, Oglinzi), Războieni (Războieni, Borşeni, Războienii de Jos), Stăniţa (Stăniţa, Chicirea, Ghidion, Poienile Oancei, Veja, Vlădnicele), Şagna (Şagna, Vulpăşeşti), Tarcău (Tarcău, Ardeluţa), Taşca, Tazlău, Tupilaţi (Tupilaţi, Arămoaia, Totoieşti), Urecheni, Valea Ursului (Bucium, Chilii, Giurgeni), Văleni (Văleni, David, Moreni), Vînători-Neamţ (Vînători-Neamţ, Lunca), Zăneşti (Zăneşti, Traian)	
26	OLŢ 55 localities **Balş, Corabia, Potcoava** (Potcoava, Fălcoieni, Sineşti, Trufineşti), **Scorniceşti** (Bălţaţi, Jitaru, Mărgineni-Slobozia, Mihăileşti, Mogoşeşti, Negreni), Bărăşti (Boroeşti, Mereni, Moţoieşti), Corbu (Burduleşti), Cungrea (Cepeşti, Ibăneşti, Oteştii de Jos), Dobroteasa (Dobroteasa, Batia, Câmpu Mare, Vulpeşti), Grădinile (Arvăteasca), Movileni (Movileni, Bacea), Oporelu, Perieţi (Perieţi, Măgura), Priseaca (Priseaca, Buiceşti, Săltăneşti), Rotunda, Sâmbureşti (Sâmbureşti, Ioniceşti, Lăunele, Mînuleşti, Stănuleasa), Tătuleşti (Tătuleşti, Bărbălăi, Măgura, Mirceşti), Teslui (Teslui, Cherleştii din Deal, Corbu), Valea Mare, Vitomireşti (Bulimanu, Dejeşti), Vultureşti (Vultureşti, Bulimanu, Dienci, Dejeşti, Stănuleasa, Valea lui Alb, Vlângăreşti),	15-17.05.2019 -abundant precipitation, runoff from the slopes 5-17.06.2019 - heavy rainfall, runoff from the slopes - puddles of inland waters - raising the groundwater level 1-10.06.2019 - heavy rainfall, runoff from the slopes -reflow pr. Valea Pîrvului, pr. Goţa, pr. Iminog, pr. Teslui, -hail 24-25.06.2019 - heavy rainfall, runoff from the slopes
27	PRAHOVA 95 localities **Ploieşti, Câmpina, Breaza (Valea Târsei), Comarnic (Comarnic, Ghioşeşti, Poiana, Podul lui Neag, Podu Lung), Sinaia, Slănic, Urlaţi (Orzoaia de Jos, Valea Crângului, Valea Nucetului, Valea Pietrii), Vălenii de Munte,** Adunaţi, Albeşti-Paleologu (Albeşti-Muru, Cioceni, Valea Părului), Aluniş, Apostolache (Apostolache, Buzota, Mârlogea), Ariceştii-Zeletin, Bătrîni, Berceni (Berceni, Cătunu, Corlăteşti, Moara Nouă), Bertea (Lutu Roşu), Călugăreni, Ceptura (Şoimeşti), Ceraşu , Chiojdeanca (Trenu), Drajna (Drajna de Jos, Ogretin), Gornet, Gura Vitioarei (Bughea de Jos, Poiana Copăceni), Iordăcheanu (Iordăcheanu, Plavia), Izvoarele (Schiuleşti), Jugureni (Valea Unghiului), Lapoş (Lapoş, Lăpoşel, Glod), Măneciu (Măneciu Ungureni, Costeni, Măneciu Pământeni), Plopu (Plopu, Nisipoasa), Poseşti (Poseştii Pământeni, Poseştii-Ungureni, Nucşoara de Jos, Nucşoara de Sus,	31.05-6.06.2019 -abundant precipitation, runoff from the slopes -current activation: pr pr. Praja, Valea Poienii -reflow: r. Cricovu Sărat, pr. Bertea, pr. Tasica, pr. Lapoş, pr. Nişcov, pr. Zeletin, pr. Plopeanca, pr. Mireş, pr. Valea Stâlpului - puddles of inland waters -other causes 21-26.06.2019 -abundant precipitation, runoff from the slopes -activating torrents -flow: râu Prahova, râu Teleajen, r. Cricovul Dulce, pr. Bălteanca, pr. Drajna, pr. Seaca, pr. Secuianca, pr. Odăii, pr. Plopeanca, pr. Rîncezeanca, pr. Zeletin,

	Valea Plopului, Valea Stupinii, Târlești), Poiana Câmpina (Râgman), Provița de Sus (Valea Bradului), Râfov (Goga), Salcia, Sângeru (Sângeru, Mireșu Mare, Tisa), Scorțeni (Scorțeni, Bordenii Mici), Starchiojd (Starchiojd, Zmeura), Șotrile, Șoimari (Lopatnița), Ștefești (Ștefești, Târșoreni), Târgușoru Vechi (Stăncești), Tătaru, Teișani (Teișani, Bughea de Sus, Olteni, Științeiu,Valea Stâlpului), Telega (Telega, Melicești), Vadu Săpat (Vadu Săpat, Ungureni), Valea Călugărească (Valea Călugărească, Dârvari, Pantazi, Rachieri, Radila, Valea Mantei, Valea Poienii, Valea Popii, Vărfurile), Valea Doftanei (Trăisteni), Vrăbilău (Poiana Vrăbilău),	
	<u>SĂLAJ</u> <u>67 localities</u> **Zalău, Cehu Silvanei, Jibou** Bălan (Chendrea), Benesat (Biușa), Boghiș (Boghiș, Bozieș), Buciumi (Bodia, Bogdana), Chieșd (Chieșd, Colonia Sighet), Cizer (Cizer, Plesca, Pria), Crasna (Crasna, Huseni, Marin, Ratin), Creaca (Creaca, Brusturi, Ciglean, Jac), Cristolț (Cristolț, Muncel, Poiana Onții, Văleni), Crișeni (Crișeni, Cristur Crișeni, Gârceiu), Dobrin, Gâlgău, Hereclean (Hereclean, Badon, Bocșița, Dioșod, Guruslău, Panic), Halmasd (Aleus, Drighiu), Horoatu Crasnei (Horoatu Crasnei, Hurez, Seredeiu, Stârciu), Ileanda, Meseșenii de Jos (Meseșenii de Jos, Arghireș, Fetindia, Meseșenii de Sus), Mîrșid, Năpradea (Năpradea, Someș Guruslău, Traniș), Pericei, Plopiș (Plopiș, Iaz), Sărmășag, Surduc (Surduc, Braglez, Cristoțel, Solona, Testioara, Tihău), Valcău de Jos, Vârșolț (Vârșolt, Recea, Recea Mică), Zimbor	<u>14-30.05.2019</u> -abundant precipitation, runoff from the slopes -increase level: r r. Someș, r. Almaș, pr. Brăduleț, pr. Valea Canata -strong wind -reflow: pr. Valea Groșilor, pr. Racovița, pr. Valea Mare - puddles of inland waters -hail <u>07-21.06.2019</u> -abundant precipitation, runoff from the slopes - puddles of inland waters -hail
	<u>SATU MARE</u> <u>18 localities</u> **Livada (Adrian),** Batarci, Beltiug (Rătești), Bogdand (Babța), Cămârzana, Cehal (Cehal, Cehăluț), Certeze (Certeze, Huta Certeze, Moișeni), Culciu (Corod), Pomi (Aciua), Supur (Supuru de Jos, Sechereșa), Tarna Mare (Tarna Mare, Bocicău, Valea Seacă), Viile Satu Mare (Tătărăști),	<u>1-9.02.2019</u> -abundant precipitation, melting snow -sliding of the outer slope on a length of about 20-30 m from the body of the left dam of the river Tur near Adrian locality <u>21.05-2.06.2019</u> -abundant precipitation, runoff from the slopes -reflow: pr. Tarna Mare, pr. Lechincioara, pr. Vale Strâmbă -internal water accumulations -not ensuring the drainage sections of the rainwater in the area of the bridges <u>21.05-11.06.2019</u> -abundant precipitation, runoff from the slopes -infiltrations at right under-crossing dam as pr. Homorodu Nou -reflow: r. Someș, pr. Homorodu Nou, pr. Cerna -internal water accumulations -insufficient rainwater drainage capacity <u>1.08.2019</u> -abundant rainfall, runoff, runoff -accumulations of rainwater
29	<u>SIBIU</u> <u>6 localities</u> **Săliște, Tălmaciu**(Tălmaciu, Tălmăcel), Gura Râului, Râu Sadului, Sadu	<u>31.05-2.06.2019</u> -abundant precipitation, runoff from the slopes -increase in debits on: râu Săliște, râu Cibin, râu Sadu, pr. Tălmăcel <u>22.07.2019</u> -abundant precipitation, runoff from the slopes -reflow: pr. Lungșoara, pr. Râușor, pr Valea Mancului, Valea

		Prejbei, Valea Popii - float blocks
30	<u>SUCEAVA</u> <u>179 localities</u> **Suceava, Fălticeni, Vatra Dornei (Vatra Dornei, Argestru, Roşu, Todireni), Cajvana (Cajvana, Codru), Liteni (Liteni, Corni, Rotunda, Siliştea), Frasin (Bucşoaia, Plutonita), Solca,** Adâncata (Adâncata, Călugăreni, Feteşti), Arbore (Arbore, Clit), Baia (Baia, Bogata), Bălăceana,Berchişeşti (Berchiseşti, Corlata), Boroaia (Boroaia, Giuleşti, Moişa, Săcuţa), Botoşana, Breaza (Breaza de Sus, Pârâul Negrii), Cacica (Pârteştii de Sus, Cacica), Calafindeşti (Calafindeşti, Botoşaniţa Mare), Capu Câmpului Ciprian Porumbescu, Comăneşti (Comăneşti, Humoreni), Cornu Luncii (Brăieşti, Păiseni, Sasca Mare, Şinca), Dărmăneşti (Dărmăneşti, Călineşti, Călineşti-Vasilache, Măriţeia Mică, Măriţei), Dolheşti (Dolheştii Mici, Valea Bourei), Dorna Arini (Cozăneşti, Dorna Arini, Ortoaia, Sunători), Dorna Candrenilor (Dorna Candrenilor, Dealu Floreni, Poiana Negrii), Drăgoieşti (Drăgoieşti, Mânzănăieşti), Dumbrăveni (Sălăgeni), Frătăuţii Noi (Frătăuţii Noi, Costişa), Frumosu (Frumosu, Deia, Dragoşa), Fundu Moldovei (Botuşel), Grăniceşti (Grăniceşti, Dumbrava, Iacobeşti, Româneşti), Hânţeşti (Hânţeşti, Bereşti), Horodnic de Sus, Horodniceni (Horodniceni, Boteşti, Mihăieşti, Rotopăneşti), Iacobeni (Iacobeni, Mestecăniş), Ilişeşti (Ilişeşti, Braşca), Ipoteşti (Ipoteşti, Lisaura, Tişăuţi), Marginea, Mănăstirea Humorului (Mănăstirea Humorului, Pleşa, Poiana Micului), Mitocu Dragomirnei (Mitocu Dragomirnei, Dragomirna, Lipoveni, Mitocaşi), Moara (Moara Nica, Moara Bulai, Moara Carp, Liteni, Frumoasa, Vornicenii Mari), Moldova Suliţa (Moldova Suliţa, Benia), Moldoviţa (Moldoviţa, Argel, Demăcuşa, Raşca), Ostra (Ostra, Tărnicioara), Panaci (Panaci, Coverca), Păltinoasa (Păltinoasa, Capu Codrului), Pârteştii de Jos (Pârteştii de Jos, Deleni, Varvata), Poieni Solca, Putna (Putna, Gura Putnei), Râşca (Râşca, Slătioara), Sadova, Satu Mare (Satu Mare, Ţibeni), Siminicea (Siminicea, Grigoreşti), Slatina (Slatina, Găineşti), Straja, Stroieşti (Stroieşti, Zahareşti, Vâlcele), Stulpicani (Stulpicani, Gemenea, Negrileasa, Slătioara), Suceviţa, Şaru Dornei (Neagra Şarului, Gura Haitii), Şcheia (Şcheia, Florinta, Mihoveni, Sfântu Ilie), Şerbăuţi (Şerbăuţi, Călineşti), Todireşti (Todireşti, Costâna, Părhăuţi, Sârgheşti, Soloneţ), Udeşti (Udeşti, Racova, Ştirbăţ), Ulma (Costileva, Lupcina, Măgura), Vadu Moldovei (Vadu Moldovei, Ciumuleşti, Ioneasa, Nigoteşti), Valea Moldovei (Valea Moldovei, Mironu), Vama (Vama, Molid), Vicovu de Jos, Voitinel, Vultureşti (Vultureşti, Giurgeşti, Hreaţca, Jacota, Mereşti, Osoi, Pleşeşti, Valea Glodului), Zamoştea (Cojocăreni, Nicani), Zvoriştea (Zvoriştea, Buda, Poiana, Slobozia)	<u>March-April 2019</u> -precipitation, runoff from the slopes <u>24.04-20.05. 2019</u> -torrential precipitation, runoff from the slopes -flow increase: r. Dorna, pr. Moişa, pr. Gligu, pr. Valea Mare, pr. Călimănel, pr. Negru, pr. Buciniş, pr. Mazăre, pr. Zbrâncani, pr. Suha Mică -landsliding -active erosion <u>21.05-4.06. 2019</u> -torrential precipitation, runoff from the slopes -flow increase: r. Dorna, r. Suceviţa, pr. Jgheaburi, pr. Fundoaia,pr. Brăteasca, pr. Suha, pr. Botuşanu, pr. Muncel, pr. Bucovăţ,pr. Varvata, pr. Morii, pr. Râşca, pr. Tiganca, pr. Remezeu, pr. Slatina, unregistered torrents, -reflow: pr. Domnica <u>6.06. 2019</u> -torrential precipitation, runoff from the slopes -flow increase: r. Suceviţa, pr. Saca, pr. Solca, pr. Clit, pr. Balcoaia, pr. Isachia, pr. Valea Morii, pr. Sadova, pr. Suha, pr. Dragoşina, pr. Hulumna, pr. Bocancea - risk of blockage and inability to take over of the sewerage network <u>17-27.06. 2019</u> -torrential precipitation, runoff from the slopes -flow increase: r. Siret, r. Moldova, r. Moldoviţa, pr. Stanişte, pr. Corlata, pr. Hinata, pr. Botuşel, pr. Horaiţ, pr. Racovăţ, pr. Smideşti, pr. Roşoşa, pr. Darieni, pr. Demăcuşa, pr. Băişescu, pr. Suha, pr. Brăteasca, pr. Muncel, pr. Racova, pr. Şovorâta, pr.Străjii, pr. Ziminel, pr. Gemenea, pr. Hojda, pr. Petruceni, pr. Negrileasa, pr. Slătioara, pr. Adânc, -reflow: pr. Arşanu, pr. Cocoşu, pr. Bursuc, pr. Smideşti, pr. Darieni <u>13.07-1.08. 2019</u> -torrential precipitation, runoff from the slopes - overflow: pr.Tătarca, pr. Pârâul Negru

31	<u>TELEORMAN</u> <u>41 localities</u> **Zimnicea, Turnu Măgurele, Videle,** Babaița (Babaița, Merișani), Beuca, Botoroaga (Botoroaga, Călugăru, Târnava, Tunari, Valea Cireșului), Bujoreni, Ciolănești (Ciolănești Deal, Ciolănești Vale), Didești, Dracșeni, Drăgănești Vlașca (Drăgănești Vlașca, Comoara), Frumoasa, Furculești, Gălățeni (Gălățeni, Bascoveni, Grădișteanca), Izvoarele, Măgura (Măgura, Guruieni), Mereni, Orbeasca (Orbeasca de Sus, Orbeasca de Jos, Lăceni), Piatra, Poieni, Săceni, Segarcea Vale, Tătărăștii de Sus, Trivale Moșteni, Vitănești (Vitănești, Purani, Siliștea, Schitu Poenari), Zâmbreasca	<u>3-19.06. 2019</u> - precipitation, runoff from the slopes -reflow r. Clanița, r. Câlniștea, r. Glavacioc, Slătioarelor, v. Suhat, -puddles -hail -collector channel with reduced capacity to take water from the slopes
	<u>TIMIȘ</u> <u>27 localities</u> **Făget** (Făget, Bichigi, Povargina), Balint (Balint, Bodo), Bara (Dobrești, Radmanești), Barna (Barna, Drinova), Bethausen (Cladova), Denta, Dumbrava (Dumbrava, Răchita), Fardea, Gavojdia, Margina (Colonie Margina, Coșteiu de Sus), Mănăștiur, Nădrag (Nadrag, Crivina), Ohaba Lungă (Ohaba Română, Dubești), Pietroasa (Pietroasa, Crivina de Sus, Fărășești, Poieni), Tomești (Luncanii de Sus)	<u>30.04-4.05.2019</u> - heavy rainfall, runoff from the slopes -reflow: r. Timiș, pr. Sasa, pr Homa, pr. Săraz <u>27.05-10.06.2019</u> - heavy rainfall, runoff from the slopes -reduced capacity of the rainwater collection and management network -flow with significant increase in flows and flow rate: râu Bega, pr. Ruginoasa, pr. Sudrias, pr. Saraz, pr. Zopan, pr. Topla -flow: Bega river, Cladova river, -landslide
32	<u>TULCEA</u> <u>15 localities</u> Beștepe, Frecăței (Frecăței, Poșta), Horia, Mahmudia, Mihail Kogălniceanu (Rândunica), Ostrov, Sarichioi (Sarichioi, Enisala, Visterna),Topolog (Făgărașul Nou, Măgurele), Valea Nucarilor (Valea Nucarilor, Aghighiol, Iazurile),	<u>1-31.05.2019</u> - abundant rainfall; -runoff from the slopes -concentration of drains on the streets <u>1-30.06.2019</u> - abundant rainfall; -draining from the slopes -concentration of drains on the streets <u>1-31.07.2019</u> - abundant rainfall; -draining from the slopes <u>1-31.08.2019</u> - abundant rainfall; -draining from the slopes -inability to take over of the sewerage network <u>1.03-31.07.2019</u> - no precipitation - drought, Măgurele village, Topolog commune
33	<u>VASLUI</u> <u>295 localities</u> **Vaslui, Huși, Murgeni(Cârja), Negrești**, Albești (Albești, Corni Albești, Crasna, Gura Albești), Alexandru Vlahuță (Alexandru Vlahuță, Buda, Ghircani, Morăreni), Arsura (Fundătura, Mihail Kogălniceanu), Banca (Stoisești), Băcani (Băcani, Drujești, Suseni, Vulpașeni), Băcești (Băcești, Armășeni, Babușa, Pălitiniș, Țibăneștii Buhlii, Vovriești), Bălteni (Bălteni, Bălteni Deal, Chetrești), Bogdana (Bogdana, Lacu Babei, Verdeș), Bogdănești (Bogdănești, Horoiata, Hupca, Orgoiești, Ulea, Untești, Vișinari, Vlădești), Bogdanița (Bogdanița, Cârtibași, Cepești, Coroiești, Rădești, Tunsești), Botești (Botești, Gugești), Bunești-Averești (Averești,	<u>6-7.05.2019</u> - heavy rainfall, runoff from the slopes -ponds and inland waters - exceeding the transport capacity of the gutters - exceeding the transport capacity of the Bârlad river <u>24.05-24.06.2019</u> - heavy rainfall, runoff from the slopes -ponds and inland waters -inability to take over the network of canals and street ditches - exceeding the transport capacity of the gutters

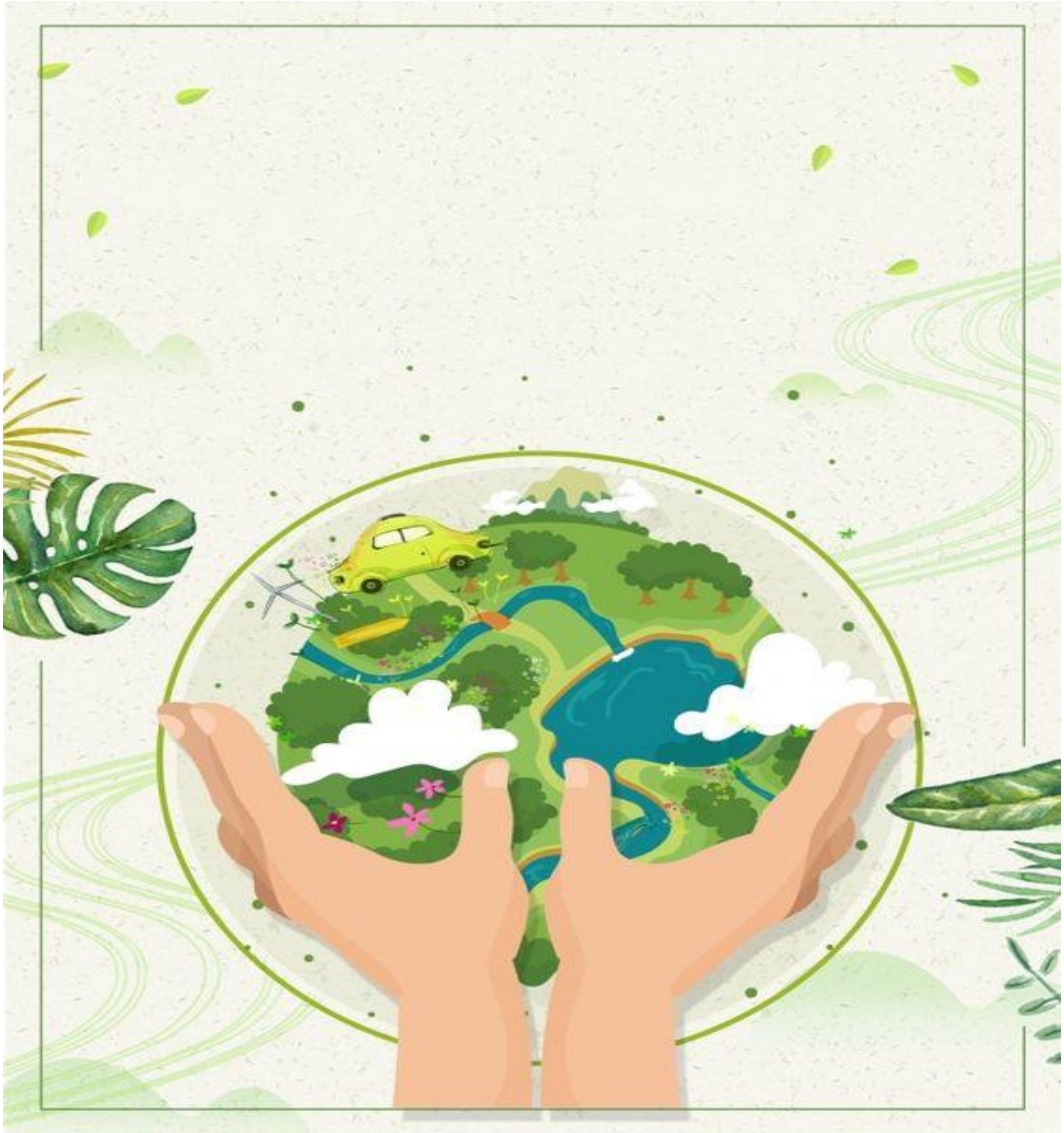
	Armăşeni, Buneşti, Plopi, Podu Oprii, Roşiori, Tabalaieşti),Codăeşti (Codăeşti, Pribeşti), Coroieşti, Cozmeşti (Cozmeşti, Baleşti, Fastaci, Hordileşti), Creţeşti (Creţeşti, Budeşti, Creţeştii de Sus, Satu Nou), Dăneşti (Dăneşti, Bereasa, Botoaia, Emil Racoviţă, Tătărani), Deleşti (Deleşti, Albeşti, Fundătura, Hârşova, Mănăstirea, Răduieşti), Dimitrie Cantemir (Guşiţei, Plotoneşti, Urlaţi), Dodeşti, Dragomireşti (Dragomireşti, Babuta, Belzeni, Ciuperca, Doagele, Poiana Pietrei, Popeşti, Rădeni, Tuleşti, Vladia), Drănceni (Ghermăneşti), Duda Epureni (Epureni, Duda, Valea Grecului, Bobeşti) , Dumeşti (Dumeşti, Dumeştii Vechi, Valea Mare), Fălciu (Fălciu, Bogdăneşti, Bozia, Copăceana, Odaia Bogdana), Fruntişeni (Fruntişeni, Grăjdeni), Ghergheşti (Gherghеşti, Chetrosu, Corodeşti, Dragomaneşti, Draxeni, Lazu, Lunca, Soci), Epureni (Epureni, Barlaleşti, Horga), Fereşti, Gârceni (Gârceni, Dumbrăveni, Racoviţa, Slobozia, Trohan), Hoceni (Oţeleni, Şişcani, Tomşa), Iana (Iana, Hălăreşti, Recea, Siliştea, Vadurile), Ibăneşti (Mânzaţi), Ivăneşti (Ivăneşti, Blesca, Broşteni, Buscata, Cosca, Coseşti, Fundătura Mare, Fundătura Mică, Hârşoveni, Iezărel, Ursoaia, Valea Oanei, Valea Mare), Laza (Laza, Bejeneşti, Râşniţa, Sauca), Lipovăţ (Lipovăţ, Căpuşeni, Chitoc, Corbu, Fundu Văii), Micleşti (Micleşti, Chirceşti, Popeşti), Muntenii de Jos (Muntenii de Jos, Băcăoani, Mânjeşti, Secuia), Olteneşti (Olteneşti, Curteni, Pahna, Târzii, Vineteşti), Oseşti (Oseşti, Buda, Pădureni, Vâlcele), Pădureni (Pădureni, Capoteşti, Davideşti, Ivăneşti, Leoşti, Rusca, Văleni), Perieni, Pogana (Pogana, Bogeşti, Cârjăoani, Măscurei, Tomeşti), Pogoneşti (Pogoneşti, Belceşti, Polocin), Poieneşti (Poieneşti, Floreşti, Frasinu, Oprişiţa), Pungeşti (Pungeşti, Armăşoaia, Curseşti Deal, Curseşti Vale, Siliştea, Stejaru, Toporăşti), Puieşti (Puieşti, Călimăneşti, Cetăţuia, Cristeşti, Fîntînele, Gîlteşti, Iezer, Laleşti, Mocani, Rotari, Ruşi), Puşcaşi (Puşcaşi, Poiana lui Alexa, Tieşoru, Valea Târgului), Rafaila, Rebricea (Rebricea, Bolati, Crăciuneşti, Draxeni, Sasova, Rateşu Cuzei, Tatomireşti, Tufeştii de Jos), Roşieşti (Roşieşti, Codreni, Gura Idrici, Idrici, Rediu, Valea lui Darie), Soleşti (Bouşori, Iaz, Şerboteşti, Valea Siliştei), Suletea (Suletea, Fedeşti, Jigalia, Rascani), Ştefan Cel Mare (Ştefan Cel Mare, Bârzeşti, Brăhăsoaia, Căntălăreşti, Mărăşeni), Tăcuta (Tăcuta, Cujba, Dumasca, Focseasca, Mirceşti, Protopopeşti), Tătărani (Tătărani, Bălţaţi, Crăsneni, Giurgeşti, Leoşti), Todireşti (Todireşti, Cotic, Drăgeşti, Huc, Plopoasa, Siliştea, Sofroneşti, Valea Popii, Viişoara), Tutova, Viişoara (Viişoara, Halta Dodeşti, Văleni, Viltoteşti), Vinderei (Vinderei, Brădeşti, Docani, Docăneasa, Gara Talasman, Obârşeni, Valea Lungă), Voineşti (Voineşti, Avrămeşti, Bănceşti, Mărăşeşti, Obârşeni, Stăncăşeni, Uricari), Vultureşti (Vultureşti, Buhăieşti, Voineşti), Vutcani (Vutcani, Mălăeşti, Poşta Vutcan), Zapodeni (Zapodeni, Butucaria, Ciofeni, Delea, Dobrosloveşti, Macreşti, Portari, Teleşti, Unceşti), Zorleni (Zorleni,	

	Popeni, Smila),	
34	VÂLCEA 167 localities **Băbeni (Băbeni, Romani, Valea Mare), Băile Govora (Curături, Gătejeşti), Băile Olăneşti (Olaneşti, Cheia), Bălceşti (Cîrlogani, Irimeşti, Preoţeşti), Brezoi, Călimăneşti** (Călimăneşti, Căciulata, Jiblea Veche, Păuşa), **Horezu** (Horezu, Râmeşti, Romanii de Jos, Romanii de Sus, Urşani, Tănăseşti), Alunu (Alunu, Bodeşti, Igoiu, Ocracu, Roşia), Bărbăteşti (Bărbăteşti, Bârzeşti), Berislăveşti (Berislăveşti, Dângeşti), Buneşti (Titireci), Câineni (Râul Vadului), Cernişoara (Cernişoara, Armăseşti, Groşi, Mădulari, Modoia, Obârşia, Sărsăneşti), Copăceni (Copăceni, Bălteni, Bondoci, Hotărasa, Ulmetu, Veţelu), Costesti (Costesti, Bistriţa, Pietreni, Văratici), Dănicei (Cireşu, Dobreşti, Lăunele de Jos), Frânceşti (Dezrobiţi, Genuneni, Mănăileşti, Moşteni), Glăvile (Olteanca), Goleşti (Aldeşti, Opătăreşti, Poeniţa, Popeşti), Grădiştea (Grădiştea, Diaconeşti, Dobricea, Linia, Obislavu, Străchineşti, Turburea, Tuturu, Valea Grădiştei), Guşoeni (Măgureni), Lăpuşata (Bereşti, Broşteni, Mijaţi, Săruleşti, Şerbăneşti, Zărneşti), Livezi (Livezi, Părăuşani, Pleşoiu, Tina, Pîrîienii de Jos, Pîrîienii de Mijloc, Pîrîienii de Sus), Mateeşti (Mateeşti, Turceşti), Mălaia, Milcoiu (Căzăneşti, Ciuteşti, Ţepenari), Mihăeşti (Bârseşti), Mitrofani, Muereasca (Andreeşti, Şuta), Nicolae Bălcescu (Băneşti, Corbii din Vale, Dosu Râului, Gâltofani, Linia Hanului, Mângureni, Predeşti, Şerbăneasa, Valea Bălcescu, Valea Viei), Olanu (Casa Veche, Ciobоţi, Drăgioiu, Nicoleşti), Oteşani (Oteşani, Sub Deal), Păuşeşti-Otasău (Păuşeşti-Otasău, Bărcănele, Buzdugan, Cernele, Păuşeşti, Şerbăneşti, Şoliceşti, Văleni), Păuşeşti-Măglaşi (Păuşeşti-Măglaşi, Coasta, Pietrari, Ulmeţel, Valea Cheii, Vlăduceni), Pesceana (Cermegeşti, Lupoaia, Ursoaia), Perişani (Perişani, Mlăceni), Pietrari (Pietrari, Pietrarii de Sus), Popeşti (Popeşti, Curtea, Dăeşti, Meieni, Urşi, Valea Caselor), Racoviţa (Copăceni), Sălătrucel (Sălătrucel, Păteşti, Seaca, Şerbăneşti), Sineşti (Sineşti, Ciucheţi, Dealu Bisericii, Mijlocu, Popeşti, Urzica), Scundu (Scundu, Avrămeşti, Blejani, Crângu), Şirineasa (Şirineasa, Ciorăşti, Valea Alunişului), Stoileşti (Bîrsoiu, Geamăna, Giuroiu, Izvoru Rece), Stroeşti (Stroeşti, Cireşu), Tomşani (Bogdăneşti, Dumbrăveşti), Vaideeni (Vaideeni, Izvoru Rece, Mariţa), Voineasa (Valea Măceşului)	25-31.01.2019 -heavy rainfall, melting snow, runoff from the slopes -inability of the rainwater to be taken over by the street gutters -landslide 21.05-13.06.2019 -heavy rainfall, runoff from the slopes -inability of the rainwater to be taken over by the street gutters -landslide 19.06-11.07.2019 -heavy rainfall, runoff from slopes, -fast floods -the inability of the rainwater to be taken over by gutters and ditches
35	VRANCEA 123 localities **Odobeşti,** Andreiaşu de Jos (Andreiaşu de Jos, Andreiaşu de Sus, Fetig, Hotaru, Răchitaşu), Bîrseşti (Bîrseşti, Topeşti), Bogheşti (Bogheşti, Bicheşti, Chiţcani, Iugani, Plăcinţeni, Pleşeşti, Prisecani,	December 2018-1.04.2019 - precipitation, runoff from the slopes -melting of the snow -increases in the level and flow of the Putna River -Erosions on both banks of the Putna River 2.02-5.02.2019

	Tăbucești), Bolotești (Găgești, Pietroasa, Vităneștii de Sub Măgură), Bordești (Bordești, Bordeștii de Jos), Cîrligele (Cîrligele, Blidari, Dălhăuți), Chiojdeni (Lojnița, Luncile, Mărăcini, Tulburea), Cotești (Cotești, Budești), Dumitrești (Biceștii de Jos, Blidari, Dumitreștii-Față, Lăstuni, Lupoaia, Poienița, Siminoc, Tinoasa), Gura Caliței (Gura Caliței, Cocoșari, Dealu Lung, Lacu lui Baban, Plopu, Poenile, Șotricari), Gugești, Homocea (Homocea, Costișa, Lespezi), Jitia (Jitia, Dealu Sării, Jitia de Jos, Măgura), Mera (Mera, Livada, Milcovel, Roșioara, Vulcăneasa), Negrilești, Naruja (Naruja, Podu Stoica), Nereju (Nereju, Brădăcești, Chiricani, Nereju Mic, Sahastru), Nistorești (Nistorești, Bîțcari, Făgetu, Podu Șchiopului, Românești, Vetrești Herăstrău), Paltin (Paltin, Prahuda, Țepa), Păunești (Păunești, Viișoara), Poiana Cristei (Mahriu, Odobasca, Petreanu, Tîrîtu), Pufești, Reghiu (Reghiu, Farcaș, Jgheaburi, Raiuți, Ursoaia), Ruginești (Ruginești, Anghelești, Copăcești, Văleni), Sihlea (Bogza, Voetin), Soveja (Dragosloveni), Tănăsoaia (Costișa, Vladnic de Sus), Tîmboiești, Tulnici (Coza, Lepșa), Țifești (Clipicești), Urechești, Valea Sării (Valea Sării, Colacu, Mătăcina, Prisaca), Vidra (Irești, Ruget, Viișoara, Voloșcani), Vintileasca (Vintileasca, Bahnele, Tănăsari), Vizantea Livezi (Livezi, Mesteacănu, Piscu Radului, Vizantea Mănăstirească, Vizantea Răzășească), Vrâncioaia (Vrâncioaia, Bodești, Muncei, Ploștina, Poiana, Spinești)	- precipitation, runoff from the slopes -melting of the snow -increases in level and flow: Milcov river, Râmnicu Sărat river, Trotuș river **28.04-3.06.2019** - precipitation, runoff from the slopes -increases in level and flow: r. Putna, r. Năruja, pr. Tichiriș, tr. Colțea , tr. Știubei, pr. Dîlgov, pr. Slimnic, pr. Oreavu,pr. Ochean, pr. Valea Neagră -talveg erosion -shore erosions **May-June.2019** - r. Milcov, r. Putna, pr. Caciu, r. Zăbala, r. Rîmna, pr. Mera, pr. Vizăuți, pr. Valea Neagră, pr. Dragomirna, tr. Bodin, tr. Vulcăneasa, pr. Lepșa -eroziuni de mal: r . Putna, r. Zăbala, pr. Caciu, r. Rîmna, pr. Vizăuți, pr. Dragomira

In this chapter, no specific indicators are specified according to the O.M.M.A.P. no.618 /30.03.2015 – the full chapter can be accessed on the link: http://www-old.anpm.ro/upload/217086_RSM%202020.pdf

INDICATORS REPORT 2020
Chapter XI
CONSUMPTION AND THE ENVIRONMENT



TRENDS IN CONSUMPTION

FOOD AND BEVERAGES

Table XI.1 - Average annual consumption per inhabitant, of the main food and beverage products, 2015 - 2019

Main food and drinks	Measurement units	Years				
		2015	2016	2017	2018	2019
Cereals and cereal products in grain equivalent	Kg/place	211.2	208.4	208.2	205.4	204.3
Cereals and cereal products in flour equivalent	Kg/place	159.8	157.6	157.3	155.1	154.4
Wheat, rye in grain equivalent	Kg/place	122.6	122.2	122.4	121.3	120.5
Potatoes	Kg/place	98.3	95.5	96.6	95.5	92.3
Legumes	Kg/place	3.2	2.1	2.4	4.1	4.0
Vegetables and vegetable products in fresh vegetable equivalent	Kg/place	158.5	155.8	152.1	173.4	170.2
Fruit and fruit products in fresh fruit equivalent	Kg/place	87.8	96	96.1	110.8	111.3
Sugar and sugar products in refined sugar equivalent (including honey)	Kg/place	25.6	25.5	25.7	25.4	25.6
Meat and meat products in fresh meat equivalent	Kg/place	63.4	65.5	68.4	73.3	74.4
Milk and milk products in milk equivalent 3.5% fat (excluding butter)	Kg/place	250.7	253.7	251.4	258.2	259.8
Milk and milk products in milk equivalent 3.5% fat (excluding butter)	Liters/place	243.4	246.3	244.1	250.8	252.2
Eggs	Pieces/place	262	262	255	236	241
Fish and fish products in fresh fish equivalent	Kg/place	5.5	5.9	6.3	6,7	7,8
Wine and wine products	Liters/place	19	18	21.6	23.8	23.4
Beer	Liters/place	88.3	88.9	89.5	90.1	89.1
Distilled alcoholic beverages (100% alcohol)	Liters of pure alcohol (100%)/place	1.3	1.5	1.5	1.9	1.9
Soft drinks	Liters/place	179.3	188.6	213.2	209.8	213.6
Total alcohol consumption (100% alcohol)	Liters of pure alcohol (100%)/place	7.9	8.1	8.6	9.2	9.2

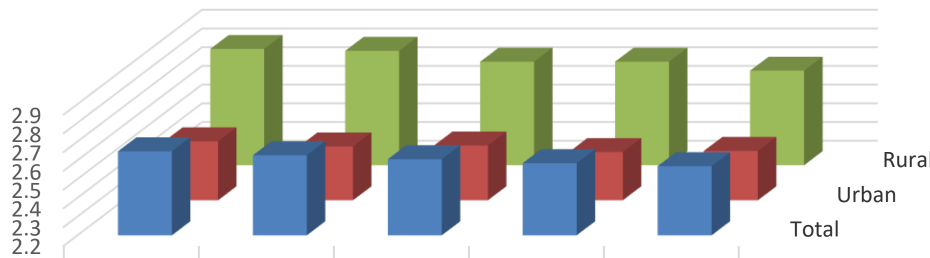
Source: National Institute of Statistics –https://insse.ro/cms/ro/tags/bilanturi-alimentare - until the date of the preparation of this report, the data for the year 2020 have not been processed

The following were recorded:

- *gradual increases in fruit and fruit products in equivalent fresh fruit, sugar (including honey), meat and meat products in equivalent fresh meat, milk and milk products in milk equivalent 3.5% fat, eggs, fish and fish products in equivalent fresh fish and non-alcoholic beverages;*
- *insignificant variations in legumes, grains, wine and wine products, distilled alcoholic beverages (100% alcohol) and total alcohol consumption (100% alcohol);*
- *decreases in cereals and cereal products in equivalent grains and flour, wheat and beer, in 2019.*

HOUSING

Figure XI.1 - Evolution of the average number of persons per household (persons/household), 2016 - 2020

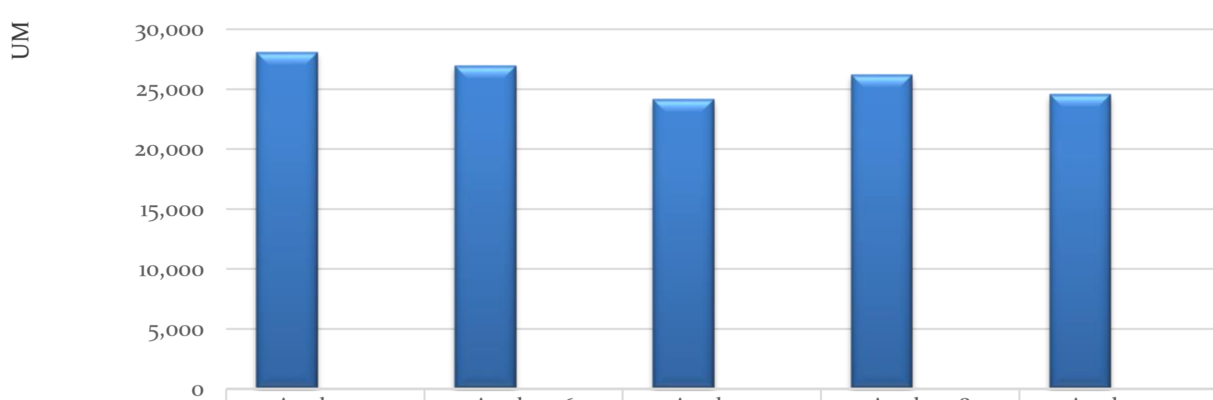


	2016	2017	2018	2019	2020
Total	2.648	2.627	2.606	2.585	2.569
Urban	2.514	2.487	2.492	2.457	2.463
Rural	2.821	2.811	2.753	2.753	2.705

Source: National Institute of Statistics

In the period 2016–2020 there is a fluctuating trend from one year to another and a slight decrease overall in 2020 compared to 2019.

Figure XI. 2 - Evolution of electricity consumption in households (*thousands of MWh, thousands of tep/toe = tons of oil equivalent*)



	Anul 2015	Anul 2016	Anul 2017	Anul 2018	Anul 2019
Mwh	28,051	26,946	24,116	26,191	24,556
1.000Toe	2.24	2.33	2.07	2.25	2.11

Source: National Institute of Statistics - up to the date of preparation of this report, the NIS has not processed the data for the year 2020

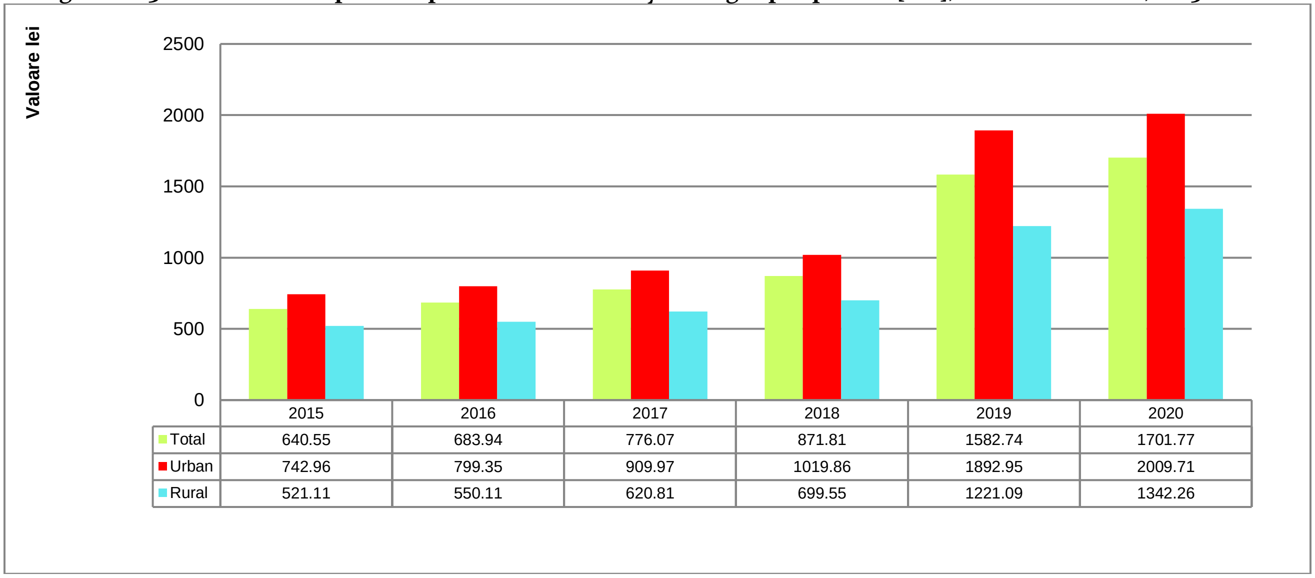
During 2015-2019(data for 2020 are not published by the NIS)electricity consumption in households has a fluctuating trend,in 2015, the highest value was recorded in the analyzed interval.

Table XI.2 - Total consumption expenditure - monthly averages per person [Lei], at national level, 2015 – 2020

Total expenses monthly averages per person – lei -	YEAR 2015	YEAR 2016	YEAR 2017	YEAR 2018	YEAR 2019	YEAR 2020
TOTAL	640.56	683.94	776.07	871.81	1582.74	1701.77
URBAN	742.96	799.35	909.97	1019.86	1892.95	2009,71
RURAL	521.11	550.11	620.81	699.55	1221.09	1342.26

Source: National Institute of Statistics –https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf- Press release no. 140/June 7, 2021

Figure XI.3 - Total consumption expenditure - monthly averages per person [Lei], at national level, 2015 – 2020



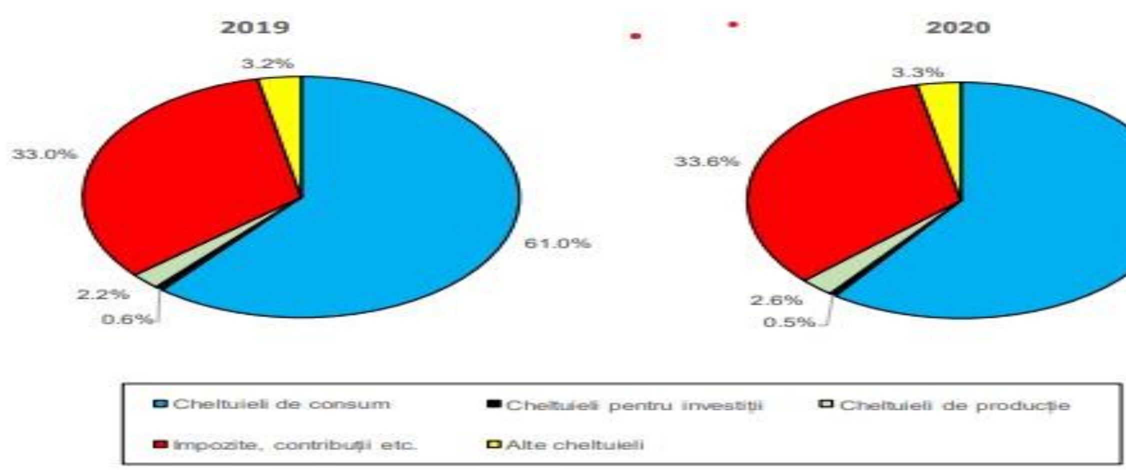
Source: National Institute of Statistics – https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf-Press release no. 140/June 7, 2021

Table XI.3 - The structure of the total consumption expenses of households by destination, in the years 2019 and 2020,[%]/ [lei]

The structure of total household expenses	Year 2019		Year 2020	
	%	- lions -	%	-lions-
Consumption expenses	61.0	2497.11	60.0	2621.66
Investment expenses	0.6	23.00	0.5	23.71
Production expenses	2.2	88.53	2.6	115.40
Taxes, contributions, etc.	33.0	1349.85	33.6	1467.93
Other expenses	3.2	133.34	3.3	143.16
Total expenses	100.0	4091.83	100.0	4371.86

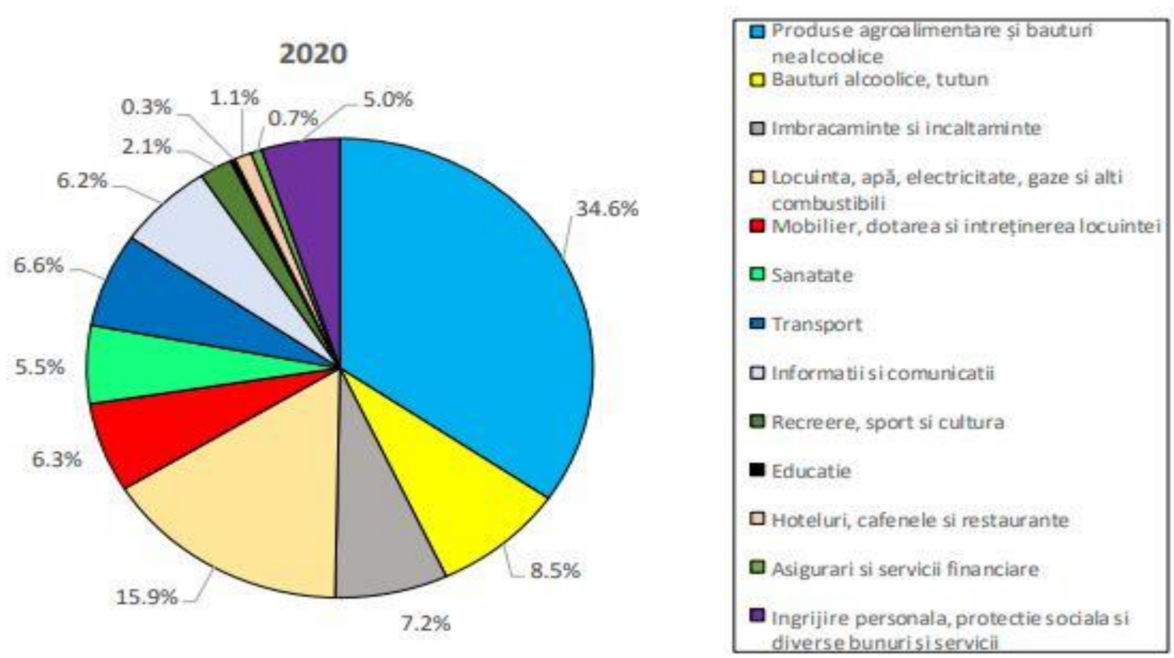
Source: National Institute of Statistics – https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf - Press release no. 140/June 7, 2021

Figure XI.4 - Structure of total household consumption expenditure by destination, years 2019 and 2020 (%)



Source: National Institute of Statistics –https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf- Press release no. 140/June 7, 2021

Figure XI.5 – Structure of total consumption expenditure by destination, year 2020, % (*)



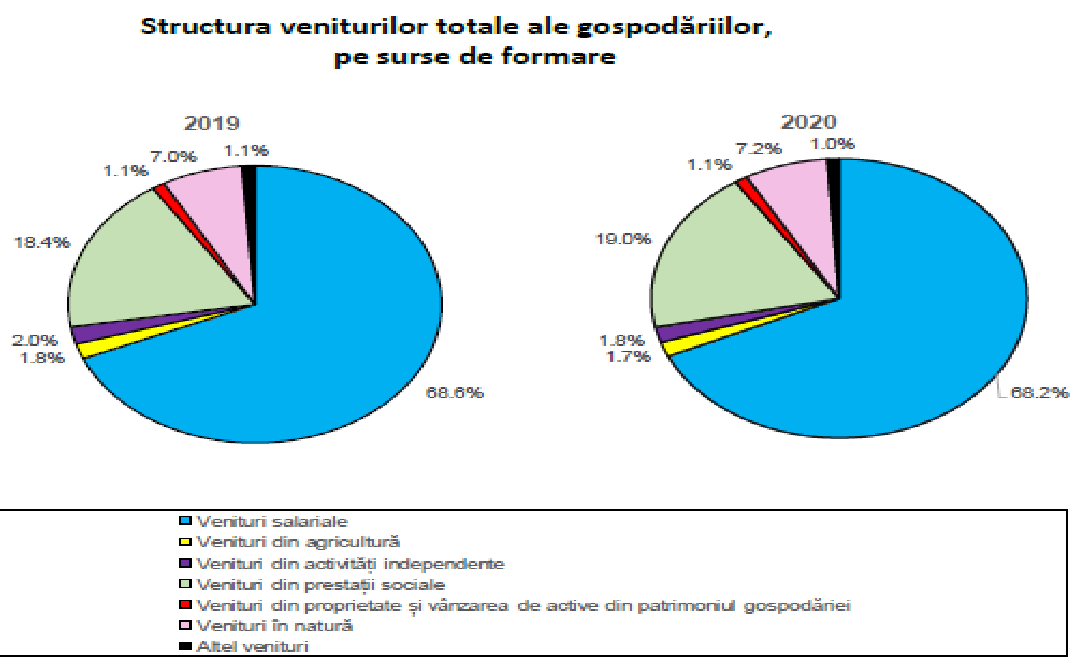
Note*: *Starting from 2020, the Classification of Individual Consumption by Destination - COICOP 2018 is used at the 5-digit level, which brings changes to the structure of certain indicators, in the sense of regrouping them, compared to previous years. Source: National Institute of Statistics – https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf- Press release no. 140/June 7, 2021*

Table XI.4 - The level and structure of total household incomes, monthly averages per person, in 2019 and 2020,[lei] /[%]

Years		Total income	% of total:							
			Cash income	from which:				Income in kind	from which:	
		monthly averages per person – lei -		Gross wages and other wage rights	Income from agriculture	Income from independent non-agricultural activities	Income from social benefits		Counter-value of income in kind obtained by employees and beneficiaries of social benefits	Counter-value of consumption of agro-food products from own resources
TOTAL	2019	1852,73	93.0	68.6	1.8	2.0	18.4	7.0	1,2	5.8
	2020	2030.50	92.8	68.2	1.7	1.8	19.0	7.2	1.1	6.1
URBAN	2019	2246.96	96.0	75.9	0.3	1.3	16.9	4.0	1.3	2.7
	2020	2426.89	95.8	75.3	0.2	1,2	17.6	4.2	1.3	2.9
RURAL	2019	1393.14	87.3	55.0	4.8	3,4	21.2	12.7	1.1	11.6
	2020	1567.72	87.3	55.5	4.3	3.0	21.6	12.7	0.8	11.9

Source: National Institute of Statistics -https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf- Press release no. 140/June 7, 2021 "Field: Standard of living"

Figure XI.6 - Structure of total household incomes, by sources of training, in 2019 and 2020



Source: National Institute of Statistics -https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf- Press release no. 140/June 7, 2021 "Field: Standard of living"

In 2020, the total average monthly income of the population per household was 5,216 lei, and the total expenses were, on average, 4,372 lei per household per month. So:

- ***Total revenue*** *monthly averages represented in 2020, in nominal terms, 5216 lei per household and 2031 lei per person, increasing by 8.9 and 9.6, respectively, compared to 2019.*
- ***Total expenses*** *of the population in 2020 were, on average, 4372 lei per household (1702 lei per person) and represented 83.8% of total income, down 1.6 percentage points compared to 2019.*

[Source:National Institute of Statistics -https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf- Press release no. 140/June 7, 2021 "Area: Standard of living"]

MOBILITY

RO 35
Indicator code Romania: RO 35 EEA indicator code: CSI 35
TITLE: **DEMAND FOR PASSENGER TRANSPORT**
DEFINITION: Passenger transport demand is defined as the sum of domestic passenger-kilometers traveled each year. Domestic passenger transport includes transport by cars, buses and coaches and trains

The indicator presents data that refer only to transport on the national territory, regardless of the nationality of the transport vehicle, for transport by cars, buses and coaches, respectively by trains (metro & trams and light metro are excluded) for a period of at least 5 years. The variable is calculated from the passenger indicator -kilometer(pkm), defined as the transport of a passenger over a distance of one kilometer. *Figure XI.7* shows the share of passenger transport modes [thousands of passengers – national km] at national level in the period 2015-2020.*Table XI.6* presents the share of each mode of transport in total passenger journeys[%pkm] at national level between 2015 and 2020. It is observed the relatively different variations for the three modes of transport, as follows: in **railway transport**, an oscillating evolution is observed with a decreasing trend until 2019; in **road transport** the evolution is oscillating with a slight upward trend in 2019; **inland waterway transport** has a decreasing trend between 2015 and 2019. In 2020, 331,333 thousand passengers were transported in intercity and international transport and 1428295 thousand passengers in local public transport (*table XI.5*). Most of the passengers were registered in road transport by buses and minibuses, respectively 1049024 thousand passengers.

Table XI.5 - Passenger transport, by means of transport and destinations, in 2020

A. TRANSPORTED PASSENGERS – thousands of passengers -	Year 2020	Year 2020 in % compared to the year 2019
I. INTER-URBAN AND INTERNATIONAL PASSENGER TRANSPORT - thousands of passengers - TOTAL (1+ ...+4)	331333	73.9
1. RAIL TRANSPORT - TOTAL	50559	72.5
a. national	50481	72.6
b. international	78	38.2
c. transit	*)	6.5 1)
2. ROAD TRANSPORT - TOTAL	273454	76.9
a. national	272586	77.1
b. international	868	41.7

3. TRANSPORT ON INLAND WATERWAYS - TOTAL	134	120.7
a. National	134	120.7
4. AIR TRANSPORT - TOTAL	7186	31.0[1]
a. In domestic flights- total	872	32.8
Out of the total:		
- In regular domestic flights	866	32.8
- In irregular domestic flights	6	33.3
b. In international flights- total	6314	30.7
Out of the total:		
- In regular international flights	6076	30.9
- In irregular international flights	238	27.0
II. LOCAL PUBLIC PASSENGER TRANSPORT – thousands of passengers -		
TOTAL[2]	1428295	- [3]
TRAMS	416854	- [3]
BUSES AND MICROBUSES	775570	- [3]
TROLLEYS	145540	- [3]
SUBWAY[2]	90331	50.4

1) The evolution in percentages, compared to similar periods of 2019, is calculated from values expressed in "passengers"
2) Provisional data
3) The data are not comparable with those of 2019 because the data for the first semester of the previous year did not include retired passengers residing in the city of Bucharest, beneficiaries of gratuities
*)Data below 0.5 thousand passengers

B. PASSENGER DISTANCE - thousands of passengers - km	Year 2020	The year 2020 in % compared to the year 2019
I. INTER-URBAN AND INTERNATIONAL PASSENGER TRANSPORT – thousands of passengers -km		
1. RAIL TRANSPORT - TOTAL	3720016	63.0
a. national	3700445	63.1
b. international	19557	48.9
c. transit	14	7.8
2. ROAD TRANSPORT - TOTAL	13572770	66.0
a. national	12039970	68.9
b. international	1532800	49.8
3. TRANSPORT ON INLAND WATERWAYS - TOTAL	6699	120.2
a. national	6699	120.2
II. LOCAL PUBLIC PASSENGER TRANSPORT – thousands of passengers -km		
TOTAL[2]	8565374	[3]
TRAMS	2186720	[3]
BUSES AND MICROBUSES	4285269	[3]
TROLLEYS	843996	[3]
SUBWAY[2]	1249389	49.6

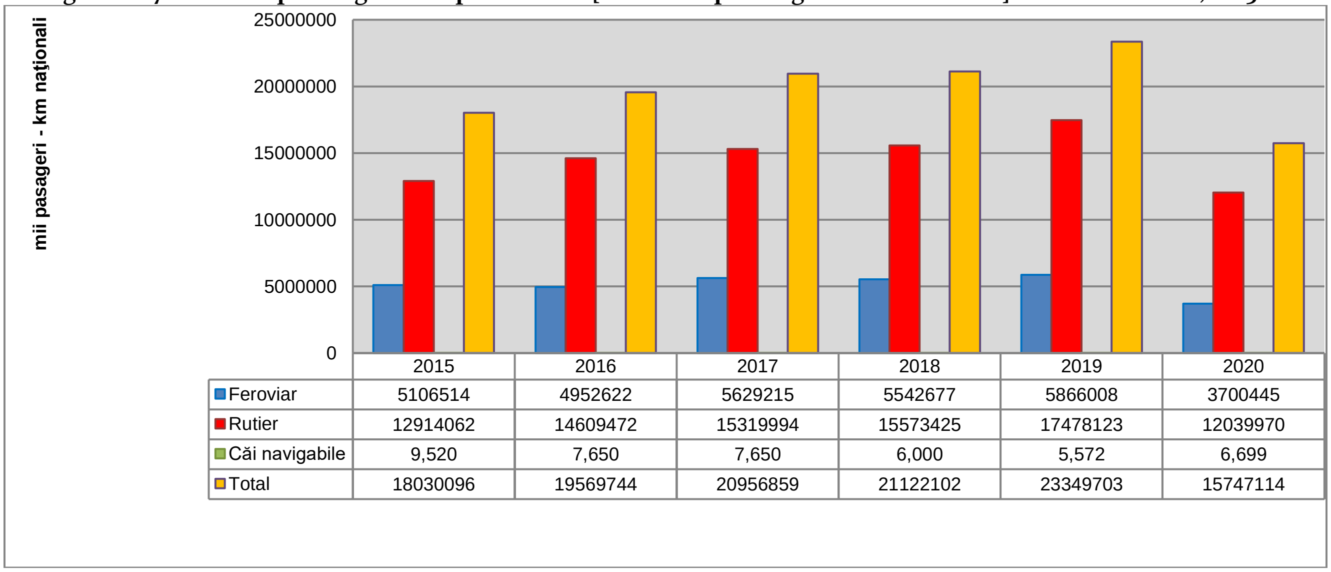
C. AVERAGE TRANSPORT DISTANCE - km		
INTER-URBAN AND INTERNATIONAL PASSENGER TRANSPORT -km		
RAIL TRANSPORT	73.6	86.8
ROAD TRANSPORT	49.6	85.9
INLAND WATERWAYS TRANSPORT	50.0	99.6

2) Provisional data
3) The data are not comparable with those of 2019 because the data for the first semester of the previous year did not include retired passengers residing in the city of Bucharest, beneficiaries of gratuities

	Year 2020	The year 2020 in % compared to the year 2019
D. ROAD VEHICLES FOR PASSENGERS - thousands of vehicles – km TOTAL (I+II+III)	849020	77.3
I. LOCAL PUBLIC PASSENGER TRANSPORT out of total:	241762	91.8
TRAMS	32821	87.2
BUSES AND MICROBUSES	182256	91.9
TROLLEYS	18381	98.5
SUBWAY	8304	97.4
II. COUNTY AND INTER-COUNTY ROAD TRANSPORT	556045	74.1
III. INTERNATIONAL ROAD TRANSPORT	51213	60.1

Source:: National Institute of Statistics - *https://insse.ro/cms/sites/default/files/field/publicatii/transportul_de_pasageri_si_marfuri_pe_moduri_de_transport_in_anul_2020.pdf*

Figure XI.7 -Share of passenger transport modes [thousand passengers – national km] at national level, 2015 – 2020



Source:: National Institute of Statistics

Table XI.6 - Share of each mode of transport in total passenger travel (% pkm), 2015 – 2020

%	2015	2016	2017	2018	2019	2020 (*)
Railway	19.47	17.50	17.41	15.49	16,28	15.3
Road	80.18	81.97	81.86	83,82	83.07	82.5
Waterways	0.05	0.04	0.04	0.03	0.03	
aerial	0.30	0.49	0.69	0.66	0.62	0.03
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	

Source: Ministry of Transport and Infrastructure, www.mt.ro (*) Provisional data

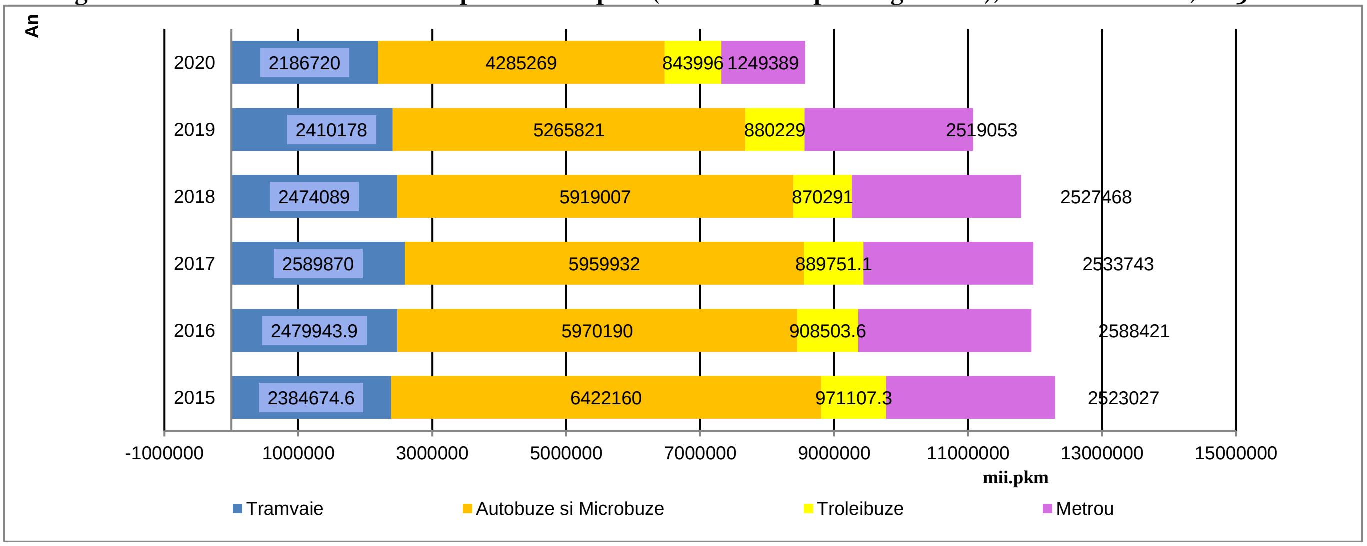
Use of public transport

Table XI.7 - Evolution of the use of public transport (thousands of passengers-km), at national level, 2015 – 2020,thousand passenger-km

Use of public transport	2015	2016	2017	2018	2019	2020 (*)
Trams	2384674.6	2479943.9	2589870.0	2474089	2410178	2186720
Buses, minibuses	6422160.0	5979190.0	5959932.0	5919007	5265821	4285269
Trolleys	971107.3	908503.6	889751.1	870291	880229	843996
Subway	2523027.0	2588421.0	2533743.0	2527468	2519053	1249389
TOTAL	12300968.9	11956059.2	11973296.0	11790855	11075281	8565374

(*) 2020 PROVISIONAL DATA -Source:: National Institute of Statistics -
https://insse.ro/cms/sites/default/files/field/publicatii/transportul_de_pasageri_si_marfuri_pe_moduri_de_transport_in_anul_2020.pdf

Figure XI.8 - Evolution of the use of public transport (thousands of passengers-km), at national level, 2015 -2020



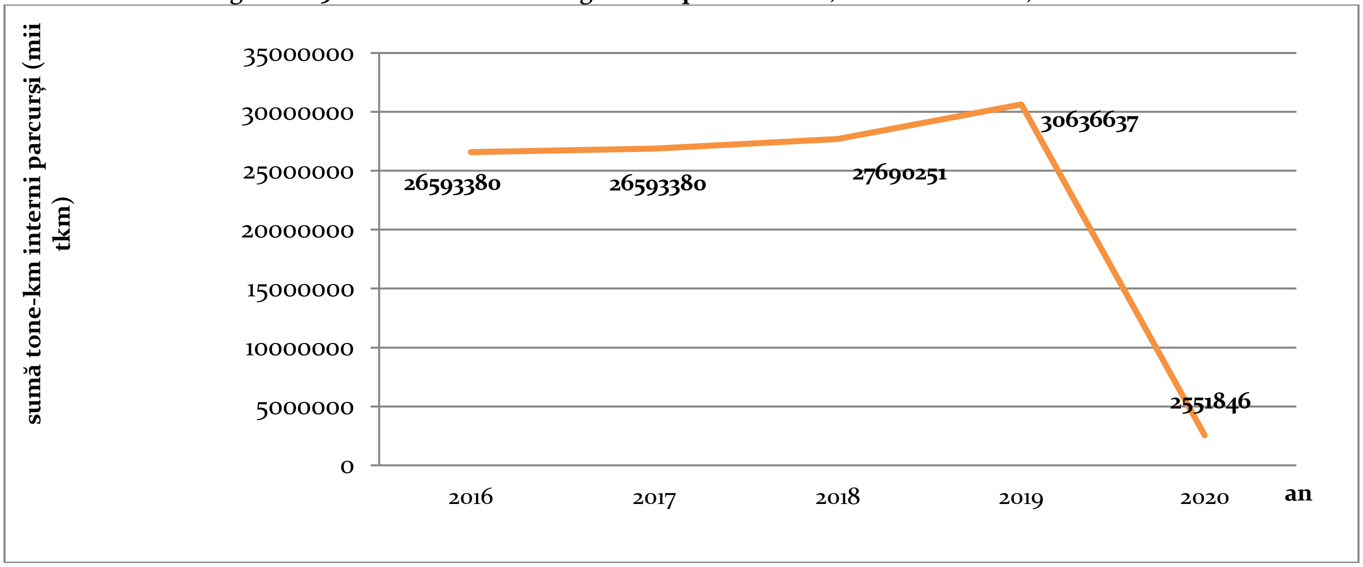
(*) 2020 PROVISIONAL DATA -Source:: National Institute of Statistics -
https://insse.ro/cms/sites/default/files/field/publicatii/transportul_de_pasageri_si_marfuri_pe_moduri_de_transport_in_anul_2020.pdf

Transport of goods

RO 36
Indicator code Romania: RO 36 EEA indicator code: CSI 36
TITLE: **DEMAND FOR FREIGHT TRANSPORT**
DEFINITION: Freight demand is defined as the sum of internal ton-kilometres traveled each year. According to the most recent metadata, inland shipping includes road, rail and inland waterway transport: inland waterways and rail transport are based on movements within the national territory ("territoriality principle"), regardless of the nationality of the vehicle or vessel. Road transport is based on all vehicle movements recorded in the reporting country

The road transport of goods includes the transport on vehicles registered in the reporting country, and the railway transport and the transport on inland waterways include the transport on the national territory, regardless of the nationality of the transport vehicle, registered for a period of at least 5 years. The variable is calculated from the *ton-km (tkm) indicator*, defined as the transport of one ton of goods over a distance of one kilometer. From the analysis of the evolution of freight transport demand (*figure XI.9*), it can be observed that in 2020, the tariff course of goods in domestic traffic decreased by 26.38% compared to 2019 due to the coronavirus pandemic and its consequences, respectively, the slowdown of industrial activity and population consumption.

Figure XI.9 -The evolution of freight transport demand, at national level, 2016 – 2020

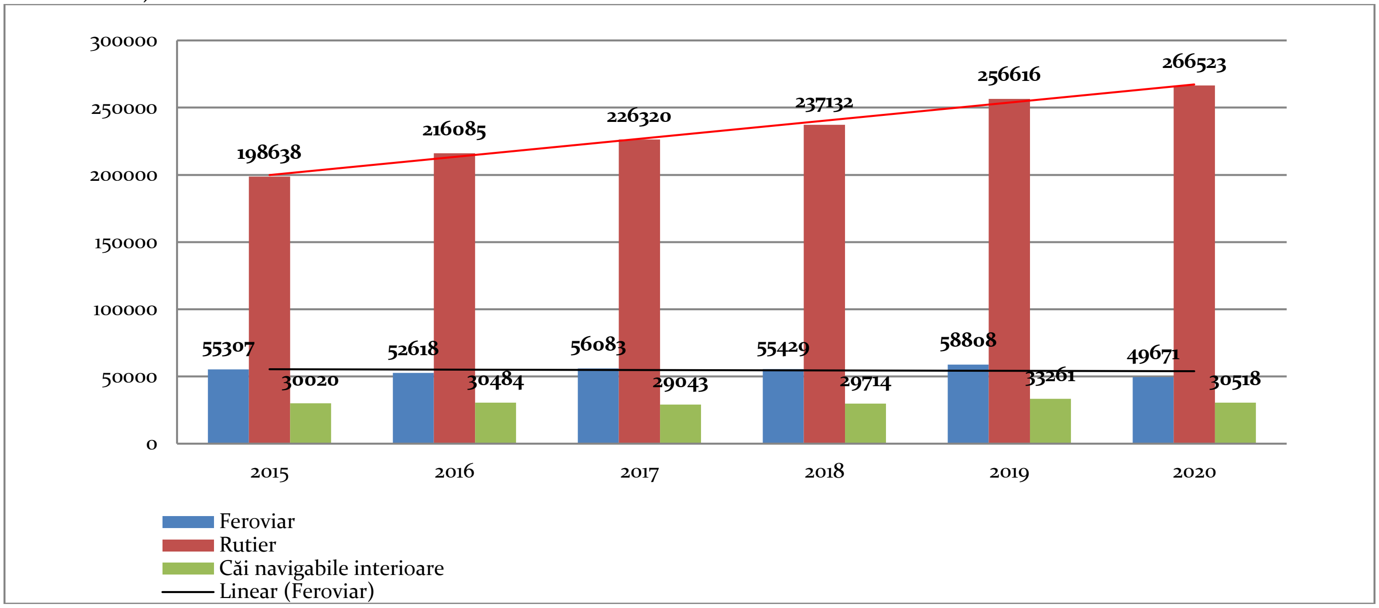


Source: National Institute of Statistics

The share of each mode of transport in the freight transport

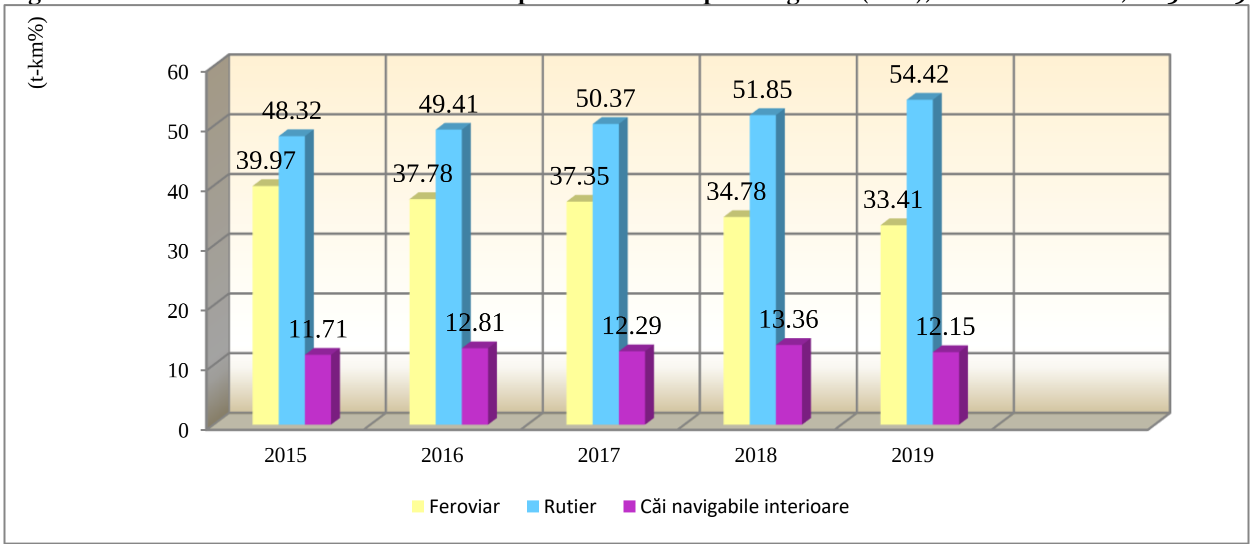
The modes of transport considered are: a) road, b) railway and c) inland waterways. Road transport of goods includes transport on vehicles registered in the reporting country, and rail and inland waterway transport includes transport on national territory, regardless of the nationality of the transport vehicle. The weight is calculated from the *ton-km (tkm) indicator*, defined as the transport of one ton of goods over the distance of one kilometer. It is observed that both in the case of the demand for passenger transport and that of freight transport, road transport has an overwhelming weight to the detriment of the other modes of transport. At the same time, *the objectives of sustainable mobility* requires the transfer of an ever-increasing volume of passenger and freight transport from the road to the railway. *Figure XI.10 shows the volume of goods transported in Romania, by rail, road and inland waterways, in the period 2015-2020, in thousands of tons. Figure XI.11* shows the share of each mode of transport in the transport of goods (tkm) at national level, for the period 2015 – 2019.

Figure XI.10 - The volume of goods transported in Romania, by rail, road and inland waterways, in the period 2015 – 2020 (thousand tons)



Source:National Institute of Statistics ,Ministry of Transport and Infrastructure

Figure XI.11 - The share of each mode of transport in the transport of goods (tkm), at national level, 2015 - 2019



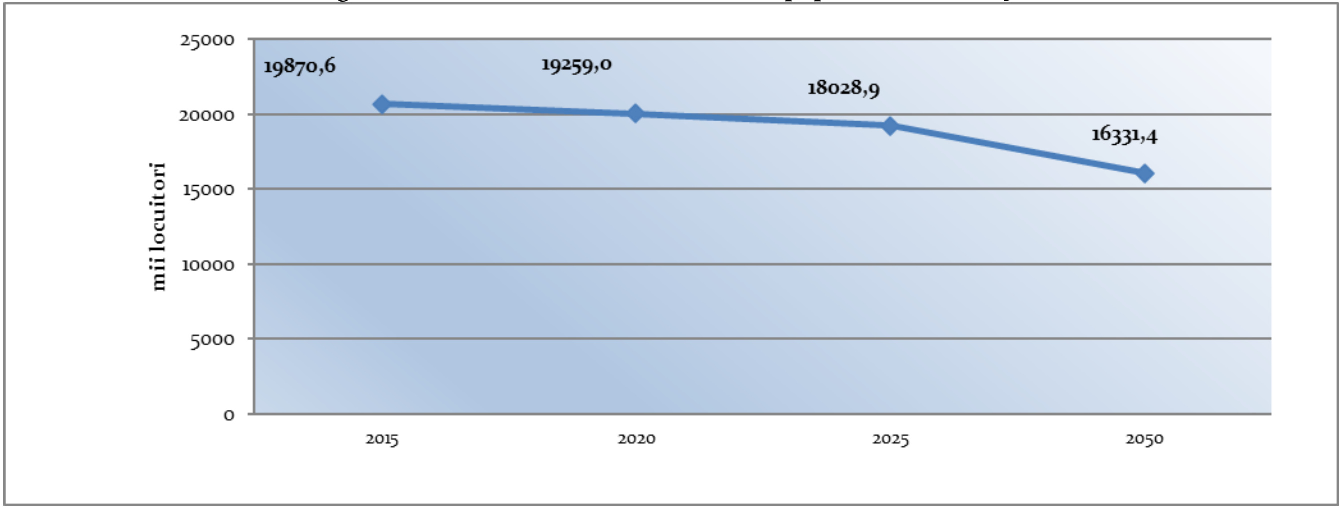
Source: Ministry of Transport,www.mt.ro - until the date of preparation of this report, the data forthe year 2020

FACTORS THAT INFLUENCE CONSUMPTION

Among the most important factors that influence private consumption are: demographic factors, social and psychological factors, income and prices, trade, globalization, technologies, the supply of goods and services, and the way in which they are marketed. They also influence consumption: information about products and services, policies, housing and infrastructure. At the microeconomic level, the consumer's income is the essential factor, which through form, size, dynamics, distribution over time and destination constitutes the material premise of the consumer's behavior but also the main restriction that is imposed on him. According to the Organization for Economic Cooperation and Development "the most important economic factor that influences consumption patterns is the level of disposable income per household".

Demographic evolution of Romania between 2015 and 2019 and its projection until 2025 and 2050 respectively (*figure XI.12*), according to the data provided by the *National Institute of Statistics*. According The National Institute of Statistics, in 2019, "*The demographic aging process intensified compared to January 1, 2018, noting a slight decrease in the share of young people (0-14 years) and at the same time an increase (of 0.3 points percentage) of the share of the elderly population (aged 65 and over). The demographic aging index increased from 110.0 (on January 1, 2018) to 113.4 elderly people per 100 young people (on January 1, 2019)*". **In the coming decades, a deepening of Romania's demographic decline is expected. Thus, Romania's population will reach approximately 16.5 million inhabitants in 2050, according to a report by the United Nations (UN), published in July 2015**. The decrease in the population will be due to the maintenance of a deficit of births in relation to the number of deaths to which will be added the cumulative balance of internal and external migration.

Figure XI.12 - The evolution of Romania's population until 2050



Source: National Institute of Statistics

According to the 2017 "*World Population Prospects: The 2017 Revision*" report, prepared by the *Population Division of the UN Department of Economic and Social Affairs*, the estimated population of the world will be, in the year 2050, almost 9.8 billion people, and in the year 2100 it is forecast that it will reach 11.2 billion inhabitants. The world population will increase annually, on average, by approximately 43.8 million inhabitants. Half of the population growth by 2050 will come from nine countries: India, Nigeria, Democratic Republic of Congo, Pakistan, Ethiopia, Tanzania, USA, Uganda and Indonesia. By 2050, seven African countries will be part of the top 20 countries with the most inhabitants. *The UN report mentions that European countries, as a result of maintaining fertility rates below the replacement level (of about 2.1 live births* *per woman), will register decreases in the number of the population. Eastern Europe will be the most affected by this demographic trend, the number of inhabitants could decrease by more than 15% in Bulgaria, Croatia, Latvia, Lithuania, Poland, the Republic of Moldova, Romania, Serbia and Ukraine.* The growth of the world population is accompanied by a change in the age structure of the population. The global reduction of the birth rate and the decrease in the number of children, in parallel with the constant increase in the number of the elderly, lead to a change in the balance between generations. ***The demographic projection carried out by the Population Division of the UN Department of Economic and Social Affairs anticipates that, in the average version, Romania's population will be 16.4 million inhabitants in 2050, and 12.1 million inhabitants in 2100.*** The growth of the world population is accompanied by a change in the age structure of the population. The global reduction of the birth rate and the decrease in the number of children, in parallel with the constant increase in the number of the elderly, lead to a change in the balance between generations. The demographic projection carried out by the Population Division of the UN Department of Economic and Social Affairs anticipates that, in the average version, Romania's population will be 16.4 million inhabitants in 2050, and 12.1 million inhabitants in 2100. The growth of the world population is accompanied by a change in the age structure of the population. The global reduction of the birth rate and the decrease in the number of children, in parallel with the constant increase in the number of the elderly, lead to a change in the balance between generations. The demographic projection carried out by the Population Division of the UN Department of Economic and Social Affairs anticipates that, in the average version, Romania's population will be 16.4 million inhabitants in 2050, and 12.1 million inhabitants in 2100.

Demographic projections at the level of member countries made by Eurostat in 2016, based on the analysis of fertility, mortality and international migration, it anticipates the probable evolution of the population of the member countries until the horizon of 2080(table XI.8). *According to the demographic projections made by Eurostat, in the basic version, the population of the EU-28 will increase until the year 2050, when it will reach about 528.6 million inhabitants, after which the population will decrease until the year 2080 (518.8 million inhabitants*). In establishing the design assumptions, Eurostat took into account the socio-demographic differences between the member states and established the period of time when the fertility level and the life expectancy level in each state will converge, and the differences regarding the demographic phenomena between the states will fade.

Table no. XI.8 – The population registered in 2015 and projected for the period 2015 – 2080 at the level of the EU-28 and the member countries

Countries	Population registered in 2015	Projected population		
		2020	2050	2080
EU-28	508401084	515591288	528567808	518798375
Belgium	11208986	11580268	13273155	14189456
Bulgaria	7202198	6954254	5564146	4593415
Czech Republic	10538275	10652407	10478190	9777734
Denmark	5659715	5887449	6685016	6858258
Germany	81197537	83751689	82686973	77793794
Estonia	1313271	1317940	1256975	1140304
Ireland	4628949	4852123	5693430	6220907
Greece	10858018	105560497	8918545	7264685
Spain	46449565	46562044	49257477	50988206
France	66415161	67818978	74376832	78688730
Croatia	4225316	4091559	3674791	3276481
Italy	60795612	60350475	58968137	53784578
Cyprus	847008	869041	984402	1004870
Latvia	1986096	1911668	1506005	1284285
Lithuania	1921262	2749762	1957377	1658478

Luxembourg	562958	628950	938416	1066377
Hungary	9855571	0789630	0287196	8691906
Malta	429344	452542	513081	517254
Netherlands	16900726	17410756	19253467	19728275
Austria	8576261	9005478	10247691	10072112
Poland	38005614	37930818	34372849	29044721
Portugal	10374822	10209628	9116350	7579557
Romania	19870647	19259049	16331359	14530142
Slovenia	2062874	2075778	2045090	1938449
Slovakia	5421349	5458718	5261609	4714770
Finland	5471753	5561792	5687527	5577757
Sweden	9747355	10293412	12681084	14388478
England	64875165	67236507	77568588	82424395
Norway	5166493	5403704	6568489	7166280

Source: Eurostat – http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_15npms&lang=en

The UN report mentions that European countries, as a result of maintaining fertility rates below the replacement level (of about 2.1 live births per woman), will register decreases in the number of the population. **Eastern Europe will be the most affected by this demographic trend, the number of inhabitants may decrease by more than 15% in Bulgaria, Croatia, Latvia, Lithuania, Poland, the Republic of Moldova, Romania, Serbia and Ukraine**. The growth of the world population is accompanied by a change in the age structure of the population. The global reduction of the birth rate and the decrease in the number of children, in parallel with the constant increase in the number of the elderly, lead to a change in the balance between generations. ***Demographic projection by the Population Division of the UN Department of Economic and Social Affairs anticipates that, in the medium version, Romania's population will be 16.4 million inhabitants in 2050, and 12.1 million inhabitants in 2100.*** The aging of the population will lead to the emergence of new market segments or the emergence of new products dedicated to seniors, in addition to the classic ones dedicated to them.

In 2020, the population of the European Union reached 678 million inhabitants.

The study "GfK Purchasing Power in Europe 2020" makes a detailed assessment of the distribution of purchasing power in 42 European countries (*table XI.9*). Europeans have an average purchasing power per capita of €13,894 in 2020. However, net disposable income across the 42 countries studied varies significantly. Liechtenstein, Switzerland and Luxembourg have the highest net disposable income, while Kosovo, Moldova and Ukraine have the lowest. Liechtensteinians have an average purchasing power over 37 times higher than that of Ukrainians. *GfK calculated the extent to which European countries (42 countries taken into account by the GfK study) suffered as a result of the effects of COVID-19 through the "Corona Impact Index". It shows differences in the loss of prosperity among private households as a result of the coronavirus crisis, thus facilitating national and regional comparisons across Europe. Thus, Lichtenstein and Switzerland suffered the least as a result of the crisis. Iceland and Norway were severely affected by the coronavirus pandemic, one of the reasons being the devaluation of their national currencies against the euro. The last place among the 42 countries in the ranking is held by Turkey, where the "Corona Impact Index" is more than 2.8 times higher than the European average.* (*Source: "GfK Purchasing Power Europe 2020"*).

Table XI.9 – Top 10 countries in Europe regarding the distribution of purchasing power,the year 2020

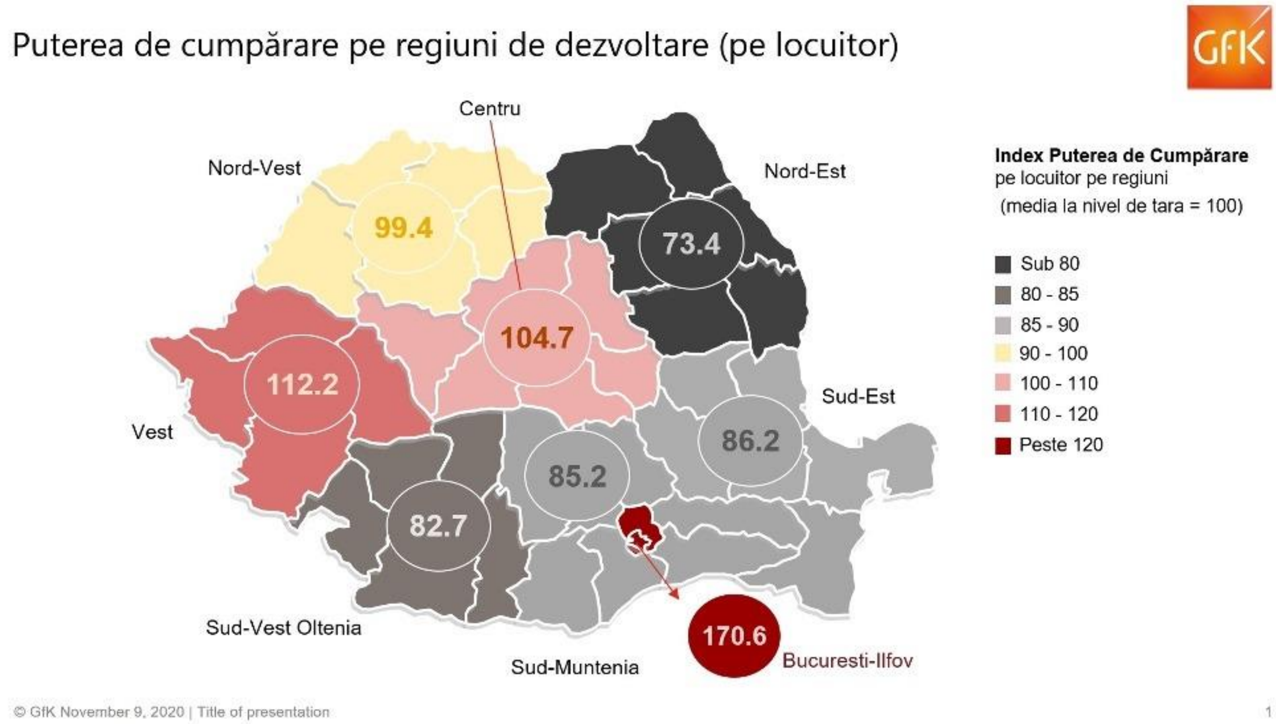
Top year 2020 (Top year 2019)	Country	No. of inhabitants	Purchasing power per capita in Euros in 2020	Europe purchasing power index*	CORONA Impact Index
1 (1)	Liechtenstein	38,378	64,240	462.4	15.2

2 (2)	Switzerland	8,544,527	41,998	302.3	26.1
3 (3)	Luxembourg	626,108	34,119	245.6	64.2
4 (4)	Iceland	364,134	28,155	202.6	158.3
5 (5)	Norway	5,367,580	25,699	185.0	163.2
6 (6)	Denmark	5,822,763	25,176	181.2	68.9
7(7)	Austria	8,858,775	23,585	169.7	60.8
8 (8)	Germany	83,019,213	22,388	161.1	77.6
9 (12)	Ireland	4,904,240	21,030	151.4	77.2
10 (10)	Sweden	10,327,589	20,882	150.3	37.1
	EUROPE (total)	678,118,773	13,894	100.0	100.0

*Source: GfK Purchasing power Europe 2020 *index per inhabitant: European average = 100*

Romania is on 31st place in the European ranking of purchasing power, under Hungary, approximately 60% below the European average(*figure XI.13*). Romania has a very large gap between the rich and the poor. The capital, Bucharest, leads the ranking by a significant difference. Residents of the capital have more than 81% more purchasing power compared to the national average. Bucharest residents have three times more spending and savings income compared to residents of the county with the lowest purchasing power, Vaslui. The average purchasing power per capita shows a decrease of almost 5.3% in 2020 compared to 2019, which can be mainly attributed to the spread of COVID-19 and the resulting economic impact. The Romanian durable goods market continued its upward trend in the second quarter of 2020, according to data audited by GfK Romania. Technical Consumer Goods (TCG) sales advanced 5.2% in April-June 2020 compared to the same period last year, supported by growth in the IT, office equipment and small appliances sectors.

Figure XI.13 - The study ***GfK Purchasing Power for Romania***



Real consumption per capita *decreased by 2.9% at the level of the European Union in the first three months of 2020, according to Eurostat data*. And according to Eurostat, it was the biggest decline since this indicator has been measured.

PRESSURES ON THE ENVIRONMENT CAUSED BY CONSUMPTION

Direct and indirect pressures on final domestic consumption attributed to food and drink, housing use, infrastructure and mobility.

GREENHOUSE GAS EMISSIONS FROM THE RESIDENTIAL SECTOR

RO 10
Indicator code Romania: RO 10 EEA indicator code: CSI 10
TITLE: **GREENHOUSE GAS EMISSIONS TREND**
DEFINITION: The indicator represents the trends (total and by sector) of greenhouse gas emissions in relation to the obligations of the member states to respect the objectives of the Kyoto protocol. The emissions are presented according to their type and are analyzed according to their potential contribution to amplifying the phenomenon of global warming

The natural greenhouse effect has the role of regulating the average temperature of the Earth, maintaining optimal living conditions. Solar energy reaches the earth in the form of short-wavelength radiation. Some are reflected by the atmosphere and the earth's surface. Most of it passes through the atmosphere and warms the earth's surface, which in turn emits long-wavelength infrared radiation (heat). The change in the radiative balance, i.e. the change in the balance between the incoming and outgoing radiation from the contour of the Earth and its atmosphere, leads to an increase in the global temperature (positive change) or to its decrease (negative change). Some gases in the atmosphere absorb heat and, reflecting it back to the earth's surface, warm the atmosphere. These are the so-called greenhouse gases (GES or GHG – "greenhouse gases"). ***Greenhouse gases covered under the UNFCCC*** are: CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3. This list does not include the greenhouse gases controlled by the Montreal Protocol, which are also substances that deplete the ozone layer.

Sources of emissions: The indicator provides information on emissions from the main anthropogenic sources of greenhouse gases, distributed among the following emission sectors (according to the IPCC nomenclature): energy supply and use, transport, industry, agriculture, waste, etc. The indicator does not refer to emissions from international aviation and maritime transport, which are not regulated by the Kyoto Protocol. In general, these sources are not taken into account in the calculation of the total greenhouse gas emissions reported at national and European level. Also, emissions from land use, land use change and forestry (LULUCF) are not included in total greenhouse gas emissions (*Bibliographic source: EEA, indicators, http://www.eea.europa.eu/data-and-maps/indicators)*.

Compared to the other sectors of greenhouse gas emissions (GHG) from the National Inventory of Greenhouse Gas Emissions (INEGES), namely Industrial Processes and Product Use (IPPU), Agriculture, Waste, as well as Land Use, Land Use Change and Forestry (LULUCF), the Energy sector represents the largest source of anthropogenic GHG emissions in Romania.

In 2019, the energy sector was responsible for approximately 66.09% of total GHG emissions (111,767.06 kt CO2 equivalent).

According to the IPCC, the Energy sector includes several subsectors:
- 1.A Combustion of fuels;
  - 1.A.1 Energy industry
  - 1.A.2 Manufacturing and Construction Industry;
  - 1.A.3. Transport;
  - 1.A.4 Other sectors (commercial/institutional, residential, agriculture/forestry/fisheries);
  - 1.A.5. Others (stationary, mobile);
- 1.B. Fugitive emissions from fuels.

The residential subsector includes the following quantities:
- supply of open flame systems for heating and cooking, including energy consumption for the living space of the owners and administration of economic agents;
- supply to the population to produce heat and hot water in central heating and the quantities of coal received by miners as direct allowances (payments) from mining companies;
- heat supplied to the population for heating and hot water, both from the public and from the car manufacturing sectors.

Between 1989 and 2019, total greenhouse gas emissions (table XI.10) showed a downward trend. In 2007 they decreased by approximately 2.03% compared to the previous year. Between 2008 and 2019, greenhouse gas emissions from the residential and commercial sector increased by 7.07%. The share of total GHG emissions of category 1.A.4.b from sub-sector 1.A.4 (figure XI.14 and table XI.11) is approximately 59.34% for the base year 1989 and 67.44 % for the year 2019. The contribution of this category is approximately 7,962,336 kt CO2. equivalent in 2019. A main contribution of the use of natural gas as a fuel is observed in this activity category, throughout the time period 1989-2019.

Table XI.10 - Greenhouse gas emissions – sub-sector „Other subsectors”

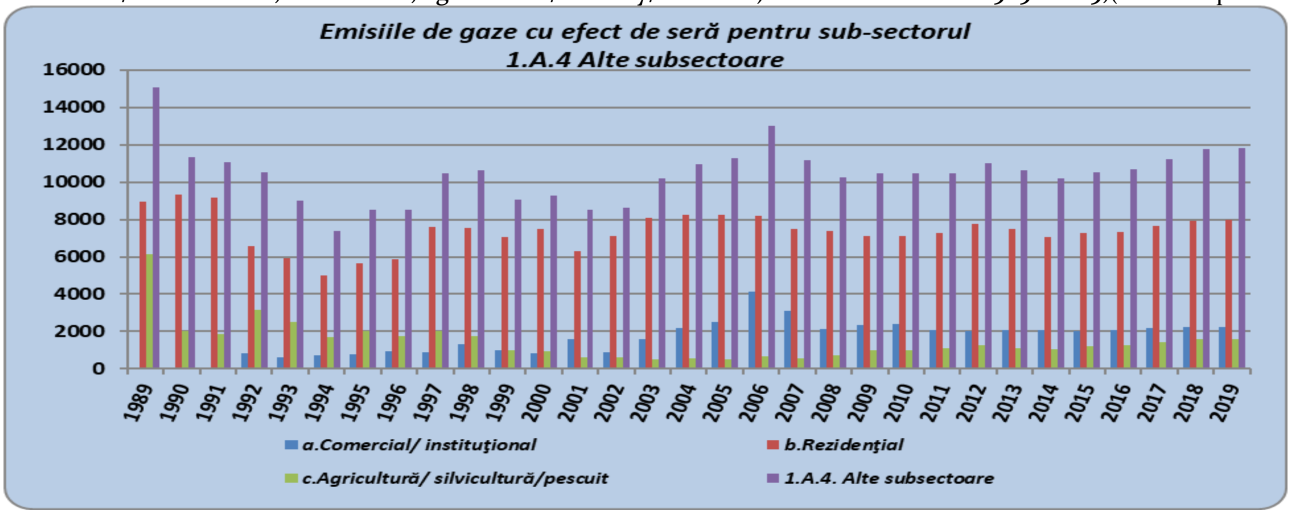
Greenhouse gas emissions for the sub-sector "Other sub-sectors" (kt CO2 equivalent)				
Year	1.A.4. Other subsectors			
	a. Commercial/ institutional	b. Residential	c. Agriculture/ forestry/fishing	Total
1989	0	8,953	6,136	15,088
1990	0	9,305	2,005	11,310
1991	0	9,176	1,873	11,049
1992	804	6,556	3,155	10,515
1993	617	5,898	2,492	9,008

1994	696	5,008	1,682	7,386
1995	800	5,653	2,048	8,501
1996	916	5,881	1,742	8,540
1997	891	7,586	1,995	10,472
1998	1,336	7,565	1,756	10,657
1999	976	7,057	1,010	9,042
2000	843	7,512	940	9,295
2001	1,593	6,316	634	8,543
2002	879	7,091	631	8,601
2003	1,602	8,060	528	10,191
2004	2,186	8,222	549	10,957
2005	2,522	8,262	515	11,299
2006	4,149	8,206	668	13,024
2007	3.122	7,476	563	11,161
2008	2,142	7,403	713	10,257
2009	2,348	7,126	1,008	10,482
2010	2,397	7,089	998	10,484
2011	2,091	7,280	1,122	10,493
2012	2,012	7,756	1,267	11,035
2013	2,066	7,471	1.102	10,639
2014	2,062	7,070	1,050	10,182
2015	2,013	7,284	1,215	10,512
2016	2,067	7,341	1,280	10,689
2017	2,174	7,668	1,404	11,246
2018	2,251	7,897	1,609	11,757
2019	2,257	7,962	1,587	11,807

Source: NEPA

Note: The differences that appeared in the RSM associated with the year 2020 compared to the elements part of the RSM associated with the year 2019 are associated with the implementation of recalculations at the level of the National Inventory of Greenhouse Gas Emissions and the introduction of elements characteristic of the year 2019

Figure XI.14 - Evolution of greenhouse gas emissions from the Energy sector – subsector 1.A.4 Other sectors (commercial/institutional, residential, agriculture/forestry/fisheries) for the time series 1989 – 2019,(kt CO2 equivalent)



Source: NEPA - National emissions reported under the Monitoring and Reporting Mechanism of Greenhouse Gas Emissions at the level of the European Union

Table XI.11 - Share of GHG emissions associated with categories at the subsector level"Other sub-sectors"

Year	Share (%)		
	a. Commercial/ institutional	b. Residential	c.Agriculture/forestry/fishing
1989	0.00	2.92	2.00
1990	0.00	3.76	0.81
1991	0.00	4.49	0.92
1992	0.42	3.46	1.67
1993	0.34	3.29	1.39
1994	0.39	2.83	0.95
1995	0.43	3.07	1.11
1996	0.49	3.15	0.93
1997	0.50	4.22	1.11
1998	0.82	4.63	1.07
1999	0.67	4.85	0.69
2000	0.61	5.41	0.68
2001	1.12	4.44	0.45
2002	0.61	4.93	0.44
2003	1.07	5.39	0.35
2004	1.48	5.56	0.37

2005	1.72	5.62	0.35
2006	2.80	5.53	0.45
2007	2.15	5.14	0.39
2008	1.52	5.26	0.51
2009	1.93	5.86	0.83
2010	2.06	6.10	0.86
2011	1.69	5.88	0.91
2012	1.66	6.41	1.05
2013	1.85	6.68	0.99
2014	1.83	6.29	0.93
2015	1.78	6.43	1.07
2016	1.87	6.63	1.16
2017	1.90	6.71	1.23
2018	1.96	6.86	1.40
2019	2.02	7.12	1.42

Source: NEPA

Note: The differences that appeared in the RSM associated with the year 2020 compared to the elements part of the RSM associated with the year 2019 are associated with the implementation of recalculations at the level of the National Inventory of Greenhouse Gas Emissions and the introduction of elements characteristic of the year 2019

ENERGY CONSUMPTION PER CAPITA

RO 27
Indicator code Romania: RO 27
EEA indicator code: CSI 27
TITLE: **FINAL ENERGY CONSUMPTION BY TYPE OF ACTIVITY SECTOR**
DEFINITION: The final energy consumption covers the amounts of energy supplied to the final consumer for the most diverse energy purposes. It is calculated as the sum of the final energy consumption from all sectors of activity. They are structured so as to include industry, transport, households, services and agriculture

The assessment of the degree of energy dependence at the sector level is carried out by adding up the amounts of energy used by branches of activity according to the energy balance. The quantities used for the production of other fuels, the consumptions of the energy sector and the losses of transport and distribution are not included.

Total energy resources available in 2019 registered an increase of 2.0% compared to those in 2018; compared to the previous year, primary energy production decreased by 1.8%, energy resource imports increased by 12.3%, gross domestic energy consumption decreased by 1.5%, and final energy consumption increased of 1.1%. Accumulating 44.1 million tonnes of oil equivalent 1) (toe) in 2019, compared to 43.2 million tonnes of oil equivalent (toe) in 2018, the decline in primary energy production (-1.8%) was offset by increased imports of energy resources (+12.3%). Among the primary energy resources, more significant variations were recorded in the usable crude oil and natural gas resources, which increased by 486 thousand toe and 459 thousand toe, respectively.

Primary energy production in 2019, of 24535 thousand toe, decreased by 444 thousand toe compared to 2018, mainly due to the decrease in the production of usable natural gas (-288 thousand toe), hydroelectric energy and coal (-140 thousand toe, respectively -88 thousand toe), but continued to keep its significant share in the total energy resources, representing

55.6% of them(*table XI.12). Primary energy resources in 2019 were 42,701 thousand tons of oil equivalent, 2.5% higher than the previous year.*

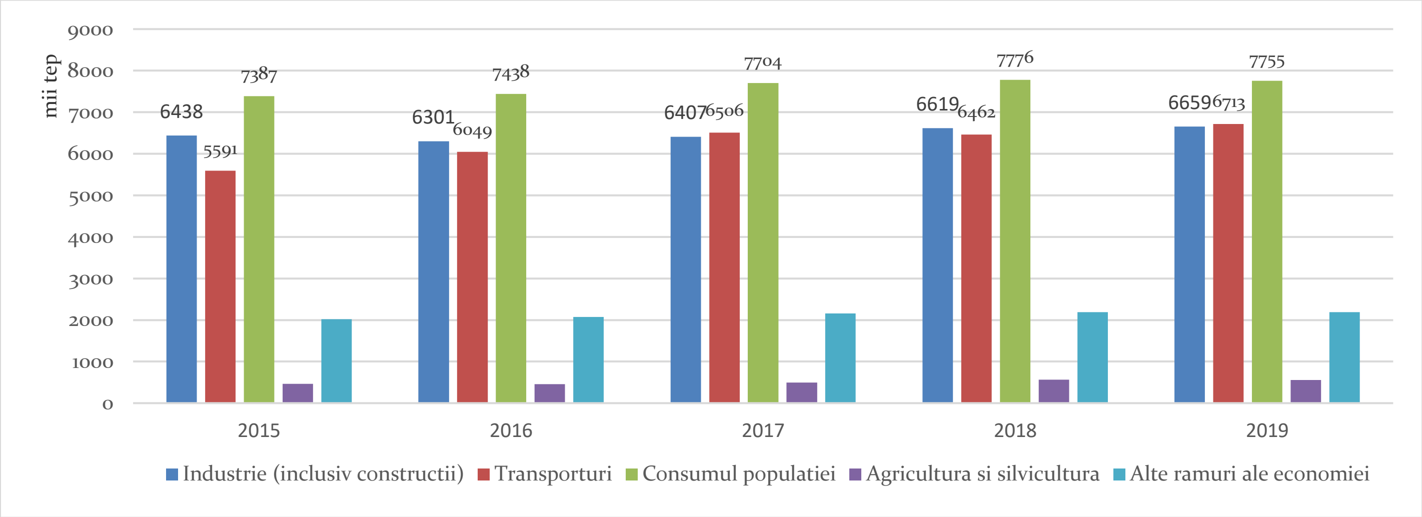
Table XI.12 -Energy resources, in structure and on the main assortments

ENERGY RESOURCES - TOTAL	2018	2019	distinction	
	thousand toe	thousand toe 1)	(±)thousand toe	%
	43238	44116	+878	2.03%
- Primary energy production (including recovered energy)	24979	24535	-444	-1.78%
• from primary energy resources:				
- coal (excluding coke)	4868	4790	-78	-1.60%
- crude oil2)	12485	12971	+486	3.89%
- usable natural gas3)	11087	11546	+459	4.14%
- imported coke	454	501	+47	10.35%
- imported petroleum products	3290	3263	-27	-0.82%
- hydroelectric, wind, solar photovoltaic and nuclear heat	5044	4960	-84	-1.67%

1)Conventional fuel with a calorific value of 10,000 kcal/kg; 2) including gasoline and ethane from the extraction scaffolds; 3)exclusive of gasoline and ethane from extraction scaffolds(Source: INSE, Energy Balance 2019- https://insse.ro/cms/ro/tags/balanta-energetica-si-structura-utilajului-energetic)

From figure XI.15 regarding **energy consumption by types of activity sectors** in the period 2015-2019, it is observed that the largest share is held by energy consumption in the residential sector, followed by industry activities and transport activities.

Figure XI.15 -Energy consumption by types of activity sectors for the period 2015-2019 (thousands of toe)



Source: *National Institute of Statistics* http://www.insse.ro

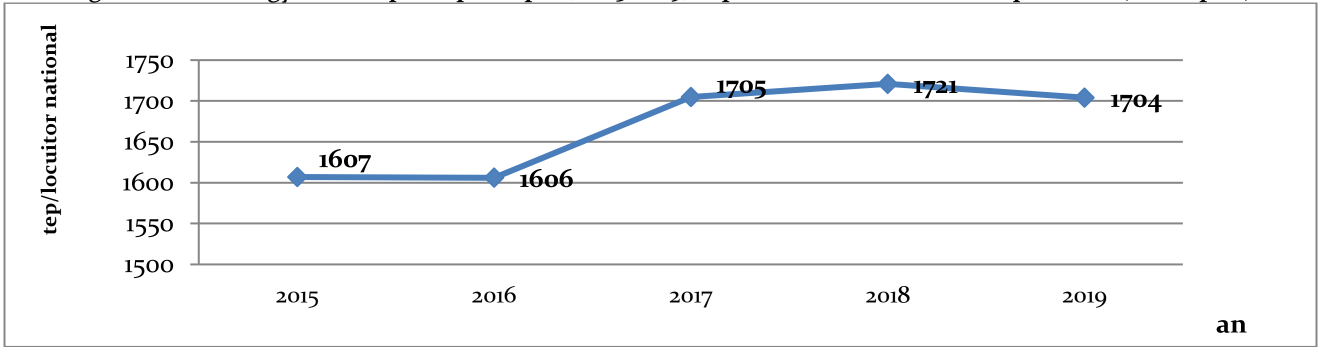
Gross domestic energy consumption per inhabitant in 2019 it was 1704 toe/place, -1%, compared to 2018 (1721 toe/place). The trend of gross domestic energy consumption per inhabitant in the period 2015-2019 is shown in *table XI.13 and figure XI.16*, where an increase is observed from 1607 toe/place in 2015 to 1721 toe/place in 2018, +6%.

Table XI.13 -Energy consumption per capita, 2015-2019, expressed in tonnes of oil equivalent (toe/capita)

YEAR	2015	2016	2017	2018	2019
Energy consumption/inhabitant (toe/inhabitant)	1 607	1 606	1705	1721	1704

Source: National Institute of Statistics http://www.insse.ro

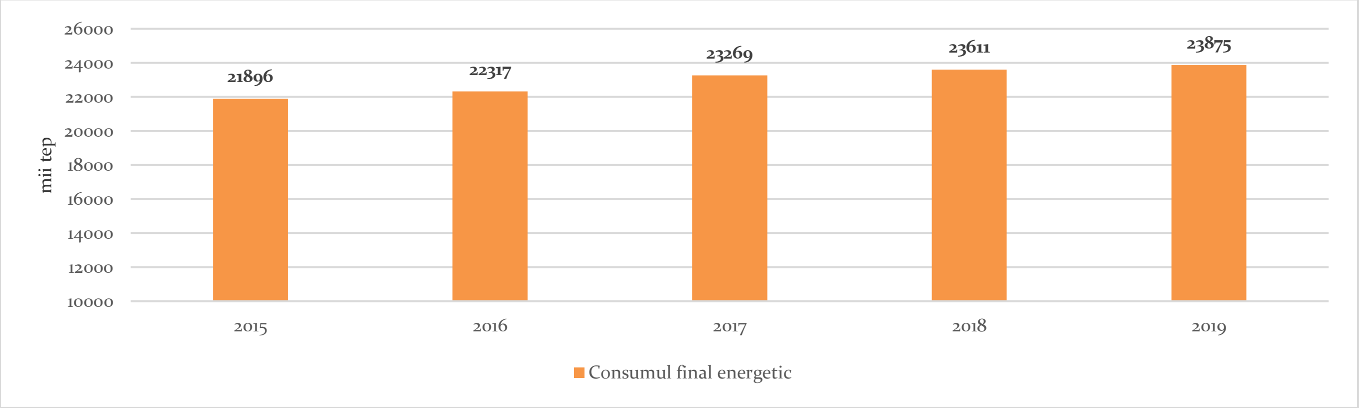
Figure XI.16 -Energy consumption per capita, 2015-2019, expressed in tonnes of oil equivalent (toe/capita)



Source: National Institute of Statistics-until the date of preparation of this report, the data for the year 2020 have not been processed - http://www.insse.ro

Final energy consumptionin 2019 increased by 264 thousand toe (+1.1%) compared to 2018 (*figure XI.17*). The final energy consumption in industry (including construction) registered an increase of 0.6% compared to 2018, mainly due to the increase in consumption in the chemical and pharmaceutical industry, rubber and plastic products (+37 thousand toe) and construction (+44 thousand toe). Compared to 2018, final energy consumption decreased by 3.3% in metallurgy and by 0.7% in the metal construction, machinery and equipment industry. In addition to industry, the transport sector and the tertiary sector also contributed to the increase in final energy consumption (*Source:* http://www.insse.ro)

Figure XI.17 -Final energy consumption 2015-2019, thousand toe

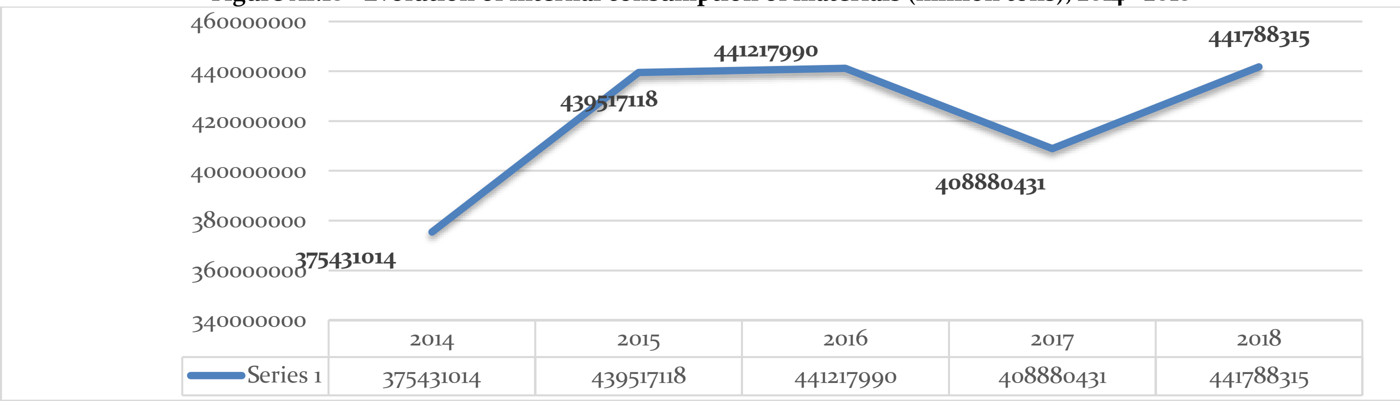


Source: National Institute of Statistics - until the date of preparation of this report, the data for the year 2020 have not been processed - http://www.insse.ro

USE OF MATERIALS

Internal consumption of materials (DMC – Domestic Material Consumption) – includes the total amount of materials used directly in the economy (domestic extraction used plus imports). The DMC components are: direct material inputs (DMI) and material exports. It provides the elements for the calculation of the decoupling indicators regarding the use of resources. ***Internal Consumption of Materials Indicator*** (*figure XI.18*) had a fluctuating trend from one year to another, between 2014-2018 and a significant increase in 2015 (*Source: National Institute of Statistics - up to the date of preparation of this report the data for the years 2019 and 2020 have not been processed).*

Figure XI.18 - Evolution of internal consumption of materials (million tons), 2014 - 2018



Source: National Institute of Statistics - until the date of preparation of this report, the data for the years 2019 and 2020 have not been processed

THE GREEN ECONOMY

PUBLIC INSTITUTIONS AND COMMERCIAL COMPANIES REGISTERED IN EMAS

RO 70
Indicator code Romania: RO 70
EEA indicator code: SCP 033
TITLE: **THE NUMBER OF ORGANIZATIONS WITH ENVIRONMENTAL MANAGEMENT SYSTEMS REGISTERED IN ACCORDANCE WITH EMAS AND ISO 14001**
DEFINITION: The indicator presents the total number of organizations and the total number of locations registered within the EMAS environmental management and audit community system and the number of organizations certified in accordance with the international standard for Environmental Management Systems, ISO 14001

The EU Eco-Management and Audit Scheme (EMAS) *is a management tool developed by the European Commission for companies and other organisations to assess, report and improve their environmental performance*.

EMAS is open to any type of organisation willing to improve its environmental performance, spans all economic and service sectors and is applicable worldwide. With the revision of the Annexes to the EMAS Regulation, it is easier for an organisation that already complies with an environmental management system such as ISO14001, to switch to EMAS. In addition to the requirements of ISO 14001, EMAS places more emphasis on compliance with the requirements of: compliance with environmental protection legislation; continuous improvement of environmental performance; external communication, by making the environmental statement available to the public; employee involvement. *EMAS is an operational environmental management system which leads to the continuous improvement of environmental performance at the level of the best available techniques of the moment, in parallel with the improvement of economic performance. From an economic point of view, EMAS means: lower resource savings and costs, therefore reducing expenditure caused by reactive management strategies such as remediation, payment of penalties for breaching the legislation*.

EMAS means:

- *Performance: EMAS supports organisations in finding the right tools to improve their environmental performance. Participating organisations undertake on a voluntary basis to assess and reduce the impact on the environment*.
- *Credibility*: verification of information by third parties, guarantees the external and independent nature of the EMAS registration process.
- *Transparency*: providing publicly available information on an organization's environmental performance is an important aspect of EMAS. Organizations achieve greater transparency both externally through environmental declaration and internally through the active involvement of employees.

With EMAS, the organisation can reduce its environmental impact, strengthen legal compliance and employee engagement, and save resources and money. Through the environmental statements that organisations have to draw up for registration in EMAS, they assume the development of performance indicators so that when it is updated annually, the indicators can be assessed to determine whether the organisation has achieved environmental performance.

EMAS offers a number of benefits such as credibility, transparency and reputation through:

- ✓ continuous improvement of environmental performance, which is independently verified and validated by the environmental statement, this being an opportunity to stand out, which leads to increased business opportunities in markets that prioritize environmentally friendly production processes, better relationships with customers, the local community and regulatory authorities,
- ✓ improving environmental risks and managing opportunities by guaranteeing full compliance with environmental regulations, reduced risk of fines related to non-compliance with environmental legislation, exemption in some situations of obtaining regulatory acts, as well as access to some incentives and public contracts,
- ✓ improved environmental and financial performance, high quality environmental management, resource efficiency and cost savings,
- ✓ improving the empowerment and motivation of the employees, by improving the environment at work, and an increased commitment of the employees in the formation of the team,
- ✓ EMAS logo which is a good marketing tool

At European level, organizations show an increased concern in achieving environmental performance, controlling their own activities, products or services. Adopting and implementing in a systematic way a set of techniques for environmental management in accordance with ISO 14001 standards can contribute to achieving optimal results for the benefit of organizations. Given the *voluntary nature of this system* as well as its low level of knowledge, ***at national level***, ***the number of organizations applying for EMAS registration is quite low***, ***organizations preferring to implement and certify an environmental management system according to the ISO 14001 standard***. To support organizations, the European Commission, in consultation with EU member states and stakeholders in the sectors addressed, developed two documents for each sector: a concise sectoral reference document (SRD) and a detailed technical report on the best environmental management practices ("good practices report"), for different sectors that have been identified as priority. ***Sectoral reference documents (SRDs)*** *on environmental management best practice provide guidance and inspiration to organizations in specific sectors on how to improve environmental performance*. Such documents have been developed for the *following sectors*: *retail trade; tourism; food and beverage industry; automobile production; manufacture of electrical and electronic equipment; Public Administration; agriculture and waste management*. For the construction sector, best practice reports have been completed and SRDs are ongoing. For other sectors, the development of good practice reports and SRDs is still ongoing. However, there are preliminary documents that can be used as a source of information about the scope and development process. Documents for the areas *Manufacturing of metallic products and telecommunications* are available on the website of the Commission's Joint Research Center (JRC). Through the environmental statements that organisations have to draw up for registration in EMAS, they assume the development of performance indicators so that when it is updated annually, the indicators can be assessed to determine whether the organisation has achieved environmental performance.

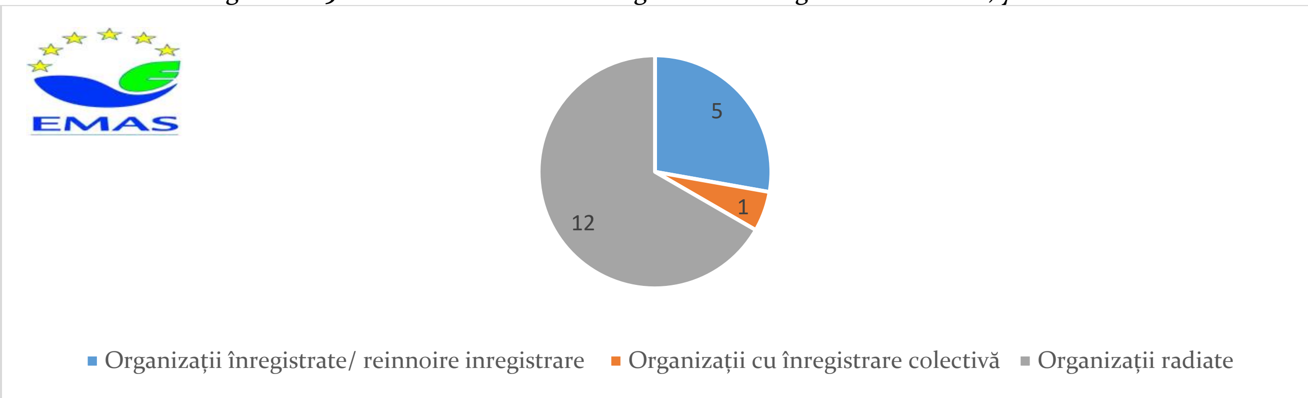
At the end of 2020, 18 organisations were registered in the National EMAS Register, but 12 of them were removed, either due to requests from organisations due to a lack of funds needed to verify and validate the environmental statement, or due to the fact that the requirements of the EMAS III Regulation have not been complied with and an organisation has collective registration at EU level (Figure XI.19). The evolution of the number of Romanian EMAS-registered organisations between 2013 and 2020 is presented in Table XI.14.

Table XI.14 Evolution of the number of Romanian organizations registered in EMAS, 2013 – 2020

	Year 2013	Year 2014	Year 2015	Year 2016	Year r 2017	Year 2018	Year 2019	Year 2020
No. total organizations from the EMAS Register	9	11	15	15	16	17	17	18
Registered organizations / renewal of registration	5	6	10	11	11	7	7	5
Organizations with collective registration	1	1	1	1	1	1	1	1
Delisted organizations	3	4	4	3	4	9	9	12

Source: NEPA

Figure XI.19 - Number of Romanian organizations registered in EMAS, year 2020



Source: NEPA

At European level, projects to promote EMAS are also targeted through the LIFE 2021-2027 programme. EMAS and the EU LIFE programme: B.R.A.V.E.R, the circular economy and quality of life sub-programme explicitly mentions the development, promotion, implementation and/or harmonisation of voluntary instruments and approaches and their application by institutions wishing to reduce the environmental impact of their activities, products and services.

PRODUCTS AND SERVICES LABELED WITH THE EUROPEAN ECOLOGICAL LABEL

RO 71
Indicator code Romania: RO 71
EEA indicator code: SCP
TITLE: **NUMBER OF PRODUCTS AND SERVICES LABELED WITH THE EUROPEAN ECOLOGICAL LABEL**
DEFINITION: The indicator presents the number of products and services for which the European ecological label was granted, year by year. The indicator does not provide information on the share of ecological products in the total range of consumer goods available to consumers

WHAT IS EUROPEAN LABELLING?
European Ecological labelling is a *voluntary scheme, designed to encourage economic operators to market goods/services with a low impact on the environment, to more easily identify green products/services and provides them with indisputable proof that the product/service offered meets their requirements and is in accordance with the rules quality and security defined in the corresponding certification report. The purpose of introducing the European Ecolabel for products/services is to promote products/services that have a low impact on the environment, throughout their entire life cycle, compared to other products/services belonging to the same group. European eco-labelling operates on the basis of certain criteria, on groups of products/services (ecological criteria and performance criteria*). For all groups of products/services, relevant ecological aspects and corresponding criteria have been identified on the basis of comprehensive scientific studies on the environmental aspects related to the entire life cycle of these products. These criteria are validated following consultation within the European Union Committee for the European Ecolabel.

THE SYMBOL OF THE EUROPEAN ECOLOGICAL LABEL

HOW DOES THE EUROPEAN ECOLOGICAL LABELING SCHEME WORK?
The European ecological labeling operates on the basis of certain criteria, on product groups. A company that wants to obtain the European ecological label for one or more of its products must apply to the competent authority - the Ministry of Environment, Water and Forests. *An individual product/service must meet all the criteria in order to be awarded the European Ecolabel. Regardless of the product/service group, environmental requirements refer to air quality, water quality, soil protection, reducing the amount of waste generated, saving energy, managing natural resources, preventing global warming, protecting the ozone layer, environmental security, noise and biodiversity*. The criteria underlying

the awarding of the European eco-label encourage the application of best practices in order to protect the environment and the health of the population.

CATEGORIES OF PRODUCTS/ SERVICES

The EU Ecolabel covers a wide range of product groups, from the main areas of production to tourist accommodation. Key experts, in consultation with key stakeholders, develop the criteria for each product group to reduce the main environmental impacts throughout the entire product life cycle. Because the life cycle of each product and service is different, the criteria are tailored to address the unique characteristics of each type of product. Every four years, on average, the criteria are revised to reflect technical innovation, such as developments in materials, production processes or emission reductions, and changes in the market. The criteria for each product group can be found on the Ecolabel website: https://ec.europa.eu/environment/ecolabel/products-groups-and-criteria.html.

The European ecological label covers 24 groups of products from different sectors of activity and services, respectively:

- **DETERGENTS: Detergents for dishwashers; Detergents for manual dishwashing; Cleaning detergents for hard surfaces; Detergents for industrial and institutional use for dishwashers; Laundry detergents; Laundry detergents for industrial and institutional use.**
- **ELECTRONIC EQUIPMENT: Electronic displays; Televisions.**
- **PAPER PRODUCTS: Graphic paper, tissue paper and tissue paper products; Printed paper; Processed paper.**
- **ARTICLES OF CLOTHING AND FOOTWEAR: Footwear; Textiles.**
- **HOME PRODUCTS: Flooring based on wood, cork and bamboo; Durable clothing; Paints and varnishes; Furniture; Bed mattresses.**
- **CARE PRODUCTS: Cosmetic products that are removed by rinsing; Hygienic absorbents.**
- **PRODUCTS FOR THE GARDEN: Culture substrates, soil improvers and mulches.**
- **SERVICES: Tourist accommodation services; Interior cleaning services.**
- **LUBRICANTS**

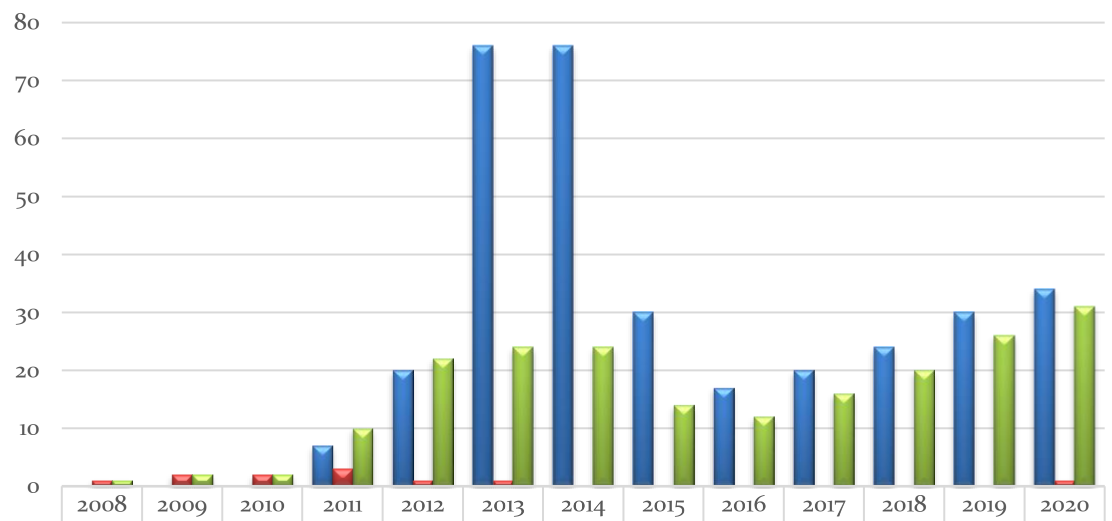
The European Ecolabel demonstrates that sustainable production is perfectly compatible with economic growth, the creation of more jobs and that investing in compliance with the European Ecolabel is a business opportunity. *In national legislation, Government Decision no. 661/2011 regarding the establishment of measures to ensure the application at national level of the provisions of Regulation (EC) no. 66/2010 of the European Parliament and of the Council of November 25, 2009 regarding the EU ecological label is applied.*

ADVANTAGES OF EUROPEAN ECOLOGICAL LABELLING: it has a European dimension; covers the entire EU market; promotes the design, marketing and use of products that have a low impact on the environment and human health; certifies the quality of use of a product and its ecological quality; has a selective character; by the level of demand, the ecological labeling criteria guarantees a selectivity of the products; considerably increases the competitive market potential for the eco-labeled product; is a collective product quality certification mark; improves the image of the manufacturer.

At the level of the European Union, the decrease in the number of licenses granted, for several years, is mainly due to the entry into force of the new criteria, which are more demanding, and companies wishing to use the EU eco-label must prove compliance with them. In contrast, ***for the year 2020, statistics show that the number of European Ecolabels granted for products/services and the number of licenses gradually increased during this year for several product groups,***

mainly detergents, varnishes and paints, furniture and cleaning services. tourist accommodation. This situation can also be observed in Romania for the groups of detergent products, rinse-off cosmetic products and accommodation services. The indicator presents the cumulative evolution of the number of products and services/number of licenses for which the European ecological label was granted in the period 2008 – 2020 (*figure XI.20*). ***In 2020, ecological labels were granted for 4 products (detergents), 1 tourist accommodation service and 5 licenses.***

Figure XI.20 -developmentsțtakes the number of products and services labeled with the European ecological label and the number of licenses granted in Romania, in the period 2008 - 2020



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Produse etichetate				7	20	76	76	30	17	20	24	30	34
Servicii etichetate	1	2	2	3	1	1	0	0	0	0	0	0	1
Licente acordate	1	2	2	10	22	24	24	14	12	16	20	26	31

Source: MEWF and NEPA

ENVIRONMENTAL EXPENSES AND TAXES

Expenditures for environmental protection

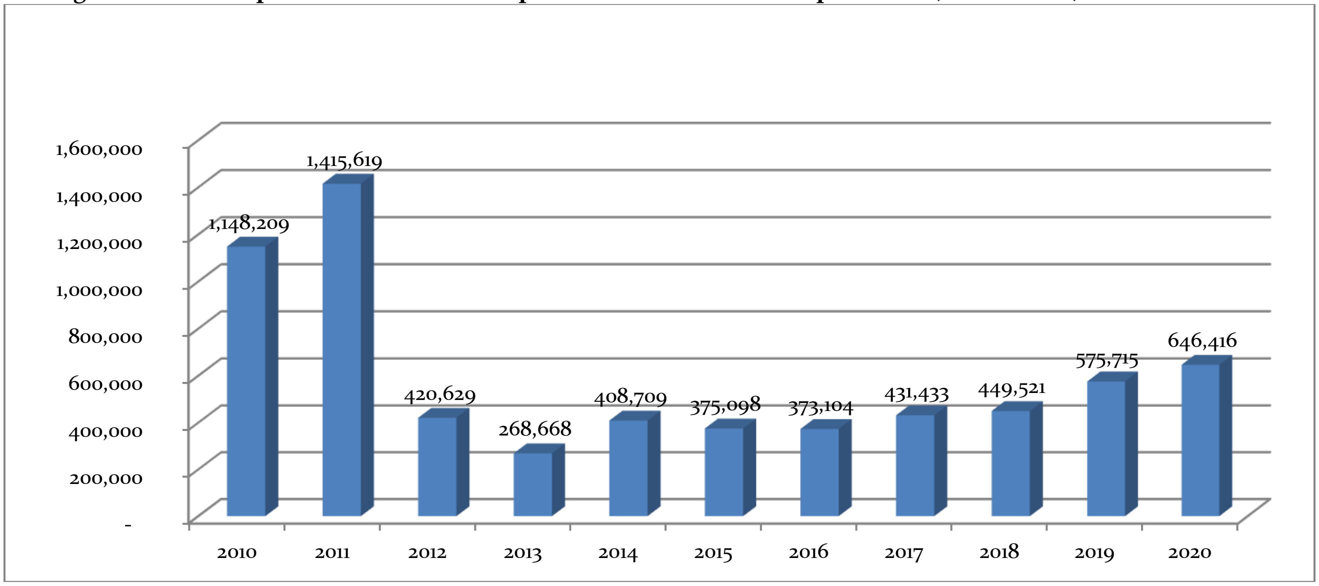
Table XI.15 - The situation of expenses for environmental protection 2010 – 2020

- thousands of lei–

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Environmental protection expenses	1,148,209	1,415,619	420,629	268,668	408,709	375,098	373.104	431,433	438,172	575,715	646,416

Source: EFA

Figure XI.21 - Comparative situation of expenses for environmental protection, 2010 – 2020, thousands of lei



Source: EFA

Financial support for environmental protection

Table XI. 16 - Use of the environmental fund in the period 2010-2020

- thousands of lei -

No. crt	Program name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	a) Reducing the impact on the atmosphere, water, soil, including monitoring air quality	33296	24825	907	0	0	0	0	0	2128	15797	12777
2	c) Waste management	42669	23141	2335	0	0	0	0	0	0	0	2694
3	d) Protection of water resources, integrated water supply systems, treatment stations, sewerage and purification stations	16606	5780	33047	89022	170023	155248	161246	174454	91947	48411	19693
4	f) Conservation of biodiversity and management of protected natural areas	864	423	0	149	64	166	0	0	0	0	0

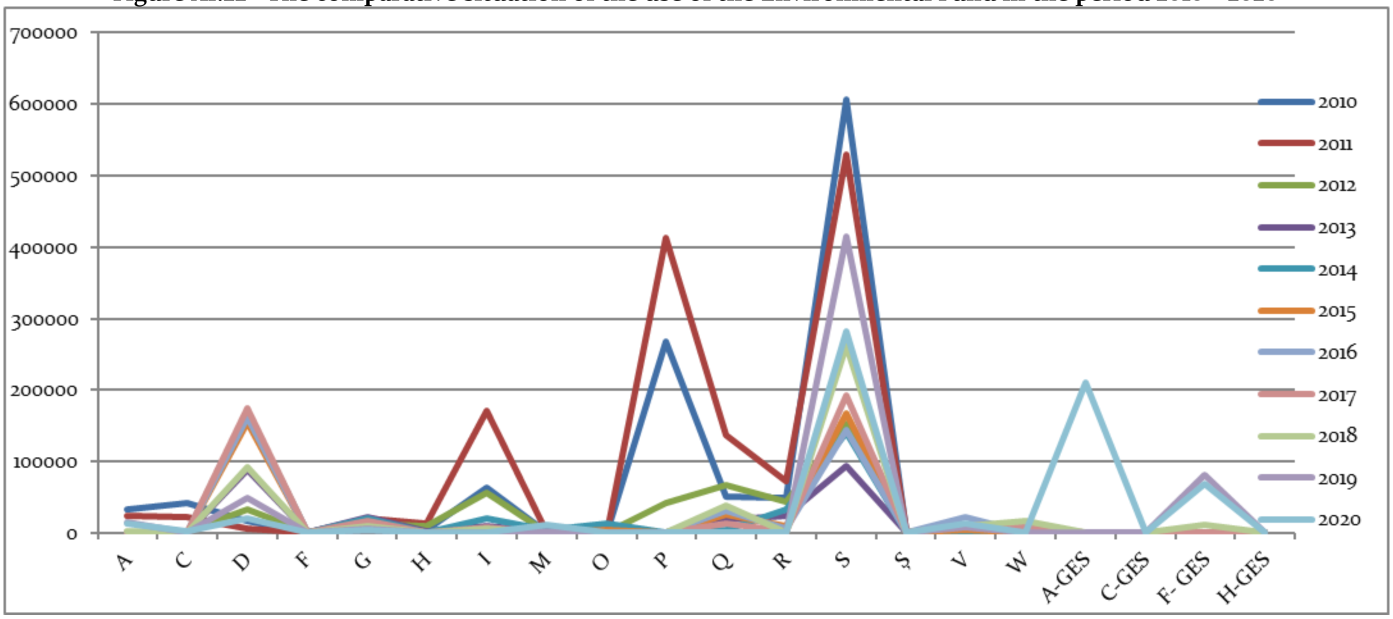
5	g) Afforestation of degraded lands, ecological reconstruction and sustainable management of forests	10974	20402	12871	22899	21155	7941	4033	16908	9506	5447	4183
6	h) Education and public awareness regarding environmental protection	4751	13812	9367	3197	290	116	0	0	0	0	0
7	i) Increasing energy production from renewable sources	64110	171975	56259	9629	20546	0	0	8746	5539	0	0
8	m) Carrying out monitoring, studies and research in the field of environmental protection and climate change regarding tasks derived from international agreements, European directives or other national or international regulations, as well as research - development in the field of climate change	0	426	0	1738	4122	0	448	1468	1522	2438	12294
9	o) Closing the settling ponds in the mining sector	0	0	0	4117	13951	4039	656	0	0	0	0
10	p) Carrying out works aimed at preventing, removing and/or reducing the effects of extreme weather phenomena	267738	412594	42025	0	1053	0	0	0	0	0	0
11	q) Installation of heating systems that use renewable energy, including the replacement or	51229	137889	66810	18661	3695	26633	31980	13065	37672	302	26

	addition of classic heating systems											
12	r) The national program for improving the quality of the environment by creating green spaces in the urban environment	48554	72901	43120	24584	32784	9380	6403	1927	1223	0	0
13	s) Program to stimulate the renewal of the national car fleet	607418	529135	153888	94672	141014	167395	144645	193152	261625	414977	281437
14	ș) Program to stimulate the renewal of the national park of tractors and self-propelled agricultural machines	802	2316	0	0	0	0	0	0	0	0	0
15	v) The program for the development and optimization of the National Air Quality Monitoring network	0	0	0	0	0	4180	22943	11823	10021	7469	13761
16	w) Reduction of greenhouse gas emissions in transport, by promoting non-polluting road transport vehicles from an energy point of view	0	0	0	0	12	0	750	9890	16989	194	0
17	a) The program on improving air quality and reducing greenhouse gas emissions, using less polluting vehicles in local public transport of people - buses and electric/CNG trolleybuses--Annex 2b BVC	0	0	0	0	0	0	0	0	0	0	210 005
18	c) The program	0	0	0	0	0	0	0	0	0	0	41

	regarding the reduction of greenhouse gas emissions in transport, by promoting the infrastructure for non-polluting road transport vehicles from an energy point of view: recharging stations for electric vehicles in county seat municipalities - Annex 2b BVC											
19	F -GES f) the program regarding the reduction of greenhouse gas emissions in transport, by promoting non-polluting and energy-efficient road transport vehicles, 2017-2019 – letter w) from art. 13, para. (1) from GEO no. 196/2005 regarding the Environmental Fund - Annex 2b BVC	0	0	0	0	0	0	0	0	11349	80680	69222
20	h) The multi-annual investment financing program for the modernization, rehabilitation, re-technological and expansion or establishment of centralized thermal energy supply systems of localities - Annex 2b BVC	0	0	0	0	0	0	0	0	0	0	20 283
TOTAL		**1149011**	**1415619**	**420629**	**268668**	**408709**	**375098**	**373104**	**431433**	**438172**	**575715**	**646416**

Source: EFA

Figure XI.22 - The comparative situation of the use of the Environmental Fund in the period 2010 – 2020



Source: EFA

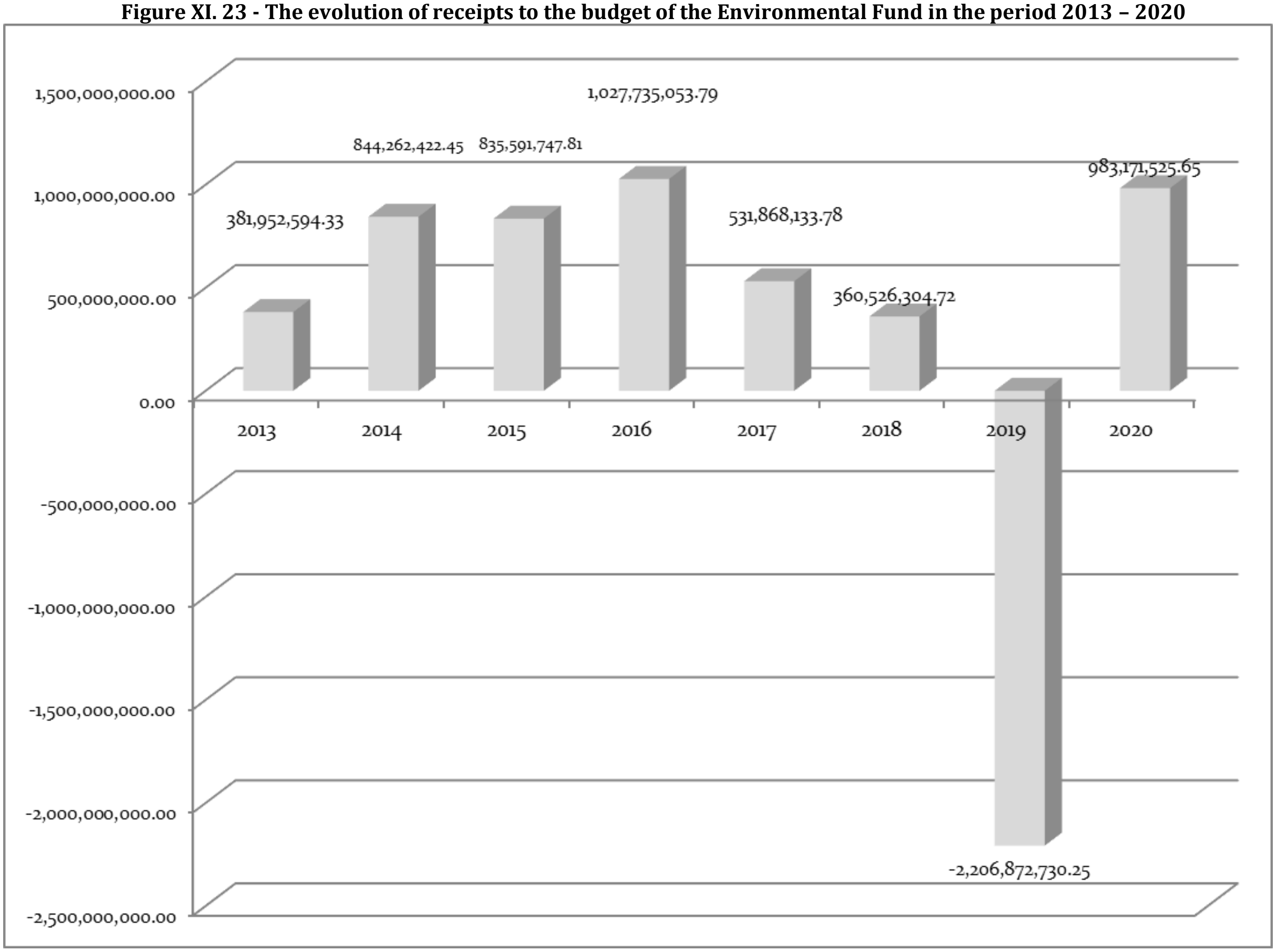
Revenues from environmental taxes

Table XI.17 - The situation revenues to the budget of the Environmental Fund in the period 2013 – 2020*(Source: EFA)*

	Revenues to the budget of the Environmental Fund, from which:	1) pollution tax for motor vehicles/environmental stamp for motor vehicles	2) sources of income according to GEO 196/2005	3) interests	4) other amounts	5) Income from the sale of greenhouse gas emission certificates
2013	381 952 594.33	162 049 134.18	122 543 570.16	20 698 136.27	76 661 753.72	0.00
2014	844 262 422.45	589 493 316.09	140 910 377.45	10 693 158.23	103 165 570.68	0.00
2015	835 591 747.81	557 031 837.10	129 353 999.68	4 330 759.62	144 875 151.41	0.00
2016	1 027 735 053.79	522 203 567.89	547 352 769.26	5 715 232.10	-47 536 515.46	0.00
2017	531 868 133.78	31 279.44	326 945 581.32	6 775 709.11	198 115 563.91	0.00
2018	360 526 304.72	-1 251 190 080.52	305 632 380.56	5 349 154.93	49 544 769.23	679 000 000.00
2019	-2 206 872 730.25	-2 903 042 489.89[1]	389 025 361.61	2 937 316.94	30 510 131.09	273 696 950.00
2020	983 171 525.65	61 076 747.25	458 058 202.59	2 989 186.61	461 047 389.20	0.00

[1] Amount of -**2 903 042 489.89lei** represents the value of refunds *the special tax for passenger cars and motor vehicles, the pollution tax for motor vehicles, the tax for polluting emissions from motor vehicles and the environmental stamp for motor vehicles, provided for by Government Emergency Ordinance no. 52/2017 regarding the refund of the amounts representing the special tax, the pollution tax for motor vehicles, the tax for polluting emissions from motor vehicles and the environmental stamp for motor vehicles,* approved by GD no. 166/29.03.2019, GD no. 335/30.05.2019, GD no. 415/21.06.2019 and GD 458/08.07.2019.

Figure XI. 23 - The evolution of receipts to the budget of the Environmental Fund in the period 2013 – 2020



Source: EFA

ECO-EFFICIENCY OF THE MAIN SECTORS OF ACTIVITY

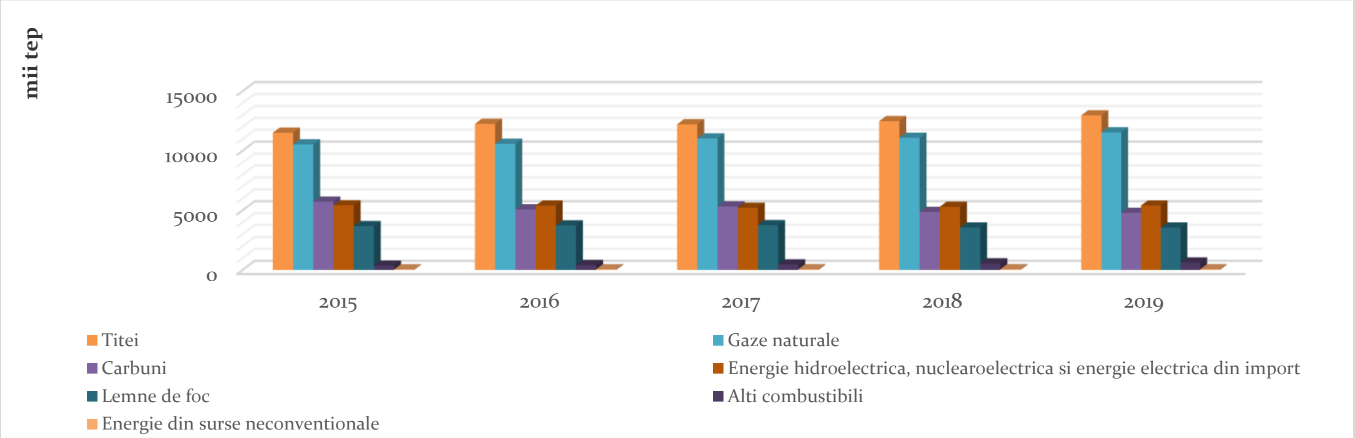
Energy

RO 29
Indicator code Romania: RO 29
EEA indicator code: CSI 29
TITLE: **PRIMARY ENERGY CONSUMPTION BY TYPE OF FUEL**
DEFINITION: The amount of energy required to satisfy gross domestic energy consumption, from solid fuels, crude oil, natural gas, firewood, nuclear and renewable sources and a smaller component of "other" sources (industrial waste and net electricity imports), of a country.

Primary energy resources and consumption by fuel type

Primary energy resources in 2019 were 42,701 thousand tons of oil equivalent, an increase of 1,054 thousand toe (+2.5%) compared to 2018. *Figure XI.24* shows the evolution of primary energy resources from the following types of fuels: coal, natural gas, crude oil, firewood (including biomass), other fuels, energy, energy from non-conventional sources. The majority share of primary energy production from crude oil and natural gas is observed.

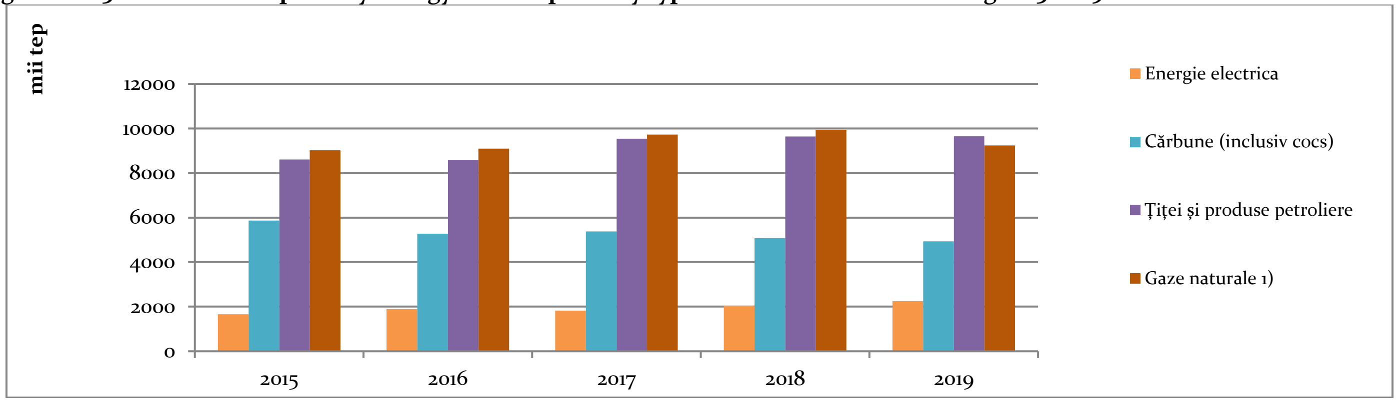
Figure XI.24 - Primary energy resources by sources of origin and resource categories,2015-2019, (thousand tep)



Source:National Institute of Statistics - until the date of preparation of this report, the data for the year 2020 have not been processed http://www.insse.ro

Primary energy productionin 2019, of 24,535 thousand toe, it decreased by 444 thousand toe compared to 2018, due to the decrease in the production of coal, crude oil and mainly usable natural gas (-288 thousand toe), but it continued to maintain its share significant in total energy resources, representing 55.6% of them. Electricity production from renewable resources (hydro, wind and solar photovoltaic) recorded a decrease of 6.2% (-140 thousand toe) compared to 2018 (fig. XI.25). The total gross domestic consumption of primary energy was 33,016 thousand toe in 2019, down 1.5% compared to 2018 (-494 thousand toe) (Source: *National Institute of Statistics* http://www.insse.ro).

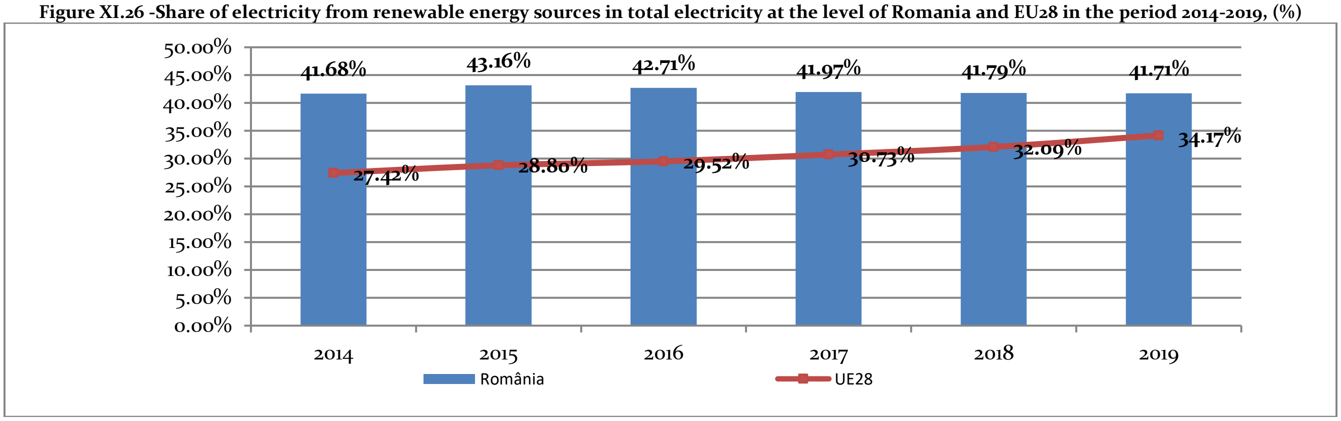
Figure XI.25 - Evolution of primary energy consumption by type of fuel in Romania during 2015-2019



Source: National Institute of Statistics - until the date of preparation of this report, the data for the year 2020 have not been processed http://www.insse.ro

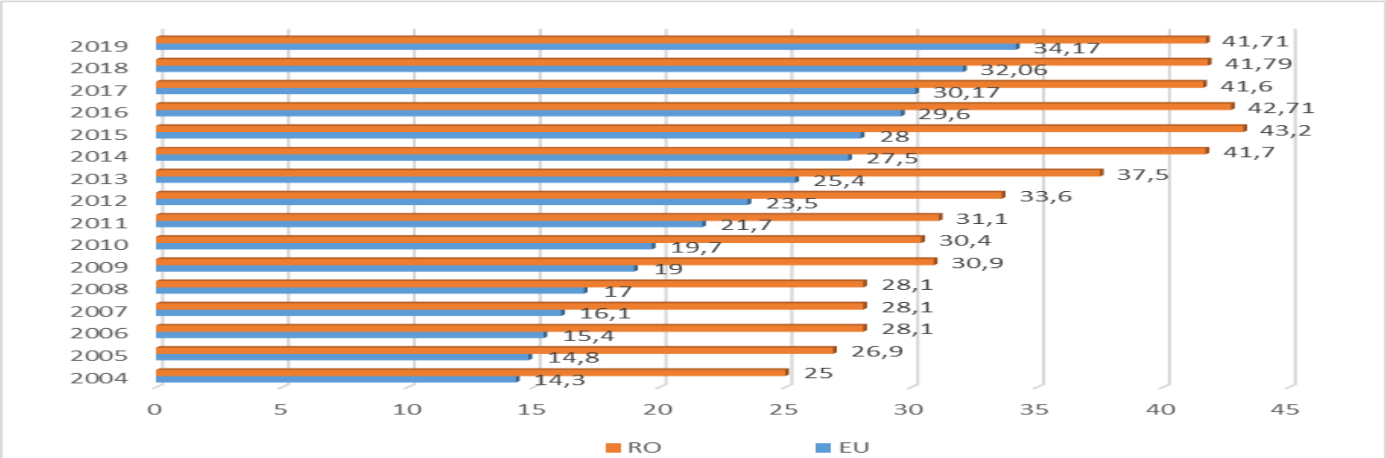
Gross domestic consumption (including losses) decreased in 2019, compared to 2018, by 1.47% (-494 thousand toe). By types of energy carriers, the gross internal consumption of usable natural gas decreased by 7.17% (-713 thousand toe) and of coal by 3.05% (-155 thousand toe), increasing the consumption of electricity by 10, 27% (+209 thousand toe) and crude oil and petroleum products by 0.16% (+15 thousand toe). *Given the current challenge regarding the insurance of energy resources and the need to reduce CO2 emissions, as well as environmental protection, investments in energy efficiency and renewable energy, the recovery of secondary energy resources and combating the phenomenon of energy poverty are a strategic priority for Romania (Source: "Romania's Energy Strategy 2016 – 2030* "). At the level of the European Union, **the share of electricity obtained from renewable sources** contributed 34.17% to the total electricity consumption in the EU-28. The increase in electricity produced from renewable energy sources in the last decade largely reflects an expansion of two renewable energy sources, namely wind energy and energy produced from biomass. In 2019 at national level, 41.71% of the total value of electricity was obtained by harnessing renewable energy sources. Supporting ecological solutions (with low impact on the environment) for the production of electricity based on renewable sources contributes to the reduction of greenhouse gas emissions from the energy sector.(*figure XI.26*).

Figure XI.26 -Share of electricity from renewable energy sources in total electricity at the level of Romania and EU28 in the period 2014-2019, (%)



Source: Eurostat, statistical database - no data was identified for the year 2020

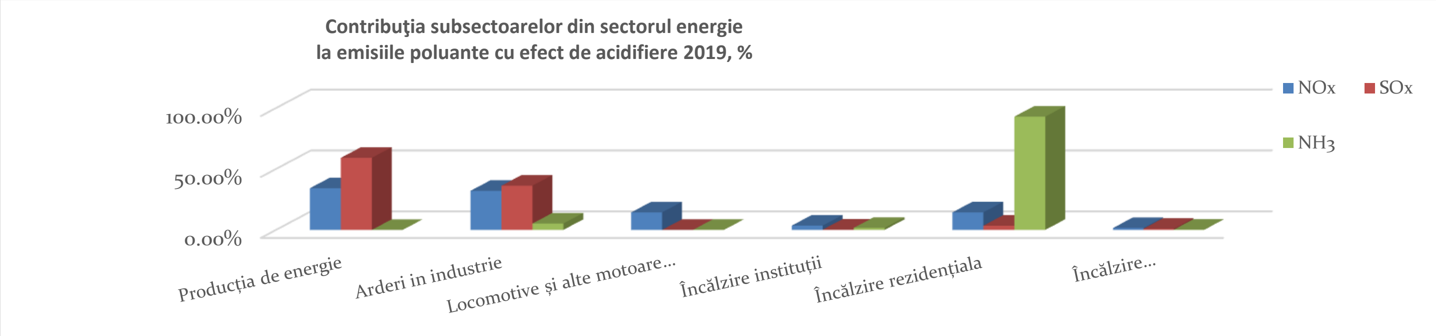
Figure XII.27 - Share of electricity from renewable energy sources in total electricity at the level of Romania and EU28 in the period 2004-2019, (%)



Source: Eurostathttps://ec.europa.eu/eurostat/web/energy/data/shares *- no data for 2020 has been identified*

Compared to the national total, the share of acidifying emissions from the energy sector is 43.2% for NOx, 89.2% for SO2 and 5.3% for NH3. For the year 2019, a 91.2% share of ammonia resulting from residential heating activity and high values of SO2 and NOx shares can be observed in energy production and industrial combustion activity (fig. XI.28).

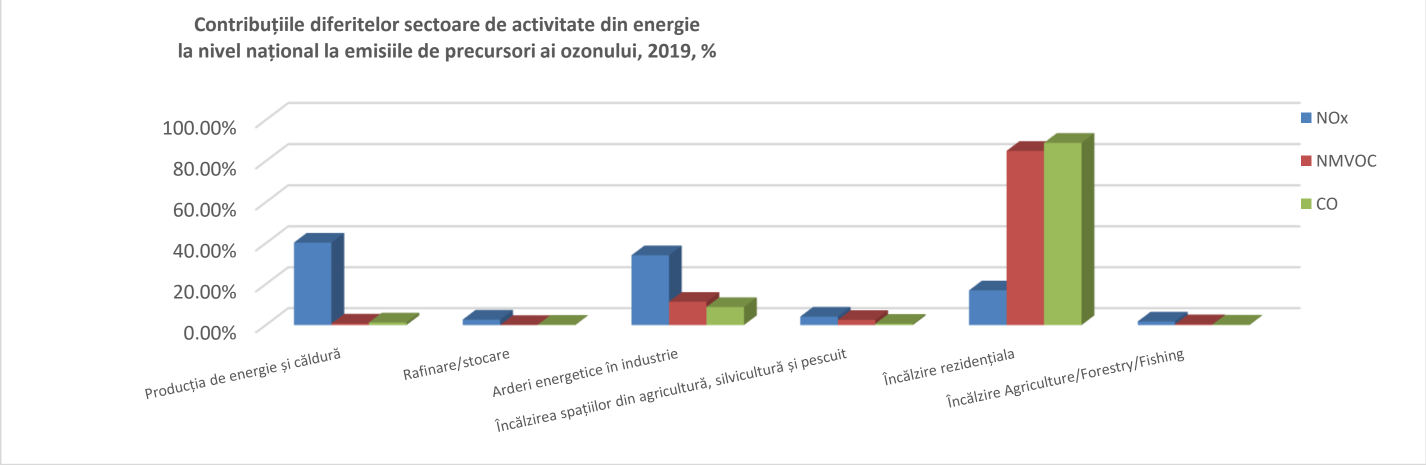
Figure XII.28 -The contributions of the activity subsectors in the energy sector, in 2019, to the emissions of polluting substances with an acidifying effect (%, NOx, SOx, and NH3)



Source: Romania's Informative Inventory Report 2021

The share of non-methane volatile organic compounds (NMVOC) emissions from the energy sector is 36.7% of the national total of NMVOC emissions, and of CO emissions, 64.4%. For the year 2019, the maximum share of NMVOC and CO pollutants (82.7%, 89%) is found in the residential heating activity and of the NOx pollutant in the energy and heat production activities and energetic combustion in industry (fig. XI.29).

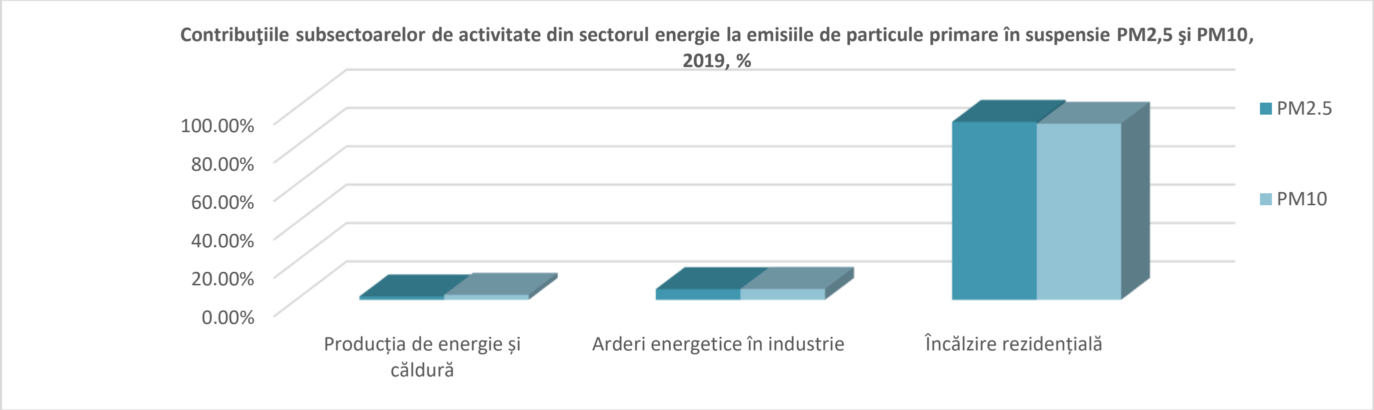
Figure XII.29 -The contributions of the activity subsectors in the energy sector, in 2019, to the emissions of pollutants released into the atmosphere and considered ozone precursors



Source: Romania's Informative Inventory Report 2021

Compared to the total national emissions of particles from the energy sector, the share of anthropogenic emissions of primary particles with a diameter of less than 2.5 µm (PM2.5) is 66.5% and of anthropogenic emissions of primary particles with a diameter of less than 10 µm (PM10) is 87.6%. For the year 2019, the maximum share in the energy sector of PM2.5 and PM10 primary particulate matter emissions is represented by residential heating, with over 90% of the total (fig. XI.30).

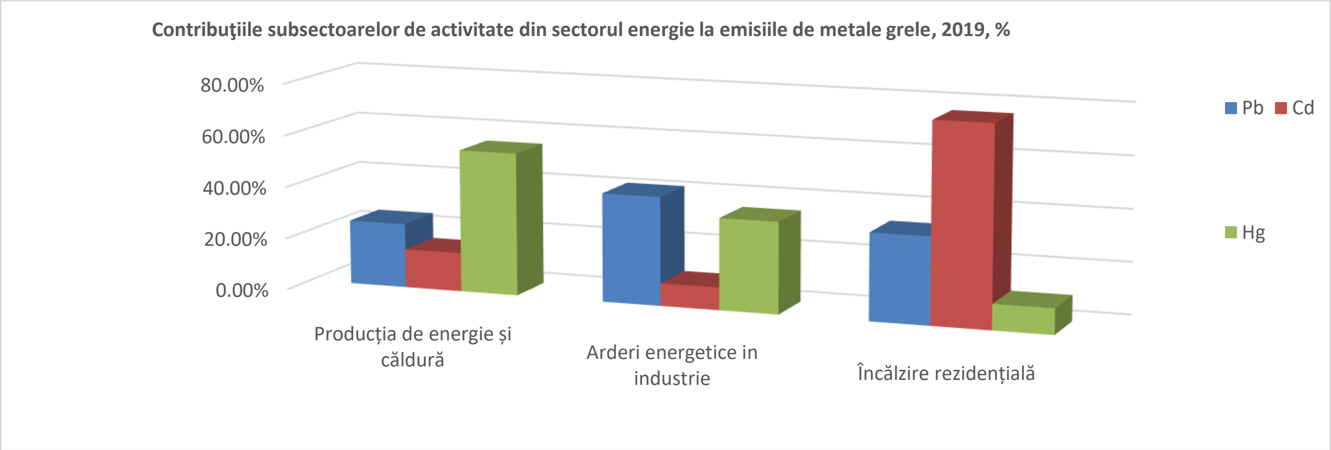
Figure XII.30 -The contributions of the activity subsectors in the energy sector, in 2019, to the emissions of primary particles in suspension PM2.5 and PM10



Source: Romania's Informative Inventory Report 2021

For the year 2019, there is a ***significant share of Hg emissions from the energy and heat production subsector (57.6%, 33%) and the major share of cadmium emissions from the residential heating subsector (75%), the share of Pb emissions being significant in all subsectors, with an average of 33%*** (*fig.XI.31*).

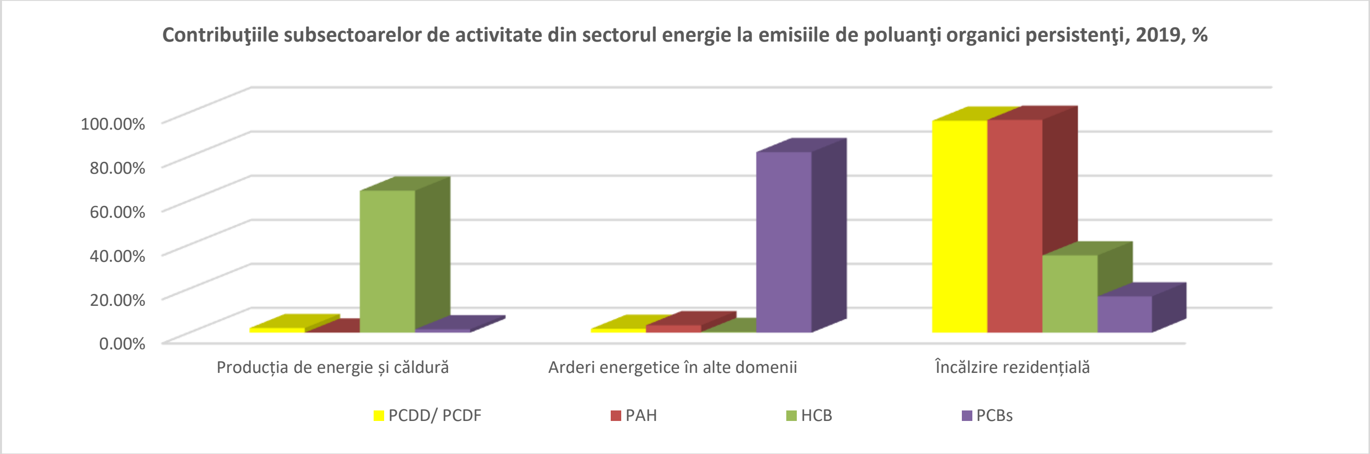
Figure XII.31 -Contributions of activity subsectors in the energy sector, in 2019, to heavy metal emissions



Source: Romania's Informative Inventory Report 2021

In 2019, it is observed that ***the major share of anthropogenic emissions of persistent organic pollutants and polycyclic aromatic hydrocarbons is residential heating, with values over 90% in the case of PCDD/PCDF dibenzofurans and PAH aromatic hydrocarbons***(*fig. XI.32*).

Figure XII.32 –The contributions of the activity subsectors in the energy sector, in 2019, to the emissions of persistent organic pollutants



Source: Romania's Informative Inventory Report 2021

RO 10
Indicator code Romania: RO 10
EEA indicator code: CSI 10
TITLE: **GREENHOUSE GAS EMISSIONS TRENDS**
DEFINITION: The indicator presents the trends (total and by sector) of greenhouse gas emissions in relation to the obligations of the member states to comply with the objectives of the Kyoto protocol. The emissions are presented according to their type and are analyzed according to their potential contribution to amplifying the phenomenon of global warming

The indicator analyses trends in total EU GHG emissions since 1990 in relation to eu and Member State targets. *The European Union and its Member States, including Romania, have independently communicated a target for reducing greenhouse gas emissions associated with economic activities of 20% reduction by 2020 compared to 1990 levels*. The emission reduction target for Romania for the years 2013-2020 is part of the common target of the European Union. The European Union target is implemented in the context of the EU Energy and Climate Change Package.

At national level, the limitation and reduction of greenhouse gas emissions is achieved through the application of the Scheme for the Commercialization of GHG Emissions Certificates (EU ETS) (the objective set at the European level for Romania being -21% in 2020, compared to the hypothetical level of emissions from the EU ETS sector from 2005) and by applying the provisions included in Decision no. 406/2009/EC. Taking into account the obligations to comply with the annual national objectives of reducing GHG emissions in accordance with the provisions of Decision no. 406/2009/CE, it is necessary for each economic sector to develop strategies and action plans that identify the necessary measures and resources to ensure at national level the linear emission trajectory in the period 2013-2020.

Environmental policies related to climate change represent an extremely important stage, and Romania must join the European effort to fulfill the ambitious objectives set in the EU policy on climate change. The national policy to reduce GHG emissions follows the European approach, i.e. on the one hand, ensuring that a part of the economic operators participate in the application of the GHG emission certificates commercialization scheme and, on the other hand, the adoption of policies and measures at the sectoral level in so that at national level the GHG emissions related to these sectors respect the linear trajectory of the emission limits established by the application of Decision no. 406/2009/EC.

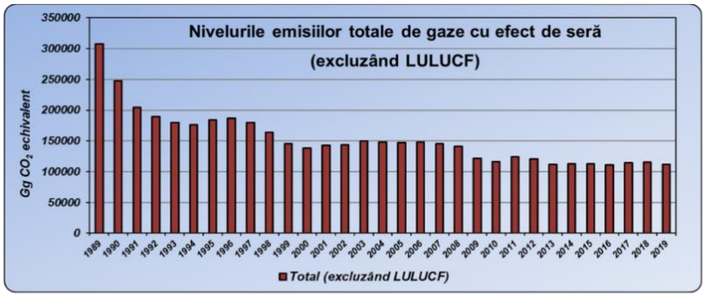
In order to optimize the planning of GHG emission reductions coming from other sources that are not under the scope of the EU ETS scheme, a correlation of the sectoral annual emission plans from regulated sources is necessary through the application of Decision no. 406/2009/CE (non EU ETS), taking into account the emissions and reduction potential of each sector, as well as the national economic development priorities. Analyzing the amount of CO_2 emissions at the level of the European Union, it was found that the largest amount results from the production of electricity and thermal energy. For example, coal-based energy production in EU states generated approximately 973 million tons of CO_2 emissions in 2005, which represented 23% of the total EU CO_2 emissions. As far as Romania is concerned, ***According to the National Inventory of Greenhouse Gas Emissions in 2019, GHG emissions related to the Energy sector represent approximately 90.58% of the total, including LULUCF and 66.09% of the total, excluding LULUCF.*** At the level of the European Union, the Transport Sector still remains the sector with the greatest impact on greenhouse gas emissions in terms of the variation of the associated level, with an increasing trend. *In 2019, emissions from the Transport Sector increased by 52.23% compared to the emissions recorded in 1990, respectively by 2.71% compared to those in 2018, increases mainly due to the increase in demand for the transport of passengers and goods as well as the preference for the use of roads as a mode of transport in exchange for other less polluting modes of transport(table XI.18 and figures XI.33). **Note**: The differences that appear in the data from the report associated with the year 2020 compared to the data from the report associated with the year 2019 are due to the implementation of recalculations at the level of the National Inventory of Greenhouse Gas Emissions and the introduction of elements characteristic of the year 2019 [Source: Climate Change Directorate within NEPA.].*

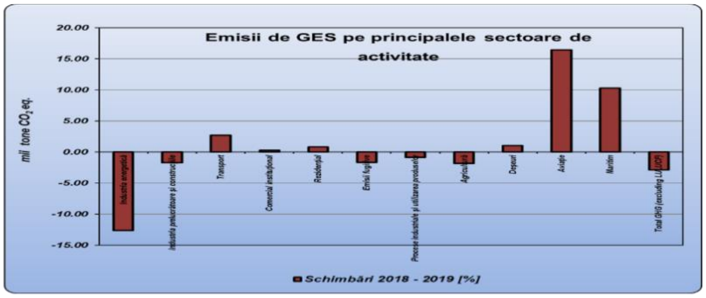
Table XI.18 -Levels of total annual emissions of greenhouse gases in the period 2000 – 2019, (thousand tons of CO_2 equivalent)

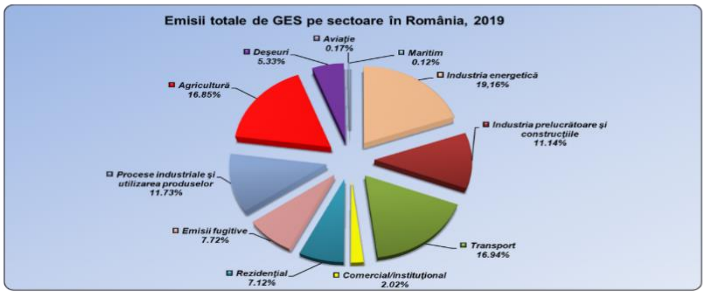
Year	Total emissions (excluding LULUCF)	Total emissions (including LULUCF)
2000	138,766.96	110,716.27
2001	142,383.73	113,427.23
2002	143,913.34	117,032.31
2003	149,600.07	122,222.19
2004	147,819.50	120,719.50
2005	146,944.76	118,575.08
2006	148,442.79	120,466.13
2007	145,429.71	117,985.13
2008	140,785.56	112,730.50
2009	121,699.30	93,448.66
2010	116,143.75	87,112.31
2011	123,862.20	96,401.49
2012	121,086.33	90,428.11
2013	111,881.72	81,143.20
2014	112,485.91	81,771.38
2015	113,193.87	82,594.64
2016	110,762.21	79,992.76
2017	114,245.64	85,609.17
2018	115,090.96	88,911.24
2019	111,767.06	81,550.34

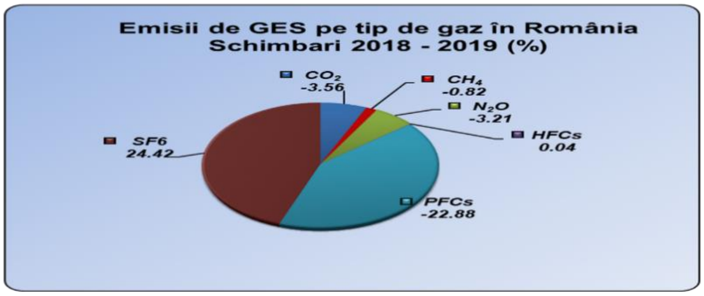
Source: NEPA

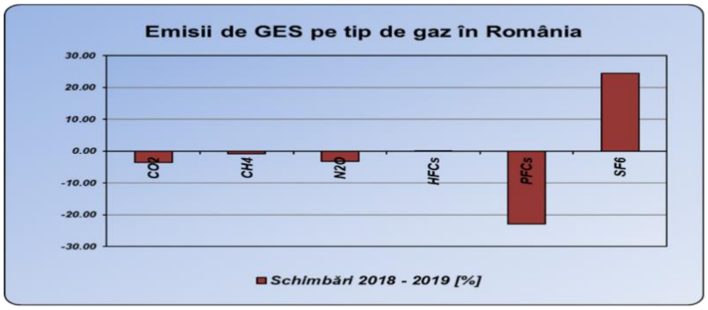
Figures XI.33 - Graphical representation of the levels of total annual greenhouse gas emissions in the period 1989 – 2019 (thousands of CO_2 equivalent tons) by activity sector and per inhabitant in Romania and compared for the EU 27 *Source: NEPA -The National Inventory of Greenhouse Gas Emissions (INEGES), made according to the IPCC methodology, using the common reporting format for all countries (CRF)*

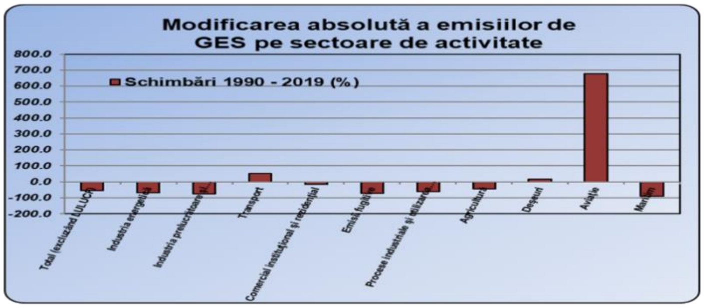

Nivelurile emisiilor totale de gaze cu efect de seră
(excluzând LULUCF)
Gg CO2 echivalent
Total (excluzând LULUCF)

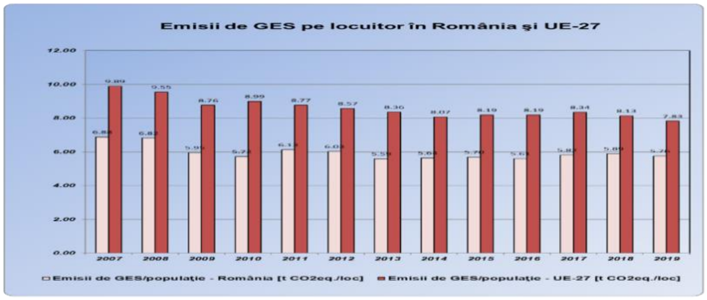

Emisii de GES pe principalele sectoare de activitate
mil tone CO2 eq.
Schimbări 2018 - 2019 [%]

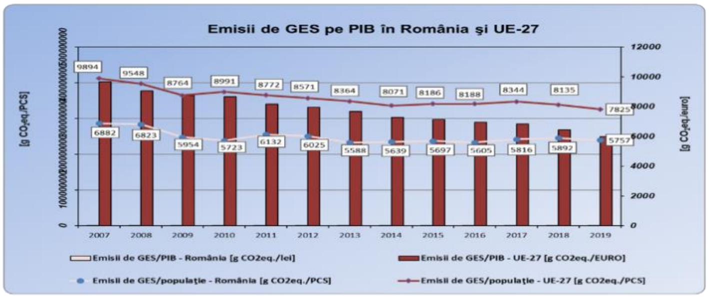

Emisii totale de GES pe sectoare în România, 2019
Aviație 0.17%
Maritim 0.12%
Deșeuri 5.33%
Industria energetică 19.16%
Agricultură 16.85%
Industria prelucrătoare și construcțiile 11.14%
Procese industriale și utilizarea produselor 11.73%
Emisii fugitive 7.72%
Transport 16.94%
Rezidențial 7.12%
Comercial/instituțional 2.02%

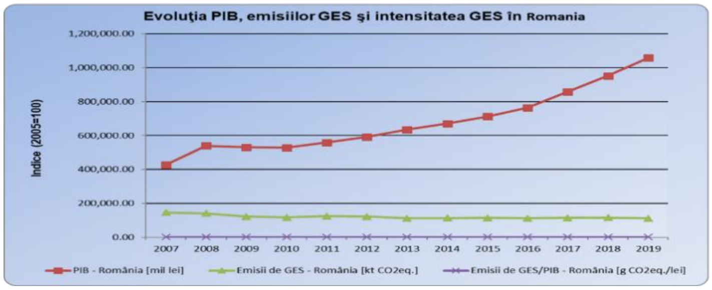

Emisii de GES pe tip de gaz în România
Schimbari 2018 - 2019 (%)
CO2 -3.56
CH4 -0.82
N2O -3.21
HFCs 0.04
SF6 24.42
PFCs -22.88

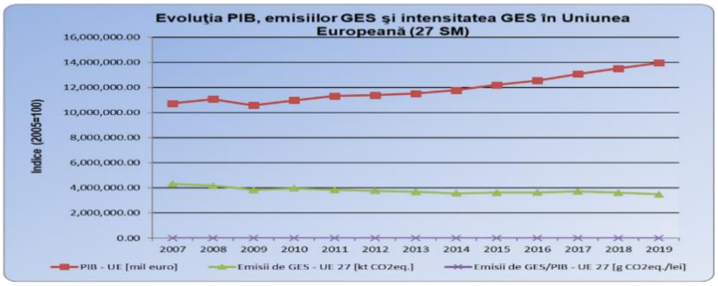

Emisii de GES pe tip de gaz în România
CO2
CH4
N2O
HFCs
PFCs
SF6
Schimbări 2018 - 2019 [%]


Modificarea absolută a emisiilor de GES pe sectoare de activitate
Schimbări 1990 - 2019 (%)


Emisii de GES pe locuitor în România și UE-27
Emisii de GES/populație - România [t CO2eq./loc]
Emisii de GES/populație - UE-27 [t CO2eq./loc]


Emisii de GES pe PIB în România și UE-27
Emisii de GES/PIB - România [g CO2eq./lei]
Emisii de GES/PIB - UE-27 [g CO2eq./EURO]
Emisii de GES/populație - România [g CO2eq./PCS]
Emisii de GES/populație - UE-27 [g CO2eq./PCS]


Evoluția PIB, emisiilor GES și intensitatea GES în Romania
Indice (2005=100)
PIB - România [mil lei]
Emisii de GES - România [kt CO2eq.]
Emisii de GES/PIB - România [g CO2eq./lei]

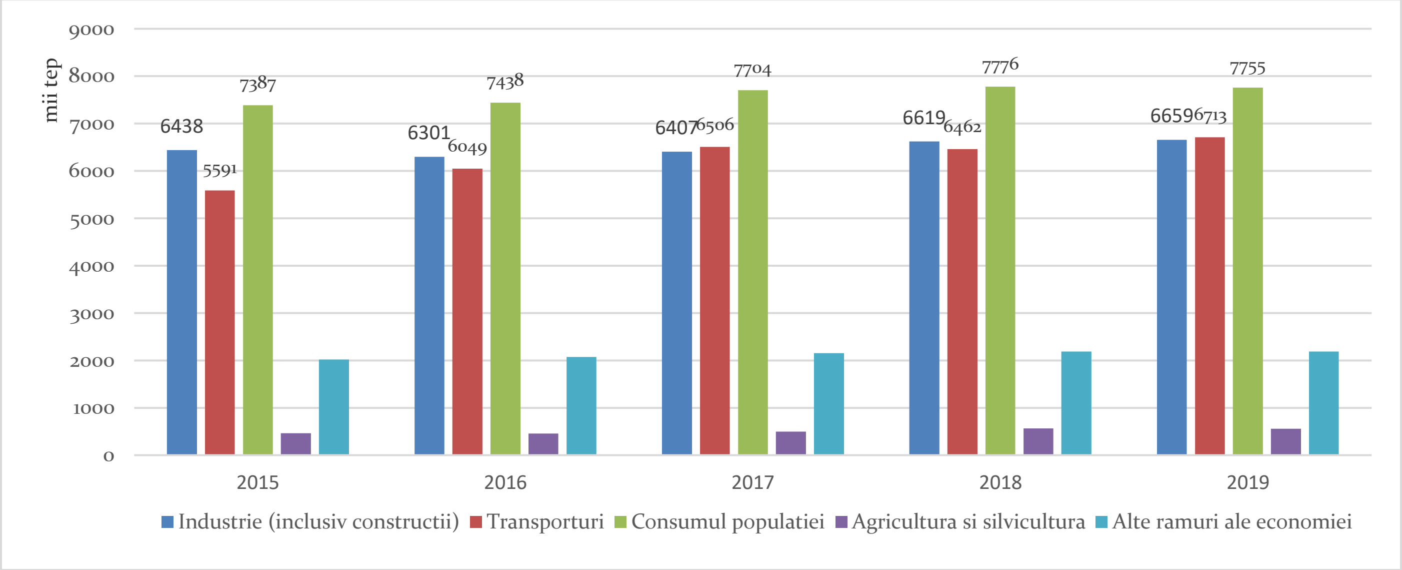

Evoluția PIB, emisiilor GES și intensitatea GES în Uniunea Europeană (27 SM)
Indice (2005=100)
PIB - UE [mil euro]
Emisii de GES - UE 27 [kt CO2eq.]
Emisii de GES/PIB - UE 27 [g CO2eq./lei]

Industry

From the graph in figure XI.34 regarding the Evolution of final energy consumption by types of activity sectors, 2015-2019 (thousands toe)it is observed that the energy consumption in the residential sector has the largest share, followed by industrial activities and transport activities.

RO 27
Indicator code Romania: RO 27
EEA indicator code: CSI 27
TITLE: **FINAL ENERGY CONSUMPTION BY TYPE OF ACTIVITY SECTOR**
DEFINITION: Final energy consumption covers the energy supplied to the final consumer for the most diverse energy purposes. It is calculated as the sum of the final energy consumption from all sectors of activity. They are structured so as to include industry, transport, households, services and agriculture

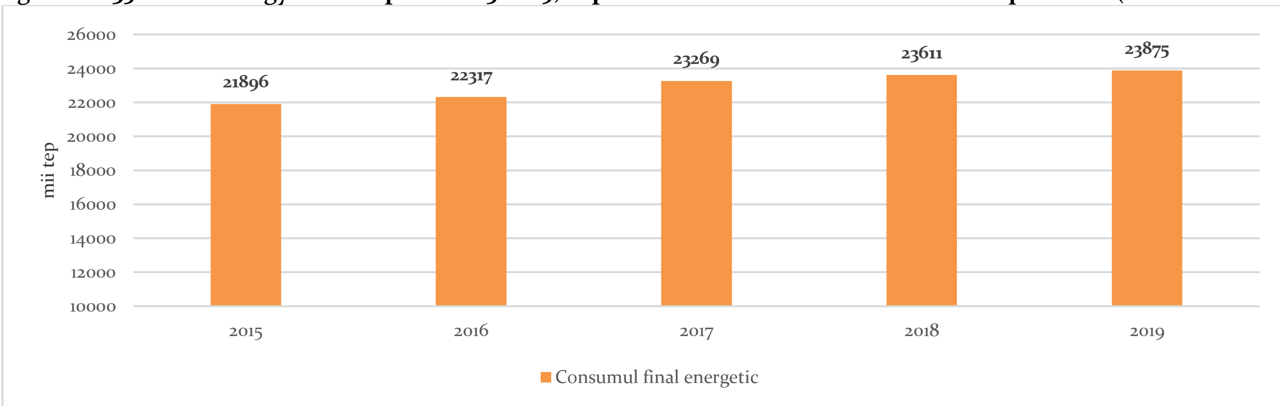
Figure XI.34 – Evolution cenergy onsum by types of activity sectors for the period 2015-2019 (thousands of toe)



Source: *http://www.insse.ro*

Final energy consumptionin 2019 increased by 264 thousand toe (+1.1%) compared to 2018 (*figure XI.35*). **The final energy consumption in industry** (including construction) registered an increase of 0.6% compared to 2018, mainly due to the increase in consumption in the chemical and pharmaceutical industry, rubber and plastic products (+37 thousand toe) and construction (+44 thousand tep). Compared to 2018, final energy consumption decreased by 3.3% in metallurgy and by 0.7% in the metal construction, machinery and equipment industry. In addition to industry, the transport sector and the tertiary sector also contributed to the increase in final energy consumption (*Source:http://www.insse.ro).*

Figure XI. 35 -Final energy consumption 2015-2019, expressed in thousands of tons of oil equivalent (thousands toe)



Source: National Institute of Statistics - until the date of preparation of this report, the data for the year 2020 have not been processed - http://www.insse.ro

Agriculture

RO 25
Indicator code Romania: RO 25
EEA indicator code: CSI 25
TITLE: **GROSS NUTRIENT BALANCE**
DEFINITION: The indicator estimates the nitrogen surplus on agricultural land. This is done by calculating the balance between the total amount of nitrogen entering the agricultural system and the total amount of nitrogen leaving the system, per hectare of agricultural land.

Table XI.19 and figure XI.36 present the situation of the application of chemical fertilizers on agricultural soils in the period 2005-2020, from which the maintenance of the trend of application of chemical fertilizers can be noted, with a maximum in 2020 when 80% from the arable surface of the country was fertilized. The fertilized area in 2020 increased by 148,535 ha compared to 2019. Compared to previous years, the following findings can be made: the amounts of applied chemical fertilizers (N, P_2O_5, K_2O) are on an upward trend, but are below the values registered in 2019 and 2018; the amounts of applied N increased by about 3%, and those of P_2O_5 and K_2O decreased by about 7% and 11%, respectively, compared to 2019; compared to 1999, the amounts of N and P_2O_5 applied in 2020 increased by over 200%, and those of K_2O by 630%; on arable land, the total amounts of NPK increased from 35.4 kg in 1999 to 78.6 kg in 2020; of the total number of fertilizers used in 2020, those based on N represent 4%, those with phosphorus 25%, and those based on potassium 11% (*Source: MARD – ICPA*).

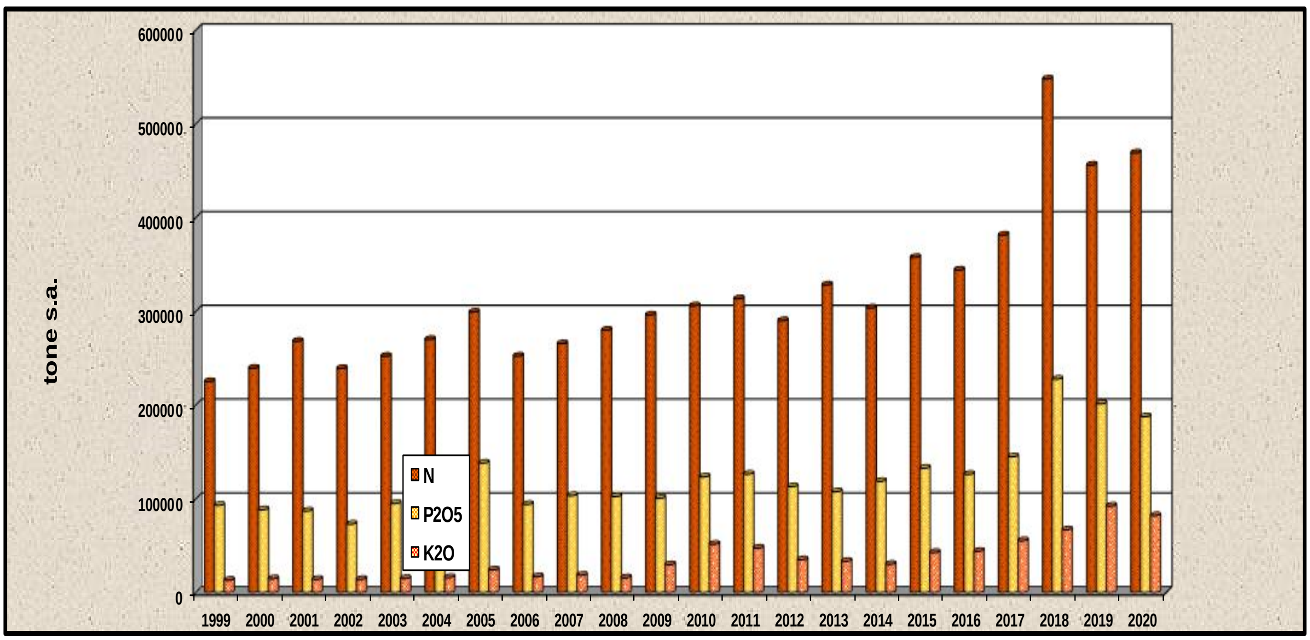
Table XI.19 -The use of chemical fertilizers in Romanian agriculture in the period 1999-2020

The year	Chemical fertilizers used (tons of active substance)				N+P2O5+K2O (kg/ha)		Fertilized surface, ha
	N	**P2O5**	**K2O**	**Total**	**Arable**	**Agricultural**	
1999	225000	93000	13000	331000	35.4	22.5	3640900
2000	239300	88300	14600	342200	36.5	23.0	3724578
2001	268000	87000	14000	369000	39.3	24.8	-
2002	239000	73000	14000	326000	34.7	22.0	-

2003	252000	95000	15000	362000	38.5	25.6	-
2004	270000	94000	16000	380000	40.3	25.8	-
2005	299135	138137	24060	461392	49.0	31.3	5737529
2006	252201	93946	16837	363000	38.5	24.7	5388348
2007	265487	103324	18405	387000	41.1	26.3	6422910
2008	279886	102430	15661	397977	42.3	27.1	6762707
2009	296055	100546	29606	426207	45.3	29	5889264
2010	305756	123330	51500	480586	51.0	32.7	7092256
2011	313333	126249	47362	486944	51.8	33.3	6893863
2012	289983	113045	34974	438002	46.8	30.0	6340780
2013	328088	107543	33324	468955	49.9	32.1	5965817
2014	303562	118574	30103	452239	48.2	30.9	6676089
2015	357352	132657	42693	532702	56.7	36.41	6574741
2016	344000	126000	44000	514000	54.7	35.13	6491498
2017	381342	144869	44259	581470	61.89	39.74	7272565
2018	547694	227605	66894	842193	89.8	57.7	6740184
2019	455964	201329	92258	749551	79.78	51.23	7373689
2020	468891	187577	81985	738453	78.60	50.48	7522224

Source: National Institute of Statistics-http://www.insse.ro, MARD

Figure XI.36 - The use of chemical fertilizers in Romanian agriculture in the period 1999-2020



Source: National Institute of Statistics-http://www.insse.ro, MARD

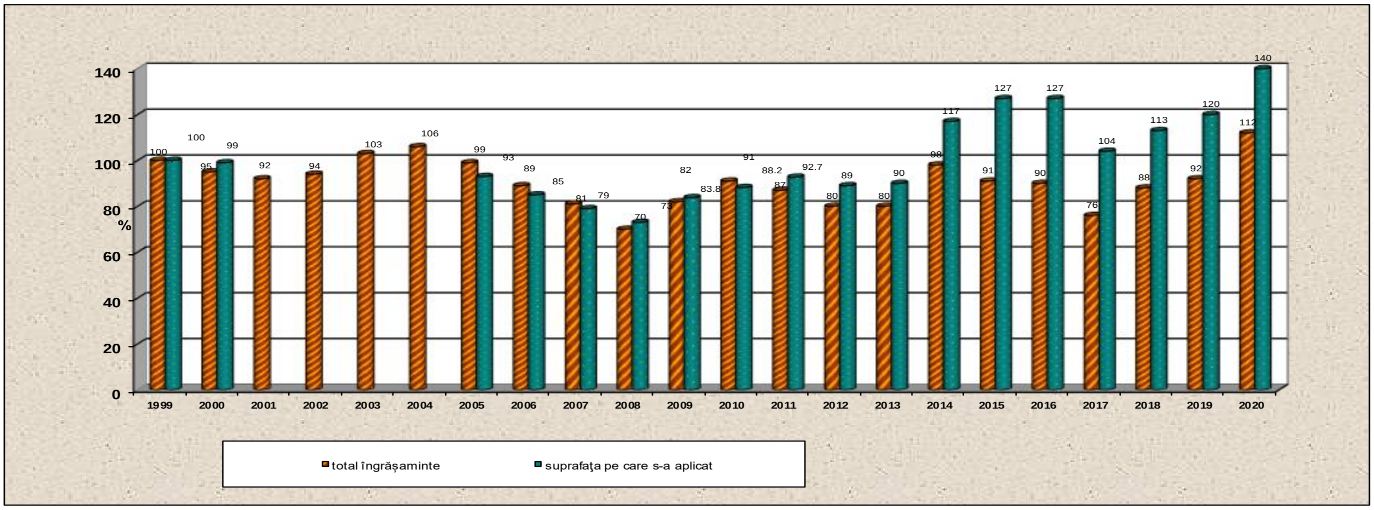
The quantity of natural fertilizers (*table XI.20 and figure XI.37*) applied in 2020, compared to the one used in 1999, increased by approx. 12%, and the area on which natural fertilizers were applied registered increases of 40 % compared to 1999 and of 20% compared to 2019, and the average amount applied in 2020 was 19.6 t/ha. In 2020, only 10% of the cultivated area was fertilized with natural fertilizers, which, in conjunction with the data of mineral fertilization, indicates that a balancing of the nutritional balance of these lands is necessary in order to achieve safe and stable harvests (*Source : MARD – ICPA*).

Table XI.20 -The amount of natural fertilizers applied in the period 1999-2020

Year	Total fertilizers		Application area		Share of the application area in relation to the cultivable area	Average quantity per ha			
						on the application area		on the agricultural area	
	t	%	Ha	%	%	t/ha	%	t/ha	%
1999	16,685,312	100	680,016	100	6.90	24,537	100	1,129	100
2000	15,812,625	95	674,200	99	6.80	23,454	96	1,068	95
2001	15,327,000	92	-	-	-	-	-	1,032	91
2002	15,746,000	94	-	-	-	-	-	1,061	94
2003	17,262,000	103	-	-	-	-	-	1,173	104
2004	17,749,000	106	-	-	-	-	-	1,200	106
2005	16,570,000	99	632,947	93	6.78	26,179	107	1,124	100
2006	14,900,000	89	575,790	85	6.10	25,877	105	1,011	90
2007	13,498,000	81	536929	79	5.69	25,139	102	0.916	81
2008	11,725,220	70	494,412	73	5.25	23,715	97	0.797	71
2009	13,748,307	82	569,531	83.8	6.05	24,140	98	0.935	83
2010	15,231,715	91	600,052	88.2	6.37	25,38	103	1.04	92
2011	14,510,194	87	630293	92.7	6.70	23.02	94	0.99	88
2012	13.292.61713.2	80	605694	89	6.48	21.95	89.5	0.91	81
2013	82,877	80	613563	90	6.53	21.65	88.2	0.91	81
2014	16,261,702	98	795031	117	8.47	20.45	83.3	1.11	98
2015	15,212,325	91	864218	127	9.20	17.60	71.7	1.04	92
2016	14,927,000	90	862330	127	9.18	17.31	70.5	1.02	90
2017	12,625,073	76	708,364	104	7.54	17.8	72.5	0.86	76
2018	14,617,549	88	771,814	113	8.52	18.9	77.02	1.05	88
2019	15,323,344	92	816,713	120	8.69	18.8	76.6	1.05	93
2020	18,680,226	112	952,337	140	10.14	19.6	79.88	1.28	113

Source:National Institute of Statistics-[http://www.insse.ro,](http://www.insse.ro) MARD

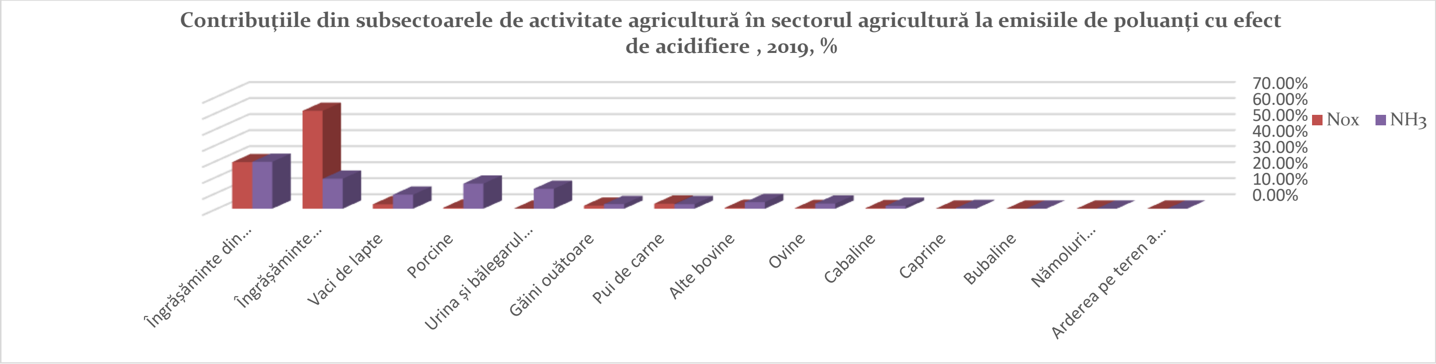
Figure XI.37 -The amount of natural fertilizers applied in the period 1999-2020



Source: National Institute of Statistics-[http://www.insse.ro,](http://www.insse.ro) MARD

The contributions from the sub-sectors of activity in agriculture to the emissions of pollutants with an acidifying effect (NOx, NH3), in 2019, are presented graphically in *figure XI.38*. From the analysis of the data presented regarding *the contribution of the activity of the agricultural sub-sectors to the emissions of pollutants with an acidifying effect in 2019*, it is found that the activities with impact are the application of synthetic and natural fertilizers in agricultural crops, followed by the breeding of animals (dairy cows, pigs, laying hens). ***The sub-sector of activity concerning the application of organic and inorganic nitrogen fertilizers (including urea) to the soil is the main contributor to NOx emissions from agriculture.***

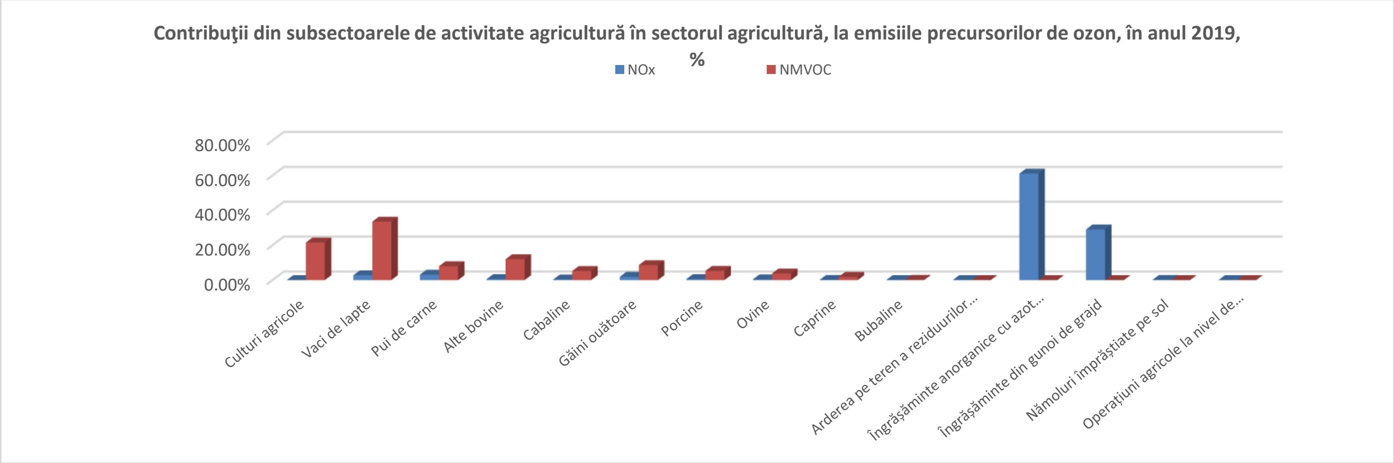
Figure XI.38 -The contributions of the activity subsectors in the agricultural sector to the emissions of pollutants with an acidifying effect (NOx and NH3), in 2019



Source: Romania's Informative Inventory Report 2021

Data on *the trend of anthropogenic emissions of soil-level* (troposphere) ozone precursor pollutants: nitrogen oxides (NOx), carbon monoxide (CO), methane (CH4) and non-methane volatile organic compounds (NMVOCs) *from the agricultural sub-sectors*, are presented in graphic form in *figure XI.39*. From the analysis of the data regarding the contribution of the activity of the agricultural sectors, to the emissions of ozone precursors at national level, it is found that the activities related to the breeding of animals (dairy cows, broilers, other cattle) along with the cultivation of agricultural land, have the largest weight for the NMVOC pollutant, and ***for NOx emissions, the main emitter is the activity subsector related to the application of inorganic nitrogen fertilizers (including urea).***

Figure XI.39 -The contributions of the sub-sectors of activity in the agricultural sector to the emissions of ozone precursors (NMVOC and NOx), in 2019



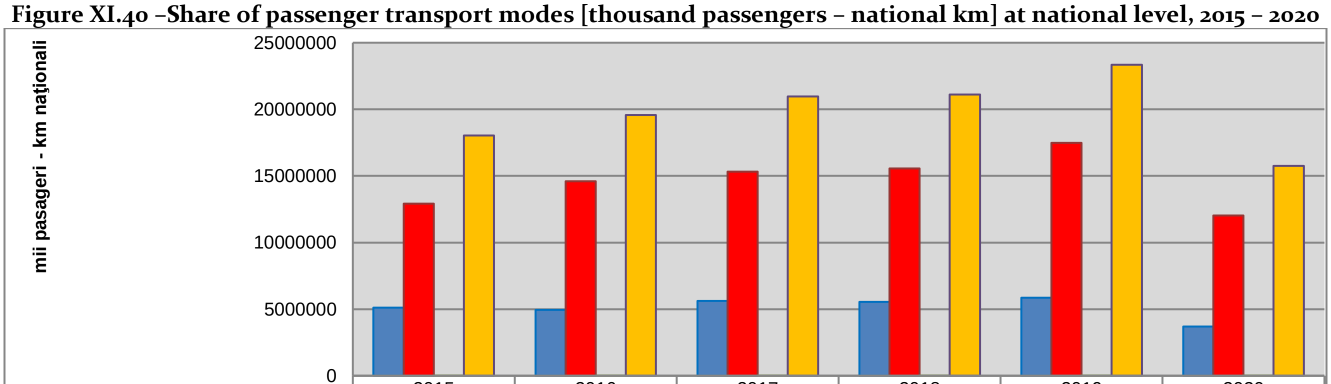
Source: Romania's Informative Inventory Report 2021

Transport

RO 35
Indicator code Romania: RO 35
EEA indicator code: CSI 35
TITLE: **PASSENGER TRANSPORT DEMAND**
DEFINITION: Passenger transport demand is defined as the sum of domestic passenger-kilometers traveled each year. Domestic passenger transport includes transport by cars, buses and coaches and trains

The indicator presents data that refer only to transport on the national territory, regardless of the nationality of the transport vehicle, for transport by cars, buses and coaches, respectively by trains (metro & trams and light metro are excluded) for a period of at least 5 years. The variable is calculated from the passenger indicator –kilometer (pkm), defined as the transport of a passenger over a distance of one kilometer. *Figure XI.40* shows the share of passenger transport modes [thousands of passengers – national km] at national level in the period 2015 – 2020. *Table XI.21* presents the share of each mode of transport in total passenger journeys [%pkm] at national level between 2015 and 2020. It is observed the relatively different variations for the three modes of transport, as follows: in railway transport, an oscillating evolution is observed with a decreasing trend until 2019; in road transport the evolution is oscillating with a slight upward trend in 2019; inland waterway transport has a decreasing trend between 2015 and 2019. In 2020, 331333 thousand passengers were transported in interurban and international transport and 1428295 thousand passengers in local public transport. Most passengers were registered in road transport with buses and minibuses, respectively 1049024 thousand passengers (Source: *National Institute of Statistics*).

Figure XI.40 –Share of passenger transport modes [thousand passengers – national km] at national level, 2015 – 2020



	2015	2016	2017	2018	2019	2020
Feroviar	5106514	4952622	5629215	5542677	5866008	3700445
Rutier	12914062	14609472	15319994	15573425	17478123	12039970
Căi navigabile	9,520	7,650	7,650	6,000	5,572	6,699
Total	18030096	19569744	20956859	21122102	23349703	15747114

Source:: National Institute of Statistics

Table XI.21 - Share of each mode of transport in total passenger travel (% pkm), 2015 – 2020

%	2015	2016	2017	2018	2019	2020 (*)
Railway	19.47	17.50	17.41	15.49	16,28	15.3
Road	80.18	81.97	81.86	83,82	83.07	82.5
Waterways	0.05	0.04	0.04	0.03	0.03	
Aerial	0.30	0.49	0.69	0.66	0.62	0.03
TOTAL	100.00	100.00	100.00	100.00	100.00	

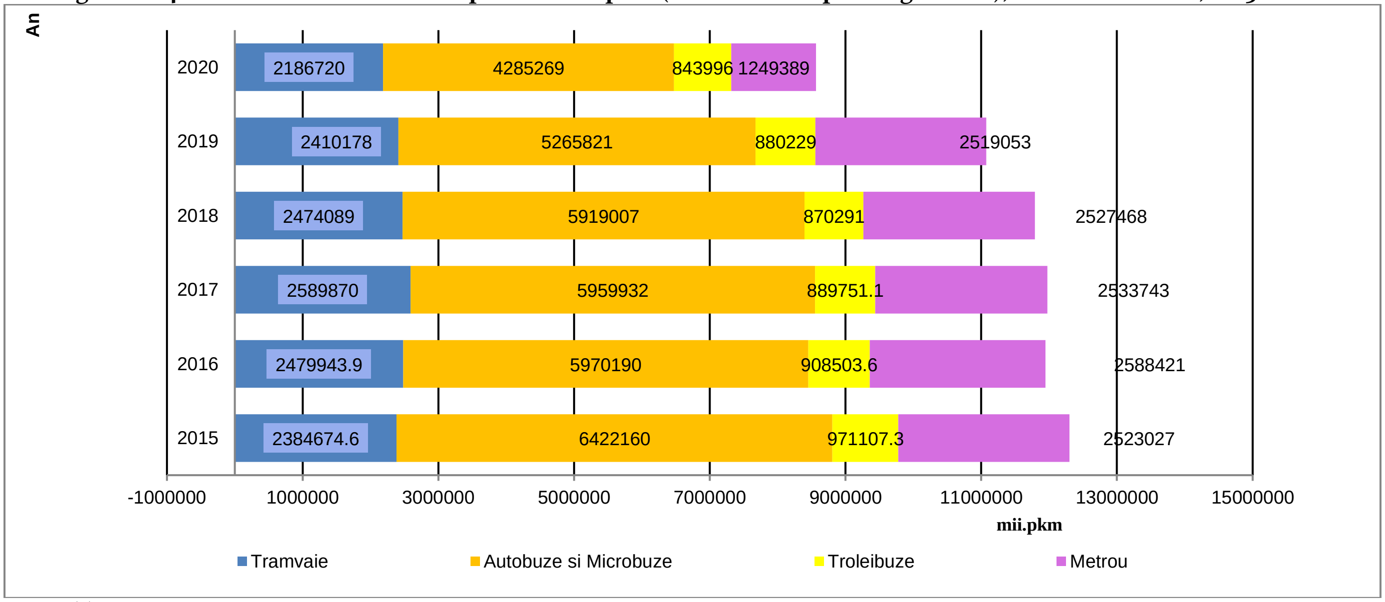
Source: Ministry of Transport and Infrastructure, www.mt.ro (*) Provisional data

Table XI.22 - Evolution of the use of public transport (thousands of passengers-km), at national level, 2015 – 2020 ,thousand passenger-km

Use ofpublic transport	2015	2016	2017	2018	2019	2020 (*)
Trams	2384674.6	2479943.9	2589870.0	2474089	2410178	2186720
Buses, minibuses	6422160.0	5979190.0	5959932.0	5919007	5265821	4285269
Trolleys	971107.3	908503.6	889751.1	870291	880229	843996
Subway	2523027.0	2588421.0	2533743.0	2527468	2519053	1249389
TOTAL	12300968.9	11956059.2	11973296.0	11790855	11075281	8565374

(*) 2020 PROVISIONAL DATA -Source:: National Institute of Statistics -
https://insse.ro/cms/sites/default/files/field/publicatii/transportul_de_pasageri_si_marfuri_pe_moduri_de_transport_in_anul_2020.pdf

Figure XI.41 - Evolution of the use of public transport (thousands of passengers-km), at national level, 2015-2020

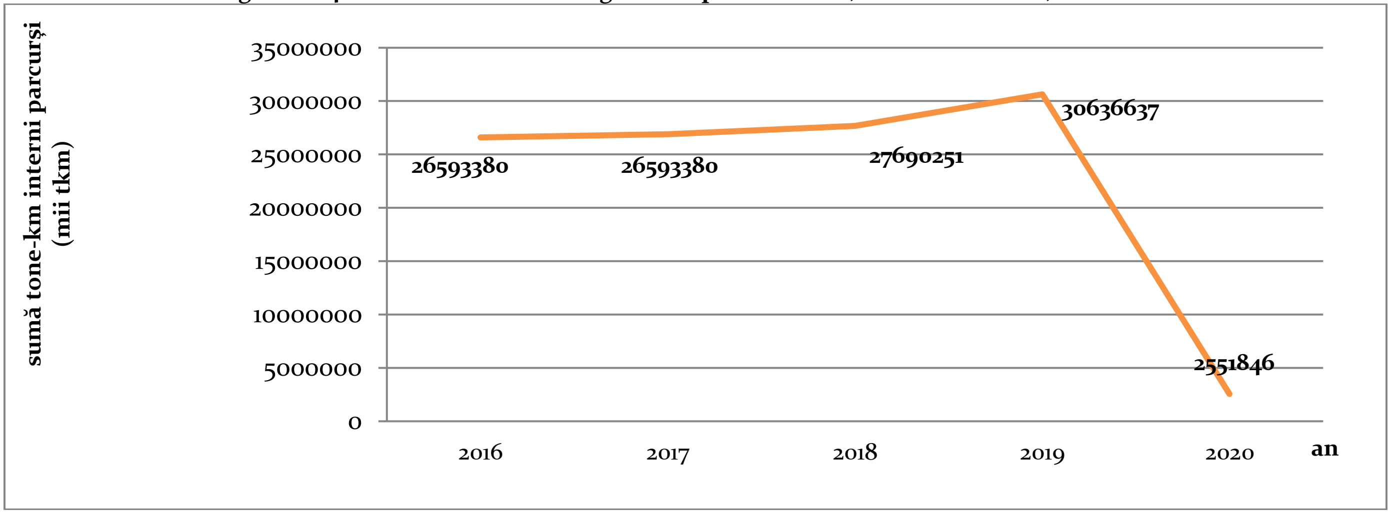


(*) 2020 PROVISIONAL DATA -Source:: National Institute of Statistics -
https://insse.ro/cms/sites/default/files/field/publicatii/transportul_de_pasageri_si_marfuri_pe_moduri_de_transport_in_anul_2020.pdf

RO 36
Indicator code Romania: RO 36
EEA indicator code: CSI 36
TITLE: **FREIGHT TRANSPORT DEMAND**
DEFINITION: Freight demand is defined as the sum of internal ton-kilometres traveled each year. According to the most recent metadata, inland shipping includes road, rail and inland waterway transport: inland waterways and rail transport are based on movements within the national territory ("territoriality principle"), regardless of the nationality of the vehicle or vessel. Road transport is based on all vehicle movements recorded in the reporting country

Road freight transport comprises transport by vehicles registered in the reporting country, and rail and inland waterway transport include transport on the national territory, irrespective of the nationality of the transport vehicle, registered for a period of at least 5 years. The variable is calculated from the *tonne-km (tkm) indicator*, defined as the transport of one tonne of goods over a distance of one kilometer. From the analysis of the evolution of the demand for freight transport (*Figure XI.42*) it is noted that in 2020, the tariff path of goods in domestic traffic decreased by 26.38% compared to 2019 amid the coronavirus pandemic and its consequences, respectively, the slowdown in industrial activity and population consumption.

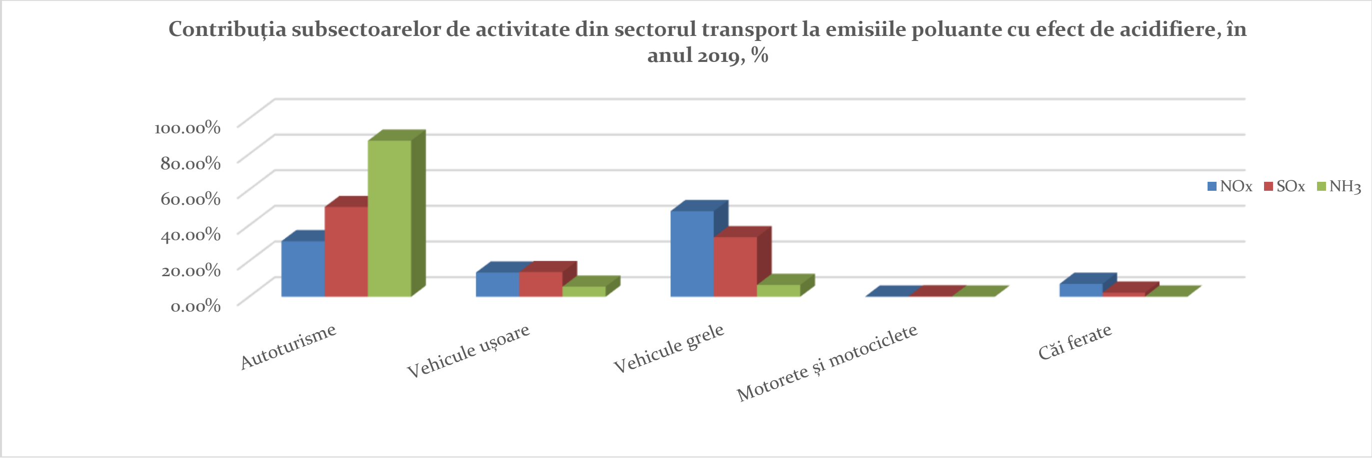
Figure XI.42 -The evolution of freight transport demand, at national level, 2016 – 2020



Source: National Institute of Statistics

Depending on the acidifying potential of the anthropogenic emissions of nitrogen oxides (NOx), ammonia (NH3) and sulphur oxides (SOx, SO2), in *Figure XI.43*, the shares of the subsectors of activity in the transport sector (without aviation) in 2019 are graphically presented. Looking at the acidifying potential of anthropogenic emissions of nitrogen oxides (NOx), ammonia (NH3) and sulphur oxides (SOx, SO2), it is noted that of the total transport emissions, the largest contribution is made by road transport in the passenger car category, followed by the categories heavy-duty vehicles, light-duty vehicles and rail transport.

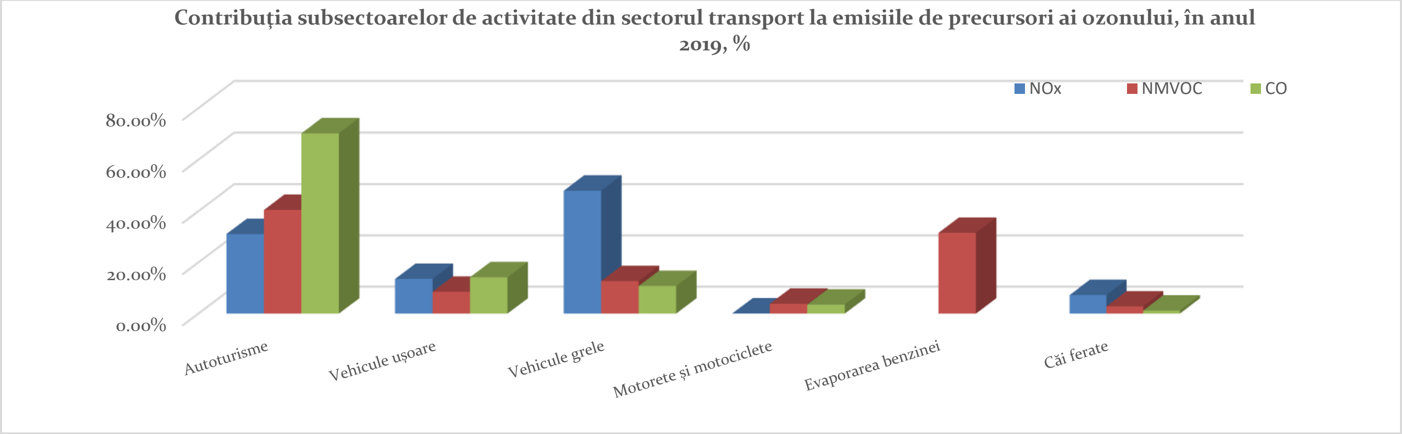
Figure XI.43 - The contribution of the activity subsectors in the transport sector to the emissions of pollutants with acidification and eutrophication effects (NOx, SOx, NH3), in 2019, %



Source: Romania's Informative Inventory Report 2021

*Figure XI.44 graphically presents the contribution of the activity subsectors in the transport sector to ozone precursor emissions (*NOx, NMVOC, CO), in 2019. It is noted that in the transport sector, the largest share is held by road transport by the category of passenger cars for carbon monoxide (CO) and non-methane volatile organic compounds (NMVOC), and for nitrogen oxides (NOx), the highest value is held by road transport by the category of heavy vehicles. Evaporation processes in vehicles equipped with gasoline engines make an important contribution to emissions of non-methane volatile organic compounds (NMVOCs).

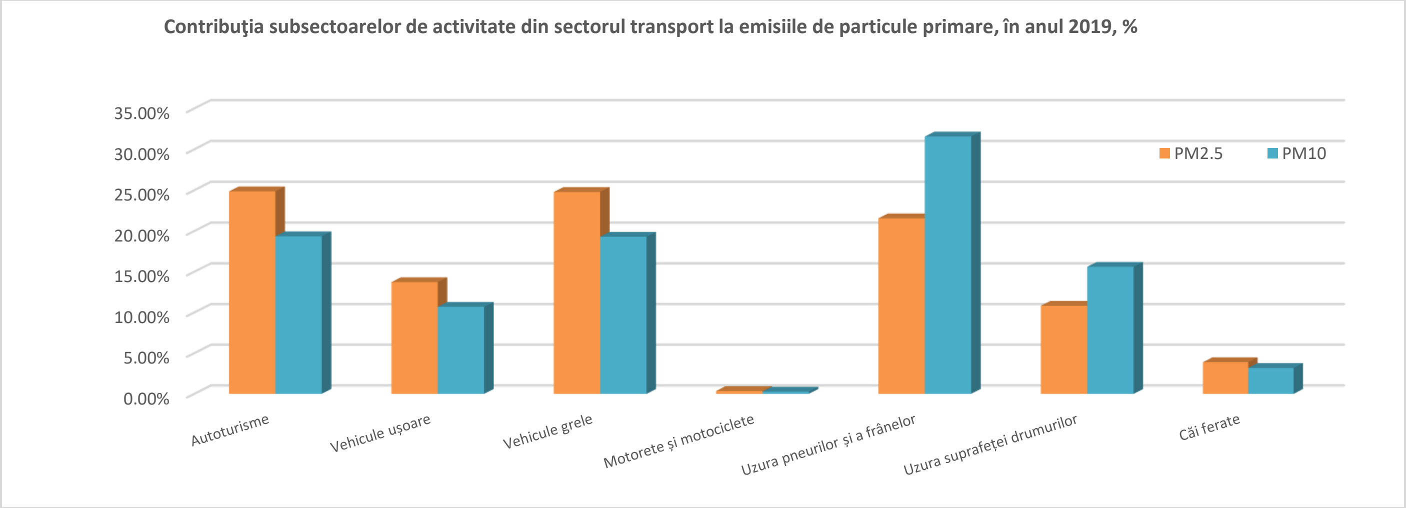
Figure XI.44 - Contribution of activity subsectors in the transport sector to emissions of ozone precursors (NOx, NMVOC, CO), in 2019



Source: Romania's Informative Inventory Report 2021

Figure XI.45 shows graphically the contributionof the activity sub-sectors in the transport sector to the emissions of primary particles with a diameter smaller than 2.5 µm (PM2.5) and respectively 10 µm (PM10), in relation to the total emissions from this sector. From the analysis of data from the transport sector, it is found that emissions of primary particles and precursors of secondary particles mainly come from road transport.

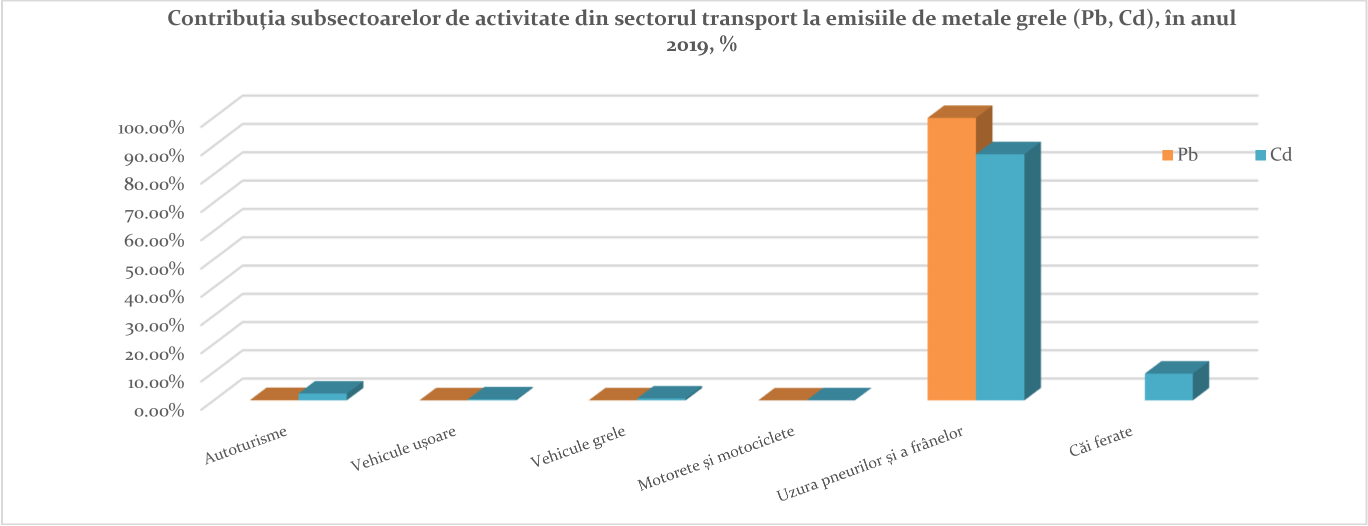
Figure XI.45 - Contribution of activity subsectors in the transport sector to emissions of primary particles (PM2.5, PM10), in 2019



Source: Romania's Informative Inventory Report 2021

In figure XI.46 it is presented graphically the share of anthropogenic emissions of heavy metals (Pb, Cd) from the activity subsectors in the transport sector in 2019. It is observed that in the transport sector, the biggest contribution to heavy metal emissions is the wear of tires and brakes of road vehicles.

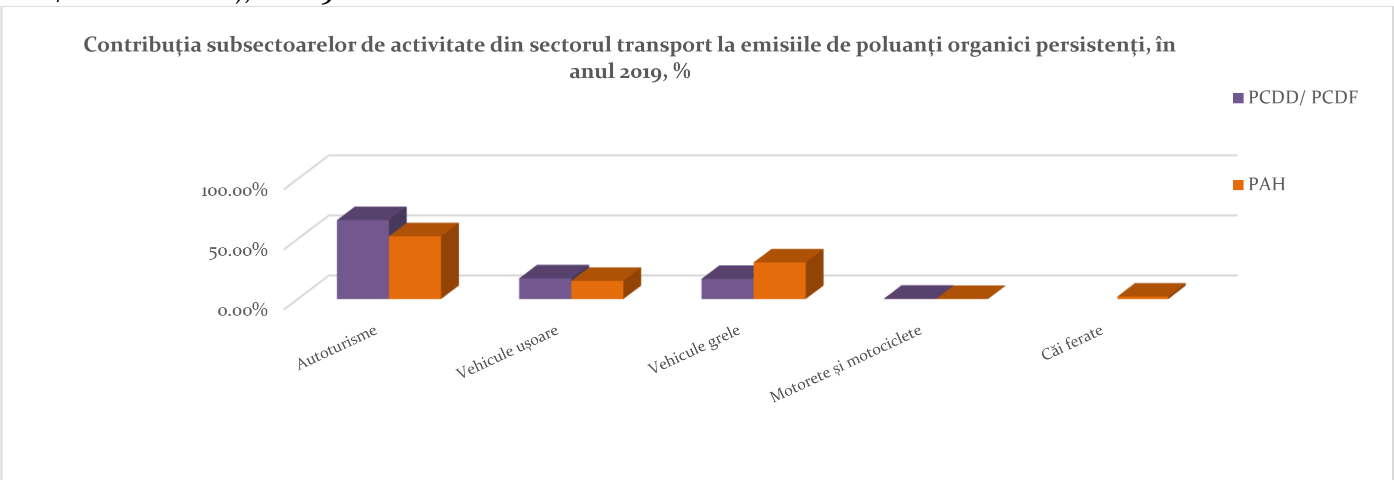
Figure XI.46 - Contribution of activity subsectors in the transport sector to emissions ofheavy metals (Pb, Cd), in 2019



Source: Romania's Informative Inventory Report 2021

It is presented graphically in figure XI.47 the share of anthropogenic emissions of persistent organic pollutants (dioxin - PCDD, furans - PCDF and polycyclic aromatic hydrocarbons - PAH), on the activity subsectors of the transport sector in 2019. It is noted that the largest share of persistent organic pollutant emissions has road transport category cars, followed by categories heavy vehicles and light vehicles.

Figure XI.47 - The contribution of activity subsectors in the transport sector to emissions ofpersistent organic pollutants (PCDD/PCDF and PAH), in 2019

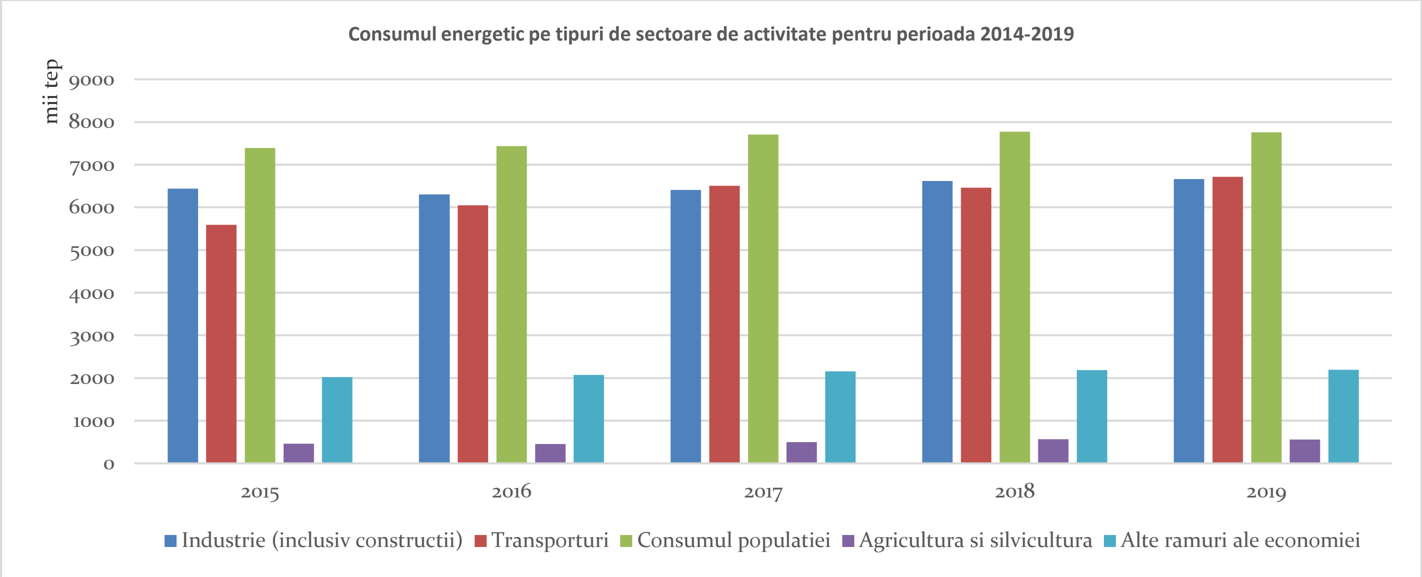


Source: Romania's Informative Inventory Report 2021

Housing

RO 27	
Indicator code Romania: RO 27	
EEA indicator code: CSI 27	
TITLE: **FINAL ENERGY CONSUMPTION BY TYPE OF ACTIVITY SECTOR**	
DEFINITION: Final energy consumption covers the energy supplied to the final consumer for the most diverse energy purposes	

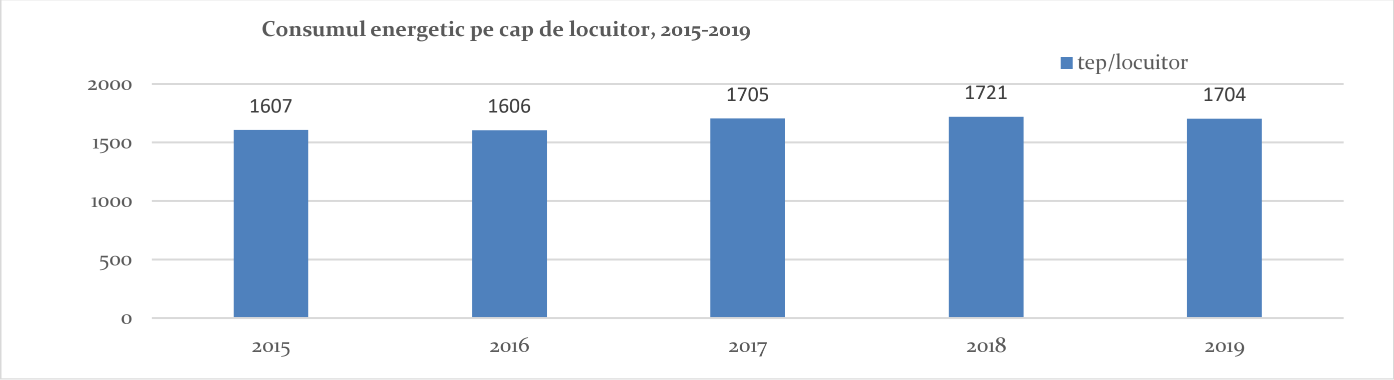
Figure XI.48 - Energy consumption by types of activity sectors for the period 2013 – 2019 (thousands of toe)



Source:http://www.insse.ro

Gross domestic energy consumption per inhabitant in 2019 it was 1704 toe/place, -1%, compared to 2018 (1721 toe/place). The trend of gross domestic energy consumption per inhabitant in the period 2015-2019 is shown in *figure XI.49*, where a increase from 1607 toe/place in 2015 to 1721 toe/place in 2019, +6%.

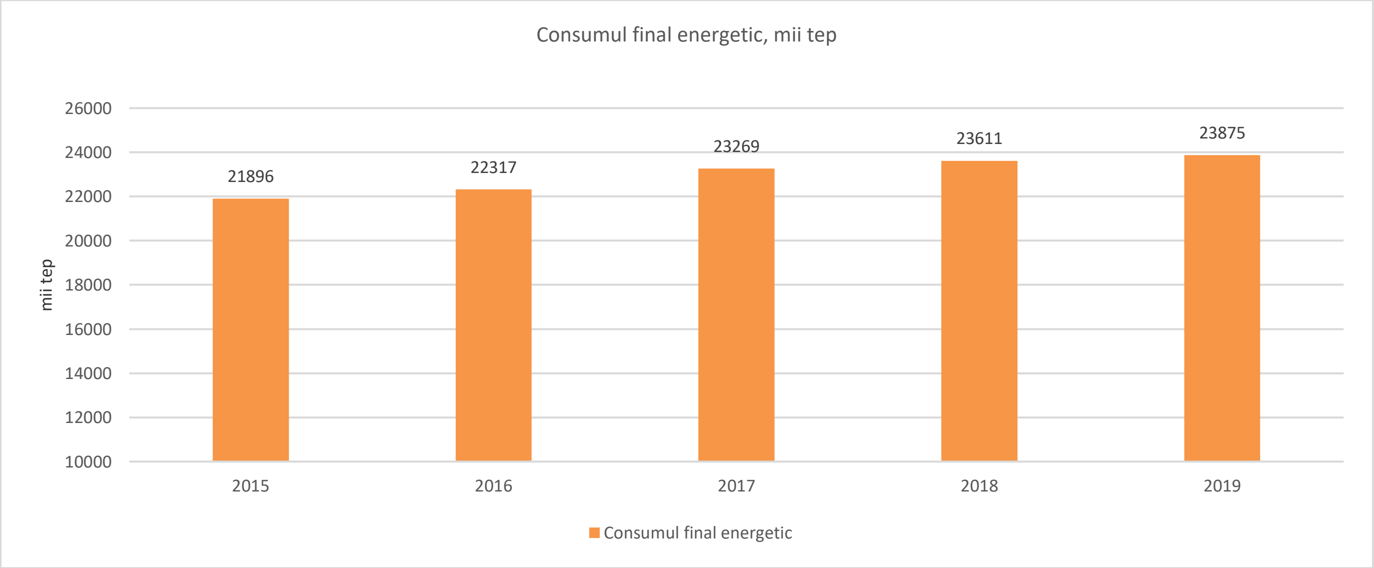
Figure XI. 49 - Energy consumption per capita, 2015-2019, expressed in tonnes of oil equivalent (toe/capita)



Source:http://www.insse.ro

Final energy consumption in 2019 increased by 264 thousand toe (+1.1%) compared to 2018 (*figure XI.50*)
The final energy consumption in industry (including construction) registered a 0.6% increase compared to the previous year, mainly due to the increase in consumption in the chemical and pharmaceutical industry, rubber and plastic products (+37 thousand toe) and construction (+44 thousand tep). Compared to 2019, final energy consumption decreased by 3.3% in metallurgy and by 0.7% in the metal construction, machinery and equipment industry. In addition to industry, the transport sector and the tertiary sector also contributed to the increase in final energy consumption (*Source:*http://www.insse.ro*).*

FigureXI.50 - Final energy consumption 2015-2019, thousand toe



Source:http://www.insse.ro

Trends: Romania's energy consumption between 2030 and 2050
The analysis of energy consumption by types of resources and by segments of demand does not show major changes in energy consumption by segments of demand and by sectors of activity, but there will be important transformations in the energy mix, especially noted in the demand of different types of energy at the sectoral level and from the point of view of the technologies used (Source: Energy Strategy of Romania 2019 – 2030, with the perspective of 2050, http://energie.gov.ro).

RO 10
Indicator code Romania: RO 10
EEA indicator code: CSI 10
TITLE: **GREENHOUSE GAS EMISSIONS TRENDS**
DEFINITION: The indicator represents the trends (total and by sector) of greenhouse gas emissions in relation to the obligations of the member states to comply with the objectives of the Kyoto protocol

Starting from 2002, Romania annually submits to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), as a Party to the UNFCCC/Kyoto Protocol (KP), the National Inventory of Greenhouse Gas Emissions (INEGES) ; additionally, as a Member State of the European Union, since 2007, Romania submits the inventory to the European Commission and the European Environment Agency. INEGES is administered in accordance with the associated legal provisions, provisions at the international level, of the European Union and at national level; the administration of the inventory is supported by the implementation of the National Inventory Arrangements (NIA) and the arrangements associated with the National System for estimating the level of anthropogenic emissions from sources or sequestration of all greenhouse gases (SNEEGES). From a methodological point of view, INEGES is carried out using the applicable IPCC methodologies: Guidelines for National Inventories of Greenhouse Gas Emissions, a document developed by the IPCC in 2006 (IPCC 2006), Revised Additional Methods and Guidelines associated with Good Practice Deriving from the Kyoto Protocol, a document developed by the IPCC in 2013 (KP Supplement) and the Supplement to the Guidelines for National Inventories of Greenhouse Gas Emissions developed by the IPCC in 2006, document developed by the IPCC in 2013: Wetlands (Wetlands Supplement). *INEGES is a tool for reporting emissions and anthropogenic retention of greenhouse gases. INEGES contains the elements in the Common Reporting Format - "CRF" (the CRF tables and the "xml" type database) and the Report to INEGES - "NIR". The report to INEGES presents in detail how the inventory was developed and contains general data and information, data and information specific to each sector of INEGES and other additional data and information required by the Kyoto Protocol. INEGES contains the elements in the Common Reporting Format - "CRF" (the CRF tables and the "xml" type database) and the Report to INEGES - "NIR". The report to INEGES presents in detail how the inventory was developed and contains general data and information, data and information specific to each sector of INEGES and other additional data and information required by the Kyoto Protocol. INEGES contains the elements in the Common Reporting Format - "CRF" (the CRF tables and the "xml" type database) and the Report to INEGES - "NIR". The report to INEGES presents in detail how the inventory was developed and contains general data and information, data and information specific to each sector of INEGES and other additional data and information required by the Kyoto Protocol*.

Total greenhouse gas emissions (excluding the contribution of the Land Use, Land Use Change and Forestry - LULUCF sector) decreased in 2019 by approximately 2.89%, compared to the level of emissions recorded in 2018 (table XI.23). The share of greenhouse gas emissions from the Energy sector in the total of greenhouse gas emissions (excluding the contribution of the sector - LULUCF) for the year 2019 was approximately 66.09%, respectively the contribution of the sub-sectors attributed to the Energy sector is as follows : Energy Industry 29.00%; Manufacturing and Construction Industry 16.85%; Transport23.63%; Fugitive emissions 11.68%; Other sub-sectors 15.98%. The contribution of the other sectors in INEGES for 2019 is represented as follows: Industrial Processes and Product Use (IPPU) is about 11.73%; Agriculture represents 16.85%; Waste is 5.33%.

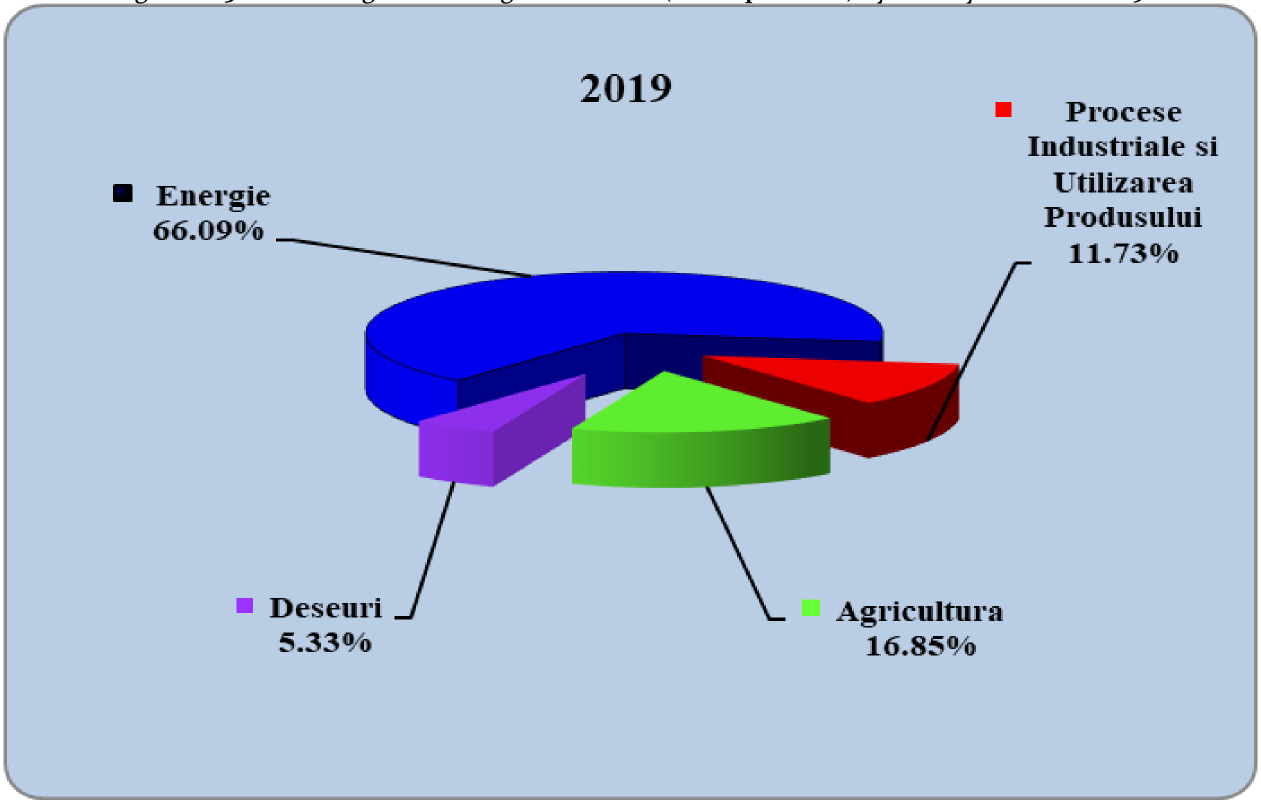
Table XI.23 Greenhouse gas emissions by activity sector

No. crt.	Sector/Sub-sector - INEGES	Emissions (kt CO2 equiv.)		Trend (%)	
		2018	2019		
1	**Energy**	76,786.66	73,869.32	-3.80	↘
	- Energy industry	24,518.07	21,418.53	-12.64	↘
	-Manufacturing industry and constructions	12,668.80	12,447.48	-1.75	↘
	- Transport	18,435.22	18,935.34	2.71	↗
	- Institutional commercial	2,251.01	2,257.07	0.27	↗
	-Residential	7,897.00	7,962.34	0.83	↗
	- Fugitive emissions	8,777.16	8,631.11	-1.66	↘
2	**Industrial processes and product use**	13,226.37	13,113.98	-0.85	↘
3	**Agriculture**	19,186.14	18,830.49	-1.85	↘
4	**Waste**	5,891.79	5,953.27	1.04	↗
5	**Total GHG (excluding LULUCF)**	115,090.96	111,767.06	-2.89	↘

Source: NEPA

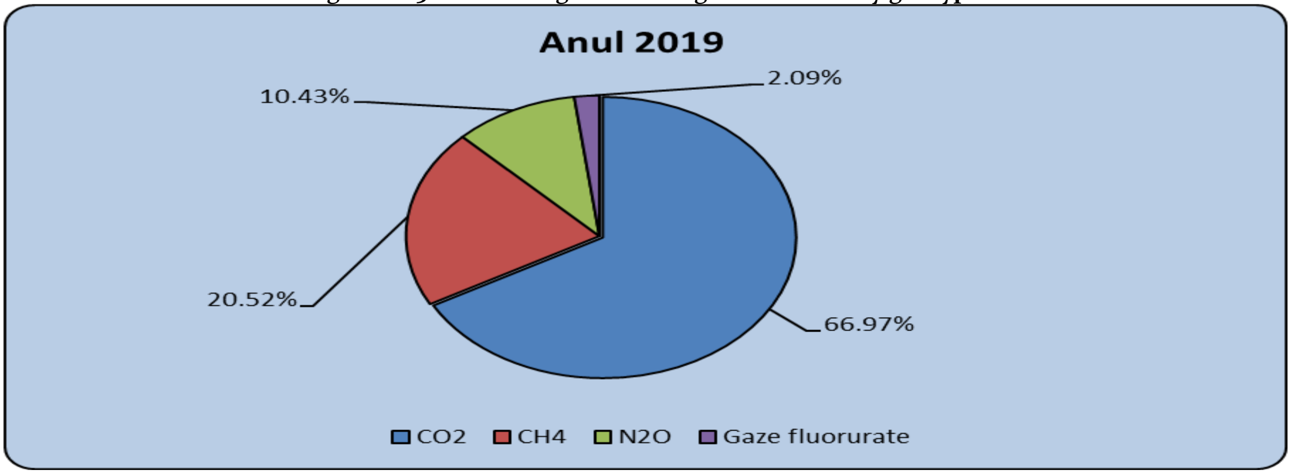
Figure XI.51a shows the share of emissions related to 2019 by activity sector. In *figure XI. 51b* it is shown the share of greenhouse gas emissions by type of gas in 2019, respectively, the changes in greenhouse gas emissions for 2019 compared to 2018, expressed in percentages.

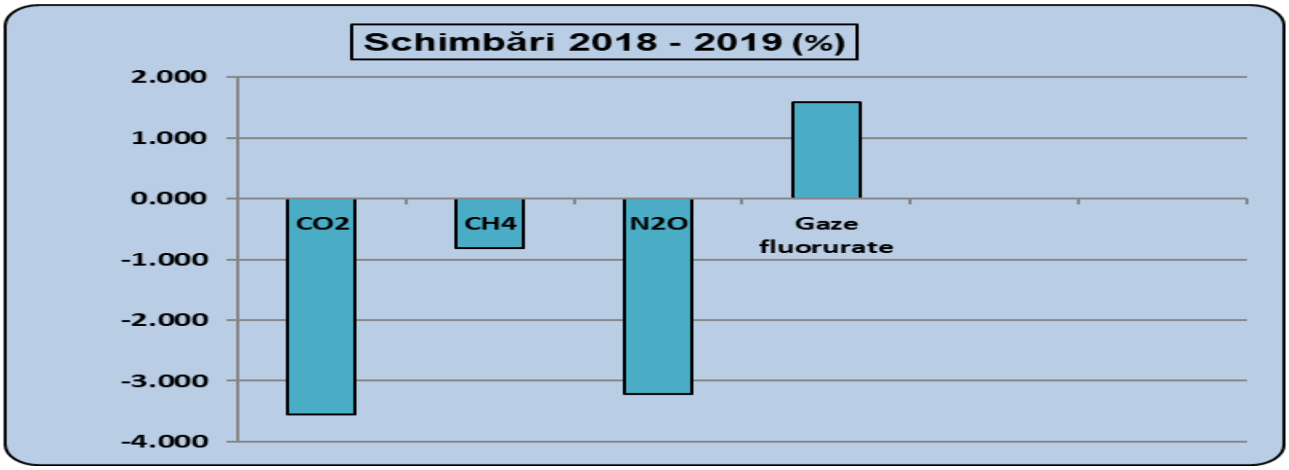
Figure XI.51a Share of greenhouse gas emissions (CO2 equivalent) by activity sector for 2019



Source: NEPA - National emissions reported under the Monitoring and Reporting Mechanism for Greenhouse Gas Emissions at European Union level

Figure XI.51b Share of greenhouse gas emissions by gas type

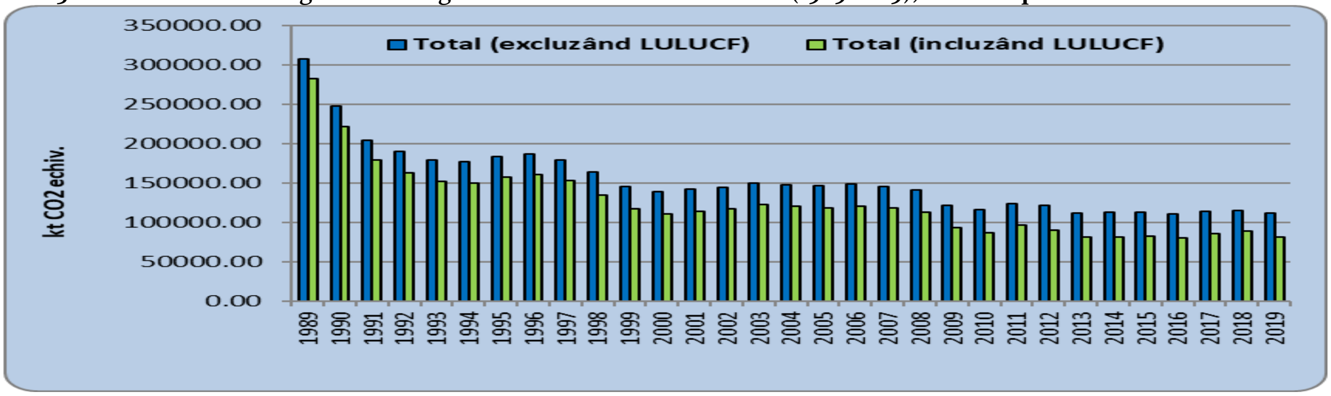




Source: National emissions reported under the European Union Greenhouse Gas Emissions Monitoring and Reporting Mechanism

In 2019, total greenhouse gas emissions (excluding the contribution of the "Land use, land use change and forestry - LULUCF) sector decreased by 63.64% compared to the level of emissions in 1989, while net GHG emissions /retentions (taking into account CO_2 retentions) decreased by 71.10% (figure XI.52). Total greenhouse gas emissions in 2019, excluding sequestration by absorbers, amounted to 111,767.06 kt CO_2 equivalent. The emission trend reflects the changes during this period characterized by the transition to the market economy; the period can be divided into three sub-periods: 1989-1999, 2000-2008 and 2009-2019. The decline in economic activities and energy consumption between 1989 and 1992 directly caused the reduction in total emissions during this period. With the entire economy in transition, some large energy-consuming industries have reduced their activities and this is reflected in the reduction of GHG emissions. Emissions started to increase until 1996, following the revitalization of the economy. Considering the start of operation of the first reactor at the Cernavodă nuclear power plant (1996), emissions decreased again in 1997. The decrease continued until 1999. Emissions have increased since 2000 and reflect economic development between 2000 and 2008. The limited decrease in GHG emissions in 2005, compared to 2004 and 2006 levels, was caused by the hydrological year positively influencing the production of energy in hydropower plants. As a result of the economic crisis, emissions decreased significantly in 2013 compared to 2008; subsequently, emissions increased in relation to the increase in the level of economic activities (*Figure XI.52*)

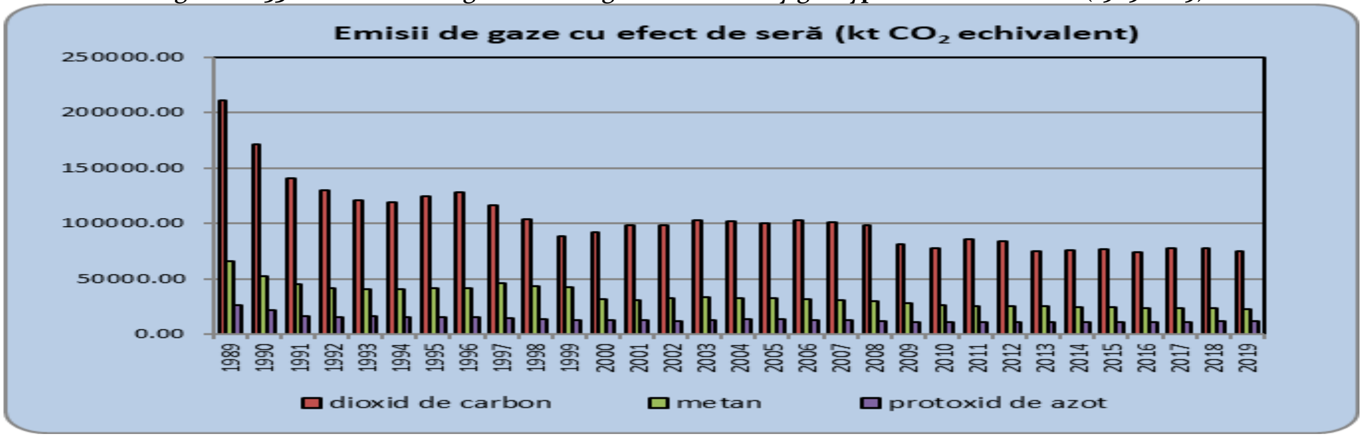
Figure XI.52 -The trend of total greenhouse gas emissions at national level (1989-2019),kt CO_2 equivalent



Source: NEPA - National emissions reported under the Monitoring and Reporting Mechanism of Greenhouse Gas Emissions at the level of the European Union

Among the greenhouse gases monitored at national level, carbon dioxide represents the pollutant with the most significant weight, followed by methane and nitrous oxide (figure XI.53). ***Carbon dioxide (CO_2)*** represents the most important anthropogenic greenhouse gas. The decrease in CO_2 emissions in 2019 by 64.52% compared to 1989 (from 210,976.81 kt in 1989 - 68.64% to 74,846.27 kt in 2019 - 66.97%) is caused by the decrease in the amount of fossil fuels burned in the energy sector (especially in the production of electricity and heat, as well as manufacturing and construction industries) as a result of the decline in activity. ***Methane (CH_4) emissions***, mainly related to fugitive emissions from the extraction and distribution of fossil fuels and livestock, decreased in 2019 by 65.16% compared to 1989 (from 65,806.51 kt CO_2 equivalent in 1989 to 22,929.99 kt CO_2 equivalent in 2019). The decrease in CH_4 emissions in agriculture is due to the decrease in the level of animal husbandry. ***Nitrous oxide (N_2O) emissions*** are mainly generated, within the activities in the agricultural soils of the agricultural sector and within the activities of the chemical industry in the Industrial Processes sector. The decline of these activities (decline in animal husbandry, decrease in synthetic N fertilizers applied to soil quantities, decrease in the level of crop production) is reflected in the trend of N_2O emissions, and they decreased in 2019 by 55.42% (from 26,141.37 kt CO_2 equivalent in 1989 to 11,653.84 kt CO_2 equivalent in 2019).

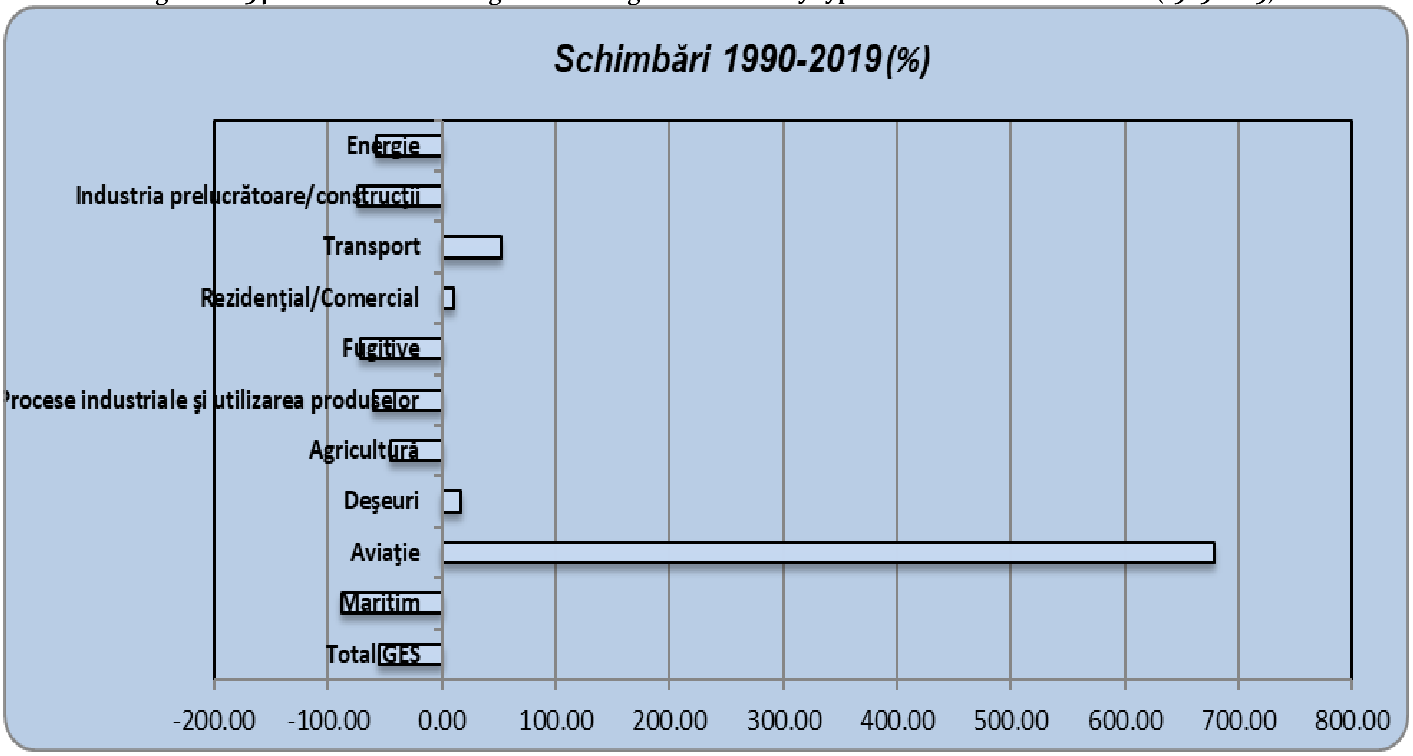
Figure XI.53 -Trend of total greenhouse gas emissions by gas type at national level (1989-2019)



Source: National emissions reported under the European Union Greenhouse Gas Emissions Monitoring and Reporting Mechanism

Figure XI.54 represents the trends of GHG emissions for each sector of INEGES, excluding the LULUCF sector. GHG emissions from the energy sector decreased by 66.08% compared to the base year 1989. A significant 71.52% decrease in GHG emissions was recorded in the Industrial Processes and Product Use sector in 2019 compared to the 1989 level as a result of the decline or cessation of certain production activities. GHG emissions from the Agriculture sector also decreased in 2019 by 50.91% compared to the 1989 emissions, this being based on the following causes: the decline of the livestock sector, the decrease in vegetable agricultural productions, the decrease in the quantities of synthetic N-based fertilizers applied to the soil. In the Waste sector, emissions increased in 2019 by 14.53%, compared to 1989 levels.

Figure XI.54 -The trend of total greenhouse gas emissionsby type of sectorat national level (1989-2019)



Source: National emissions reported under the European Union Greenhouse Gas Emissions Monitoring and Reporting Mechanism

RO 16
Indicator code Romania: RO 16
EEA indicator code: CSI 16
TITLE: **GENERATION OF MUNICIPAL WASTE**
DEFINITION: The indicator expresses the total amount of municipal waste generated per capita (kg per capita and year)

In accordance with the provisions of the National Waste Management Plan, approved by GD no. 942/2017, "*municipal waste is household waste and other waste, which, by nature or composition, are similar to household waste*". According to Decision 2011/753/EU establishing the rules and calculation methods for verifying compliance with the objectives set in art. 11, paragraph (2) of Directive 2008/98/EC of the European Parliament and of the Council, "municipal waste" means household and similar waste, where "household waste" represents waste from households, and "similar waste" means waste which, from the point of view of their nature and composition are comparable to household waste, excluding industrial waste and waste from agriculture and forestry activities. *The collection of municipal waste* is the responsibility of the municipalities, which can carry out these tasks either directly (through the specialized services within the Local Councils) or indirectly (by delegating this responsibility on a contractual basis, to specialized and authorized companies for carrying out sanitation services).

Generated municipal waste

The value was calculated by summing the quantities generated for the following types of waste:

- household and assimilated waste and from municipal services collected by sanitation operators, excluding inert waste;
- household waste generated and not collected by sanitation operators;
- recyclable waste from the population, collected through authorized economic operators, other than sanitation operators (paper and cardboard, metals, plastic, glass, wood, textiles, WEEE, waste batteries and accumulators).

It includes bulky waste, waste from parks, gardens and street cleaning, including the contents of street waste bins, as well as electrical and electronic equipment waste from households.

Excluded are: Sludges from urban wastewater treatment; Construction and demolition waste.

According to the method of collection, municipal waste is:

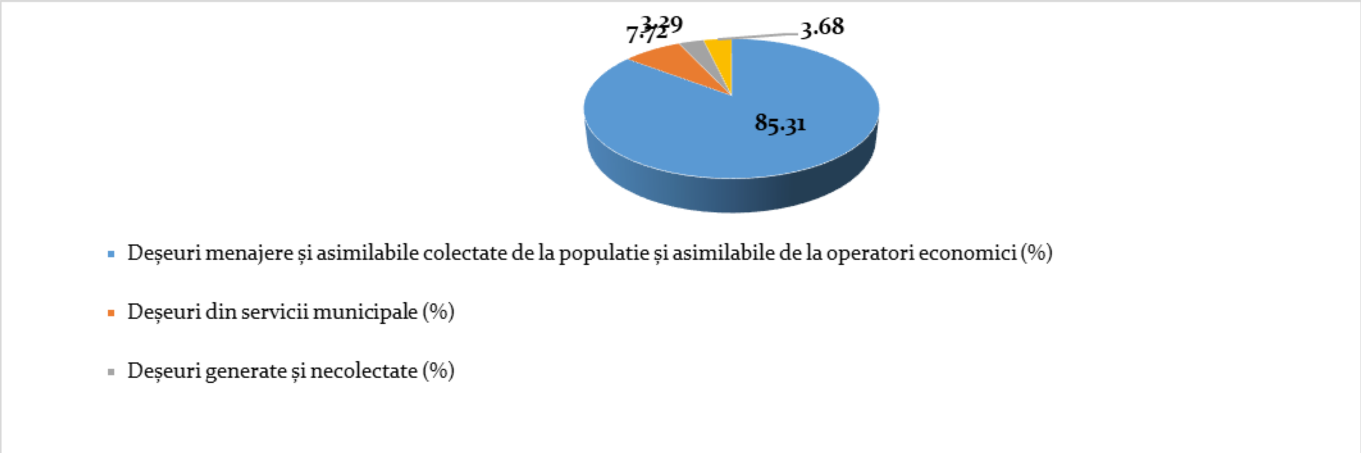
- Collected by or on behalf of municipalities;
- Collected directly by private economic operators - valid for WEEE and other types of recyclable waste;
- Generated and not collected by a sanitation operator, but managed directly by the generator.

The amounts of waste generated by the population not served by sanitation services are calculated using the generation indices provided for in the National Waste Management Plan: 0.65 kg/place/day for the urban environment and 0.3 kg/place/day for rural environment. *Table XI.24* shows the amounts of municipal waste generated by waste category in the period 2015-2019.

Table XI.24 – Quantities of municipal waste generated during 2015-2019

Indicator name	Years				
	2015	2016	2017	2018	2019
Amount of municipal waste generated (tons)	4903535	5142542	5333171	5296239	5430341
From which:					
- Household waste collected from the population and assimilated from economic operators (tons)	3685250	3894853	4162921	4249988	4632802
- Waste from municipal services (tons)	429286	454170	400228	430097	419429
- Generated and uncollected waste (tons)	600345	523670	419444	314022	178470
- Recyclable waste from the population, collected through authorized economic operators, other than sanitation operators (tons)	188654	269849	350578	302132	199640

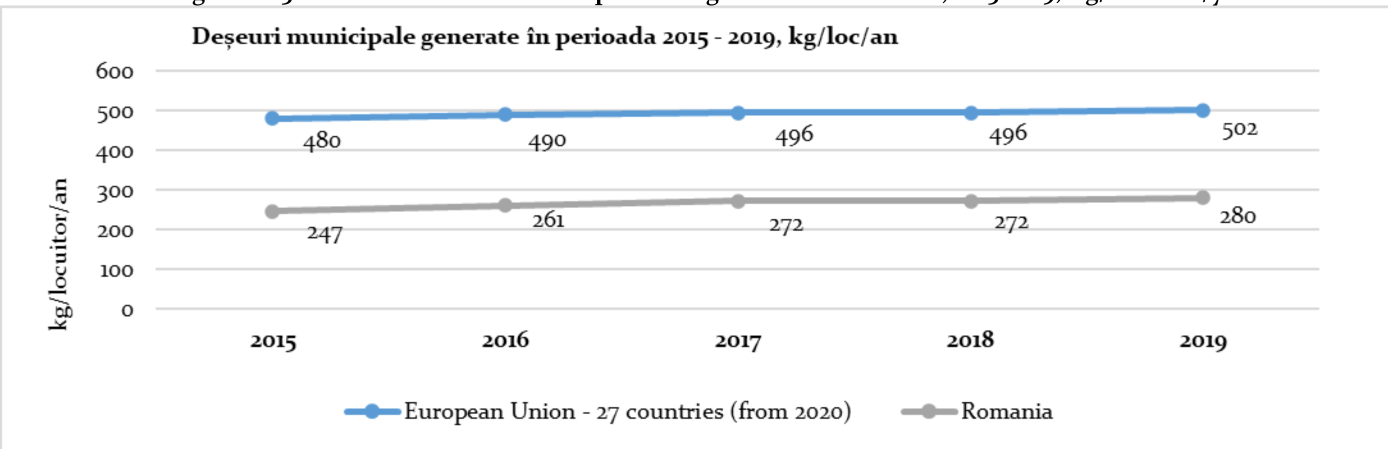
Figure XI.55 – Share of the main categories of municipal waste generated in 2019



Source: National Environmental Protection Agency

Figure XI.56 shows the evolution of the municipal waste generation indicator in Romania compared to the average recorded in the European Union.

Figure XI.56 - Evolution of the municipal waste generation indicator, 2015-2019, Kg/location/year



Source: EUROSTAT

The main specific indicators of sustainable development regarding municipal waste are presented in *table XI.25*.

Table XI.25 – Specific information on municipal waste in the period 2015-2019

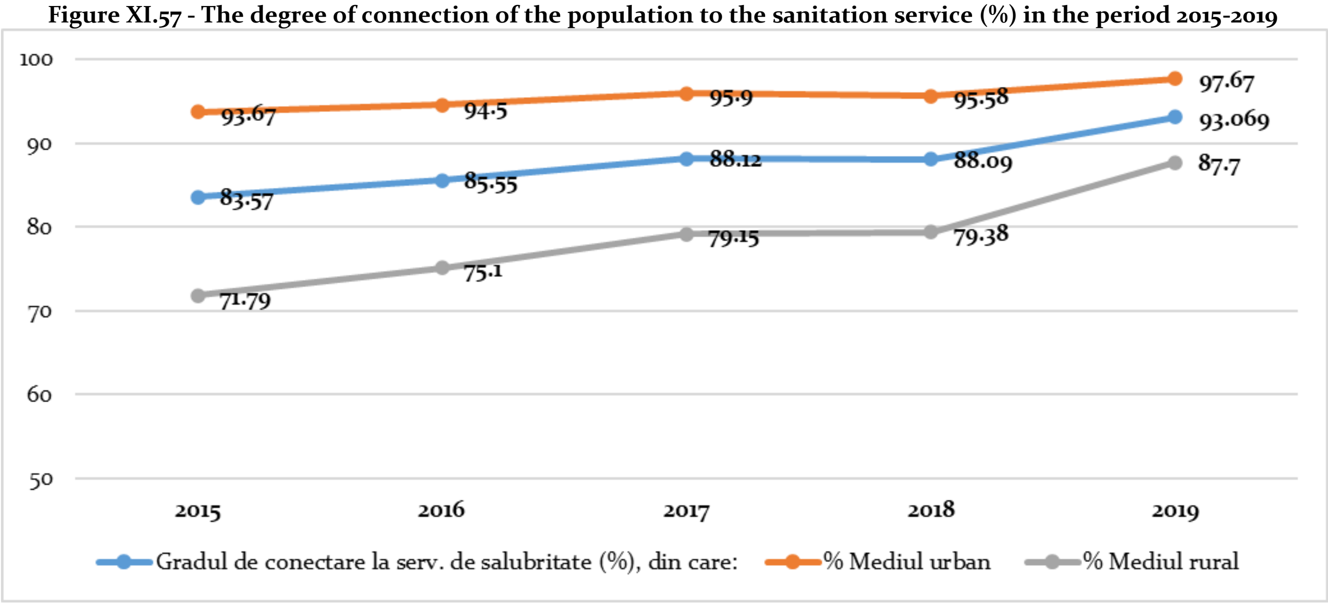
Indicator name	2015	2016	2017	2018	2019
The degree of connection to the sanitation service (%)	83.57	85.55	88.12	88.09	93.07
- Urban area	93.67	94.5	95.9	95.58	97.67
- Rural area	71.79	75.1	79.15	79.38	87.7
Amount of municipal waste collected separately (tons)	430305	580602	696742	634536	576816
Amount of municipal waste recycled * (tons)	649591	689443	745427	586406	623214

The degree of recycling achieved for municipal waste (%)	13.25	13.41	13.98	11.07	11.48
The amount of municipal waste used for energy (tons)	116296	219608	227280	241445	251277
Amount of biodegradable waste from municipal waste deposited (tons)	1856416	1913329	2159103	2068288	2120022
Number of compliant municipal warehouses in operation	35	37	42	43	44
Number of transfer stations in operation	36	51	52	53	84
Number of sorting stations in operation, including manual sorting activities	99	101	103	105	103

**recycled waste comes from both separate collection and waste collected in a mixture, entered into treatment processes*
Source: National Environmental Protection Agency

According to what is presented in *table XI.25*, at national level, ***in 2019 the degree of connection of the population to the sanitation service increased to 93%. In the urban environment this is approximately 98% and in the rural environment it has increased to 88%.*** *Figure XI.57* shows the evolution of the degree of connection to the sanitation service in the period 2015-2019.

Figure XI.57 - The degree of connection of the population to the sanitation service (%) in the period 2015-2019



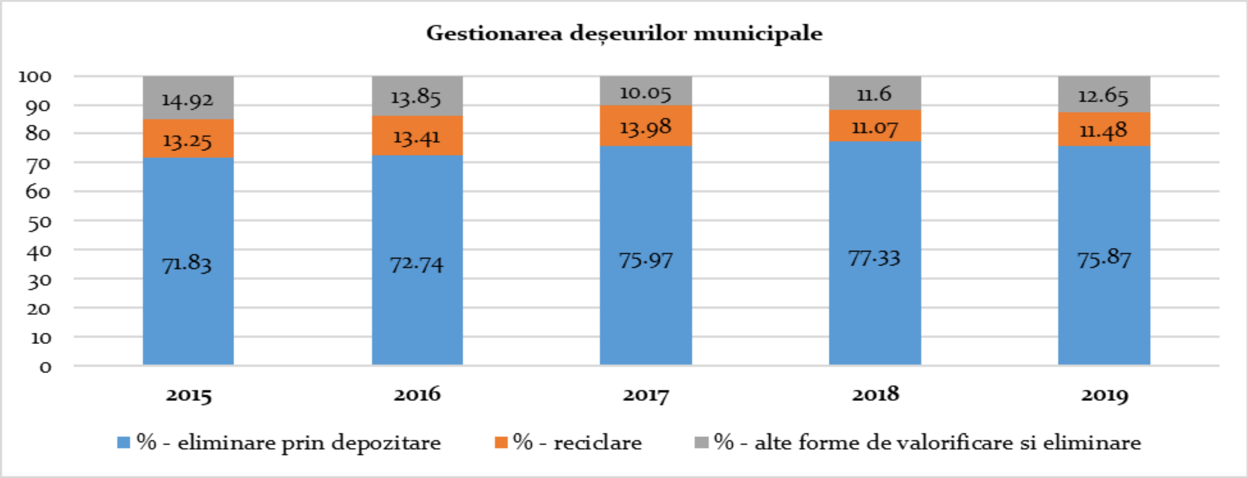
Source: National Environmental Protection Agency

The management of municipal waste involves its collection, transport, recovery and disposal, including the supervision of these operations and the subsequent maintenance of disposal sites. The responsibility for the management of municipal waste lies with the local public administrations, which, by their own means or by the concession of the sanitation service to an authorized operator, must ensure the collection (including separate collection), transport and treatment, of this waste. For certain waste streams that fall into the category of municipal waste, collection is allowed from the public and by authorised economic operators. Part of the municipal waste collected is sent directly to final recovery (material or energy), respectively to disposal, while another part is sent to intermediate treatment plants (sorting plants, composting) – see *figure*

XI.58. The disposal of municipal waste is carried out exclusively through landfilling. So far, no municipal waste incineration plants have been put into operation in Romania. At the end of 2019, 44 compliant landfills for municipal waste were authorised and operated

From figure XI.58 it can be seen that in 2019 there was a slight reduction in the quantities of municipal waste stored. However, the amount of stored waste still remains high, which is inconsistent with the principles and objectives adopted by the EU through the circular economy legislative package.

Figure XI.58 - Share of the main municipal waste management activities, in relation to the amount of waste generated, in the period 2015 – 2019, (%)



Source: National Environmental Protection Agency

Note: The decrease in the share of recycled waste starting from 2018 is determined by the change in the calculation methodology - starting this year, the amount of individually composted biodegradable waste was no longer considered recycled, taking into account the provisions of PNGD and European legislation

Reducing the amount of stored biodegradable waste

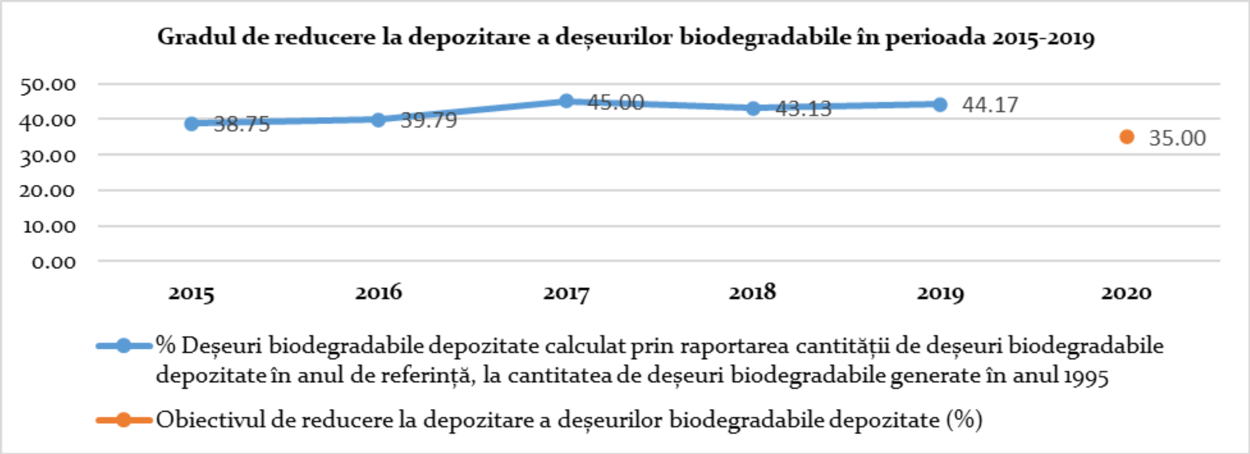
Biodegradable waste, according to the legislative provisions on waste storage, represents any waste that can undergo aerobic or anaerobic decomposition, such as food products, garden waste, paper or cardboard. *According to the provisions of GD no. 349/2005 on waste storage, within a maximum of 15 years from July 16, 2001, the reduction in biodegradable waste storage must be achieved to 35% of the total amount, expressed by gravimetric, produced in 1995. Romania requested and received a four-year derogation to achieve this objective, thus, the final deadline was July 16, 2020. Table XI.26* shows the quantities of biodegradable waste generated and stored in the period 2015-2019.

Table XI.26 – Quantities of biodegradable waste generated and stored in the period 2015-2019

Indicator name	1995	2015	2016	2017	2018	2019
Amount of biodegradable waste generated (million tons)	4.80	2.57	2.64	2.89	2.81	2.99
Amount of stored biodegradable waste (million tons)		1.86	1.91	2.16	2.07	2.12
Biodegradable waste deposited compared to 1995 (%)		38.75	39.79	45.00	43.13	44.17

Source: National Environmental Protection Agency

Figure XI.59 - Evolution of the degree of reduction in storage of biodegradable waste in the period 2015-2019 (%)



Source: National Environmental Protection Agency

FORECASTS, POLICIES AND MEASURES RELATING TO CONSUMPTION AND THE ENVIRONMENT

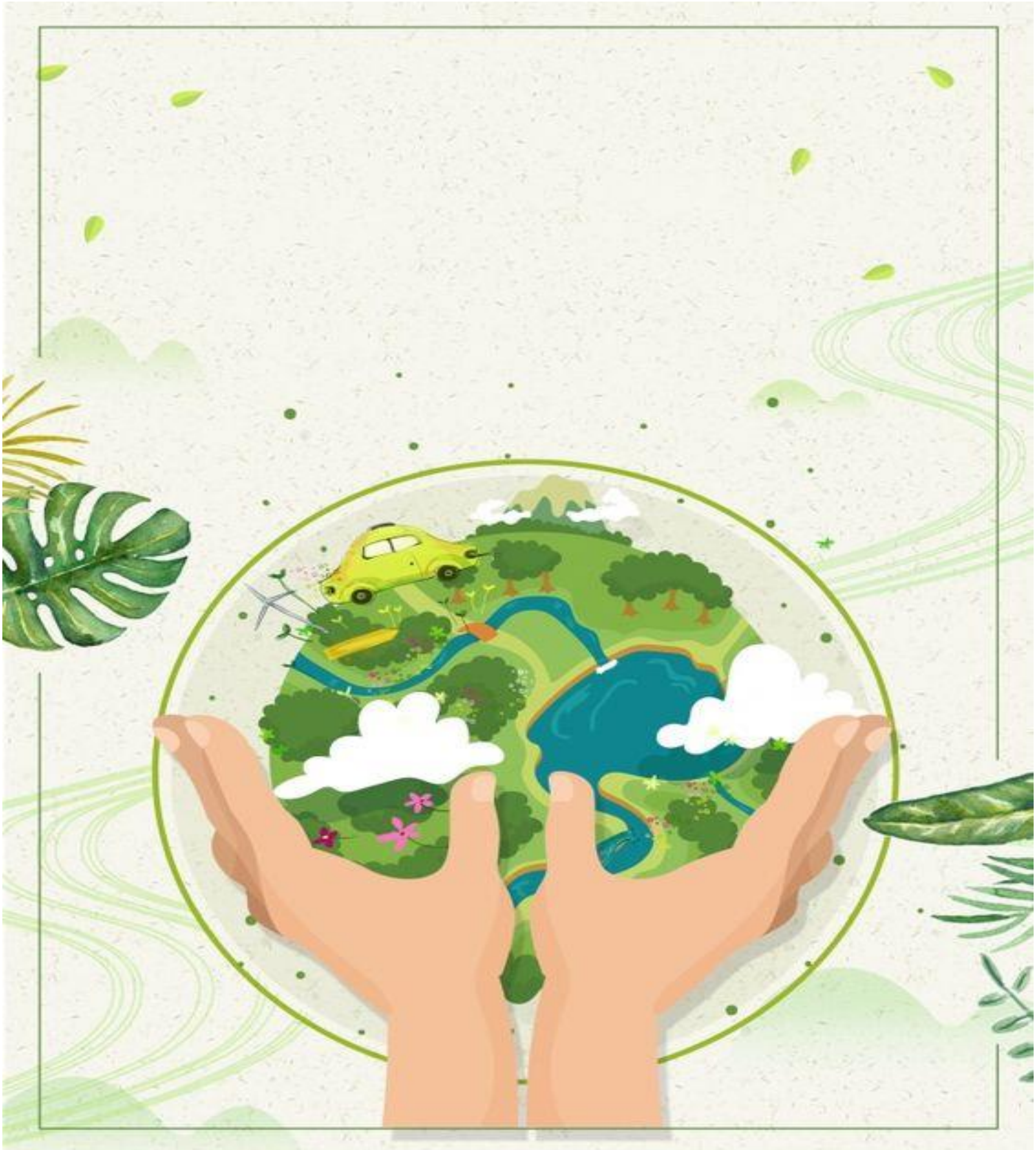
The National Strategy for Sustainable Development of Romania establishes concrete objectives for the transition, within a reasonable and realistic time frame, to the development model generating high added value, propelled by the interest in knowledge and innovation, oriented towards the continuous improvement of the quality of people's lives and of the relationships between them in harmony with the natural environment.

According to the National Sustainable Development Strategy of Romania, the short, medium and long term strategic objectives are:

- Horizon 2013: The organic incorporation of the principles and practices of sustainable development into the overall programs and public policies of Romania as an EU member state.
- Horizon 2020: Reaching the current average level of the European Union countries in the main indicators of sustainable development.
- Horizon 2030: Romania's significant approach to that year's average level of EU member countries from the point of view of sustainable development indicators.

The fulfillment of these strategic objectives will ensure, in the medium and long term, a high economic growth and, consequently, a significant reduction of the economic-social gaps between Romania and the other member states of the European Union. Through the lens of the synthetic indicator by which the process of real convergence is measured, namely the gross domestic product per inhabitant (GDP/place), at the standard purchasing power (SPP), the application of the Strategy created the conditions for GDP/place expressed in SPP to exceed, in year 2013, half of the European Union average at that time, to approach 80% of the European Union average in 2020 and to be slightly higher than the European average level in 2030.
The strategy proposes a vision of the sustainable development of Romania in the perspective of the next two decades, with objectives that transcend the duration of electoral cycles and conjunctural political preferences.

CHAPTER XII
TRENDS AND CHANGES IN ROMANIA COMPARED TO EU TRENDS



TRENDS AND CHANGES IN ROMANIA

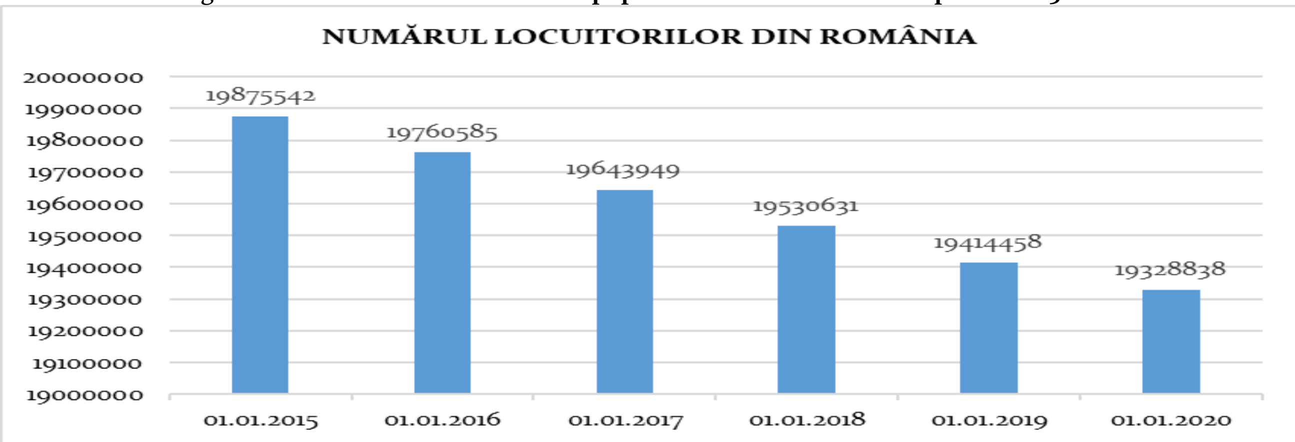
Adopting the principle of sustainable development requires all policies to be developed and implemented according to economic, social and environmental impact. Therefore, from the perspective of this integrated approach, it is desirable that sustainability become a catalyst for internal and external policy decisions, economic action and public opinion to promote both new structural and institutional reforms and changes in production and production behaviors. consumption.

SOCIAL

EVOLUTION OF THE POPULATION NUMBER AT NATIONAL LEVEL AND IN URBAN AGGLOMERATIONS

According to NIS data, on January 1, 2020, the population of Romania was 19,328,838 people. Between 2015 and 2020, the country's population decreased by 546,704 people (*see Figure XII.1*). **According to Eurostat data**, on January 1, 2021, Romania's population was 19,186,201 inhabitants, registering a decrease compared to 2019. Between 01.01.2016 - 01.01.2021 Romania registered the most important decrease of the total population in the European Union (EU- 27) ranking 4th (after Latvia, Croatia and Bulgaria) by the percentage rate of population decline. At the EU-27 level, between 01.01.2016 and 01.01.2021, there was an increase in population of approximately 0.5%.

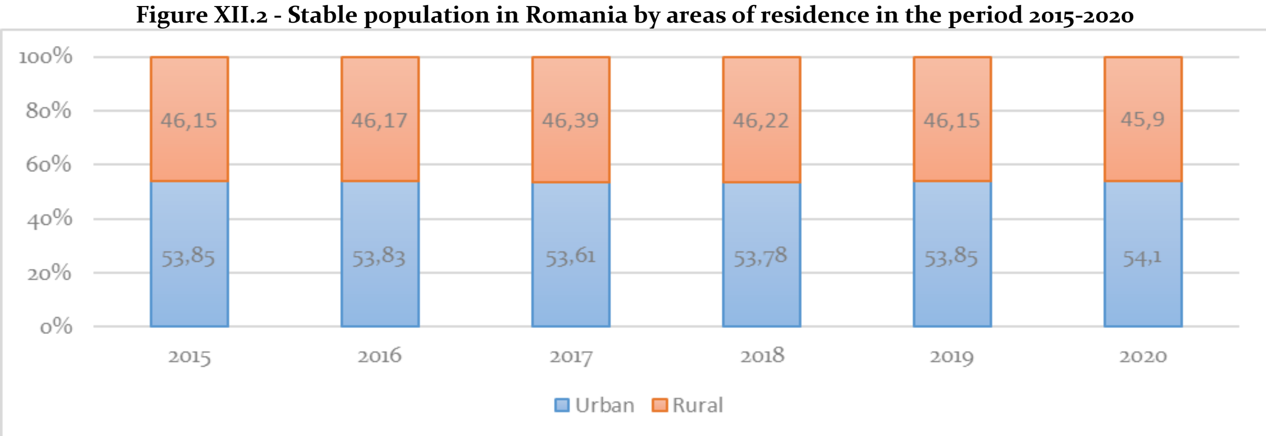
Figure XII.1 - Evolution of the stable population in Romania in the period 2015-2020



Sources: NIS, Tempo online databasehttps://europa.eu/european-union/about-eu/countries_ro

DISTRIBUTION OF THE POPULATION BY AREAS OF RESIDENCE

Figure XII.2 - Stable population in Romania by areas of residence in the period 2015-2020

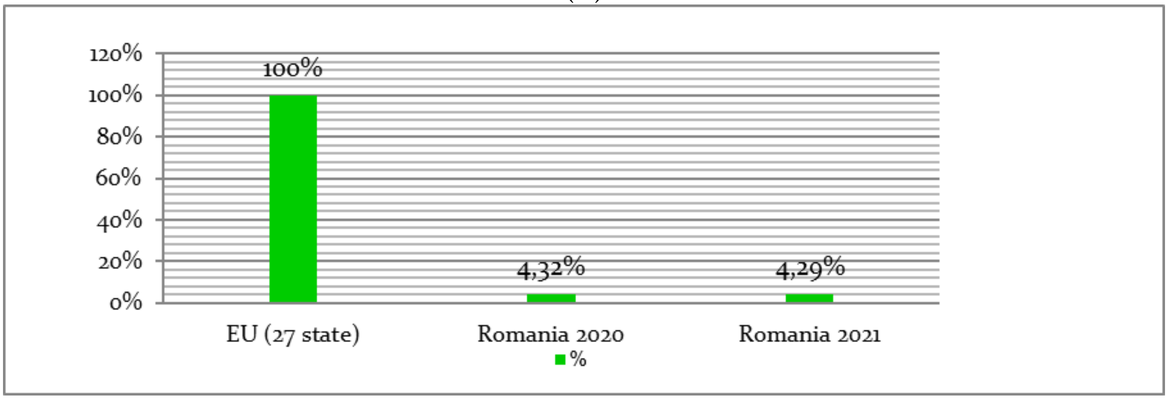


Sources: NIS,Tempo online database

Urbanization is currently one of the general global trends. ***In present, the degree of urbanization in Romania is 54.10%. Thus, on January 1, 2020, 10,456,496 people lived in urban areas, representing over half of the country's population, and 8,872,342 people lived in rural areas, representing 45.9% of the country's population*** (*see Figure XII.2*) . The effects of current demographic trends in Romania are manifested more strongly in rural areas through: the aging of the rural population; emigration especially affects the rural environment; internal rural-urban migration contributes to the depopulation of villages.

According to the study conducted by Allianz International Pensions: "In Romania, the evolution of the birth rate, which registers a decreasing trend, will be associated with the aging of the population. United Nations statistics (Population Division, 2012 Revision) estimate that the average age of Romania's population will reach almost 49 years in 2050 (projection made taking into account average fertility rates), from 40 years in 2015. In addition , according to the same projections made by the UN, from a numerical point of view, Romania's population will be 17.8 million people in 2050, reaching 12.6 million in 2100. Therefore, this demographic evolution will be a challenge and for Romania "(Source:*http://www.capital.ro/*).

Figure XII.3 - Comparison between the population of Romania and that of the EU 27 on 1 January 2020 and 1 January 2021, (%)



Source: ec.europa.eu/eurostat/

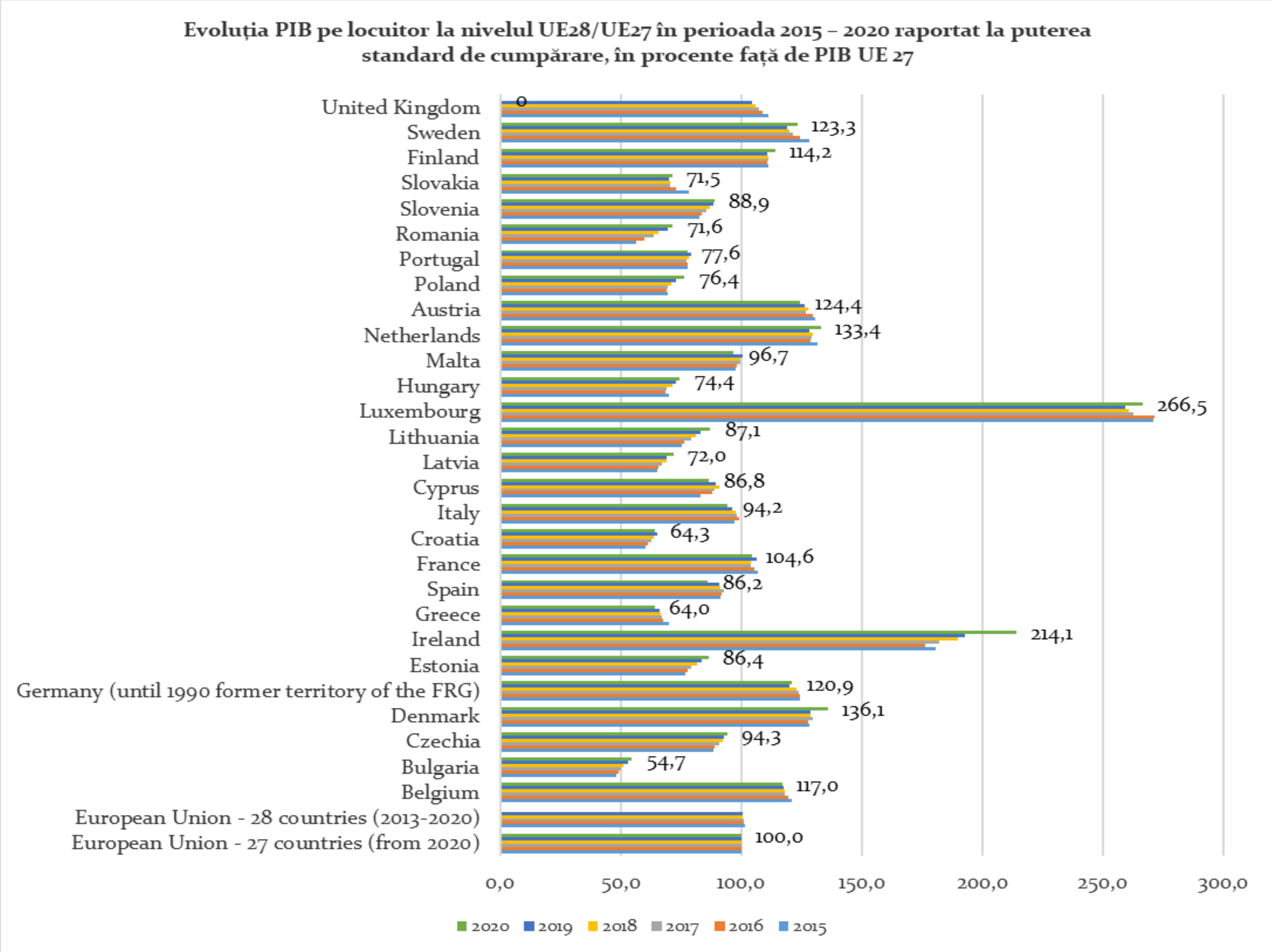
On January 1, 2020, the population of Romania represented 4.32% of the total population registered by the EU 27, and on January 1, 2021, the population of Romania represented 4.29% of the total population registered by the EU 27 (*figure XII.3****). In comparison, in 2019 and 2018 the population of Romania represented 3.80% and 3.81% respectively of the total population registered by the EU 28.***

ECONOMIC

GDP EVOLUTION AT NATIONAL LEVEL AND ON THE MAIN ACTIVITY SECTORS

Gross domestic product (GDP) is the most commonly used measure for the overall size of an economy, while GDP per capita (in euros or adjusted to take into account differences in price levels between different countries) is widely used to compare living standards. , or in order to monitor the convergence process in the European Union. *In order to assess living standards, it is appropriate to use GDP per capita in terms of purchasing power standards (PPS), in other words adjusted to the size of an economy in terms of population and also regarding the price differences between countries (figure XII.4)*. GDP growth at the levelEU-28experienced a substantial slowdown in 2008, and in 2009 GDP fell sharply as a result of the economic and financial crisis. In 2011, the level of GDP in the EU-28 recovered slightly, to 13 217 145 million Euros, and this evolution continued, in a progressive rhythm in the following years. In 2019, the GDP at the prices on the EU-28 market, continued to increase to 16 495 689.6 million Euros. GDP at EU-27 market prices was also estimated at 13,969,074.4 million euros in 2019 and 13,315,959.7 million euros in 2020, a significant decrease, probably due to the COVID-19 crisis.

Figure XII.4 - Evolution of GDP per capita at EU level 28 in the period 2015 - 2020



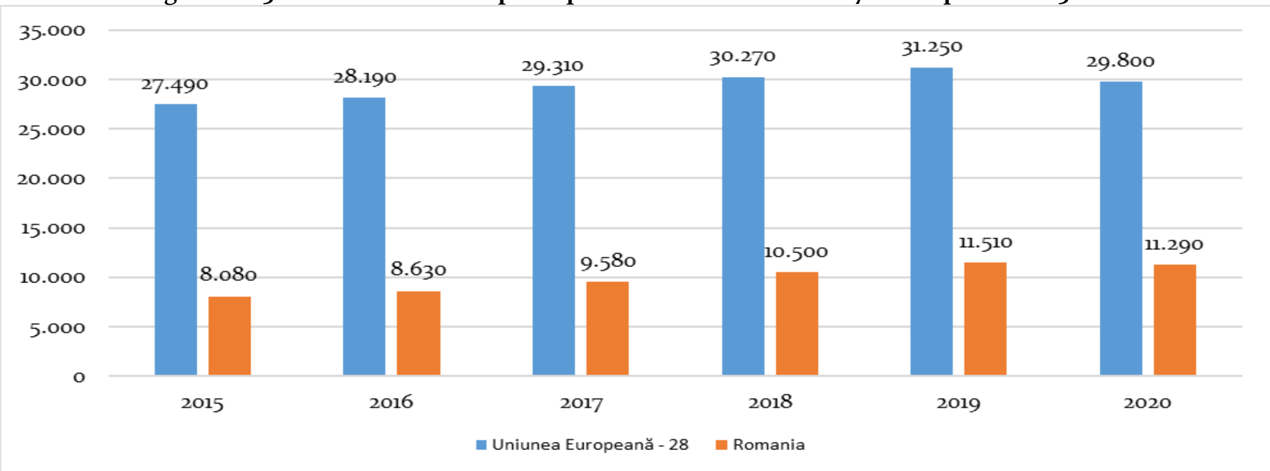
Source: Eurostat, statistical database, http://ec.europa.eu/eurostat/

In the European Union, according to preliminary data displayed by Eurostat for 2020, actual individual consumption per capita varies between 61% and 131% of the European average, marking a narrowing of the gap between the two poles of the hierarchy (59% -135% in 2019). In 2020, ten countries recorded values of actual individual consumption above the EU average. Luxembourg, with an effective level of individual consumption by 31 percentage points above the EU average, was placed first, while Germany and Denmark were above the EU average by 23 and 21 percentage points, respectively, the latter rising by 5 percentage points compared to 2019. The following positions were in order of the Netherlands, Austria and Finland, Belgium, Sweden, the United Kingdom, down 3 percentage points and France, with consumption levels exceeding the European average by 9-17 percentage points. In Cyprus, Italy, Lithuania and Ireland, actual individual consumption was 2-6 percentage points below the EU average, and in the Czech Republic, Spain and Portugal 13-15 percentage points below average. Poland equals Malta with 17 percentage points below average, while Romania and Estonia with individual consumption 21% below the EU average, very close to that of Slovenia (20% below the EU average) ahead of Greece (-22%), Slovakia (-27%) and Latvia (-28%). Three other Member States recorded individual consumption by more than 30 percentage points below the EU average in 2020. Thus, Hungary and Croatia had an individual consumption of about 31-33 percentage points below the EU average, and Bulgaria with 39 percentage points below the EU average. However, there is a rapprochement of the states at the base of the EU media hierarchy and the rise of Romania from 73% to 79% of the European average in the last three years. And in the case of GDP per capita, which measures economic activity, there are significant differences between Member States. In 2020, GDP per capita, expressed in the purchasing power standard, varied between 55% of the EU average in Bulgaria and 266% in Luxembourg. A number of 11 countries recorded in 2020 a level of GDP per capita above the EU average: 211% in Ireland, 136% in Denmark, 133% in the Netherlands, 124% in Austria, 123% in Sweden, 121% in Germany, 117% in Belgium, 115% in Finland, 103% in France and 102% in the United Kingdom. In the case of Bulgaria, actual individual consumption was 39 points below the EU average, and GDP per capita was 45 points below the EU average.

In 2020, in the European Union, ***actual individual consumption (AIC) per capita expressed in PPS (standard purchasing power parity)*** ranged from 61% of the EU average in the case of Bulgaria, 69% in the case of Hungary and ***79% of the EU average in the case of Romania***, to 135% in the case of Luxembourg and 123% of the EU average in the case of Germany.Romania reached 79% of the EU28 average living standard in 2020, according to the actual individual consumption indicator (AIC) published by Eurostat, overpassing the group consisting of Hungary, Croatia and Bulgaria. The advance between 2015 and 2020 was 16 percentage points.

In terms of ***GDP per capita*** (the value of Gross Domestic Product per capita expressed in standard purchasing power parity — PPS), ***in 2020 it ranged from*** 55% of the EU average for Bulgaria, 64% for Croatia and Greece, 71.6% ***in the case of Romania*** (*figures XII.5 and XII.6*) and up to 266% in Luxembourg and 211% in Ireland.

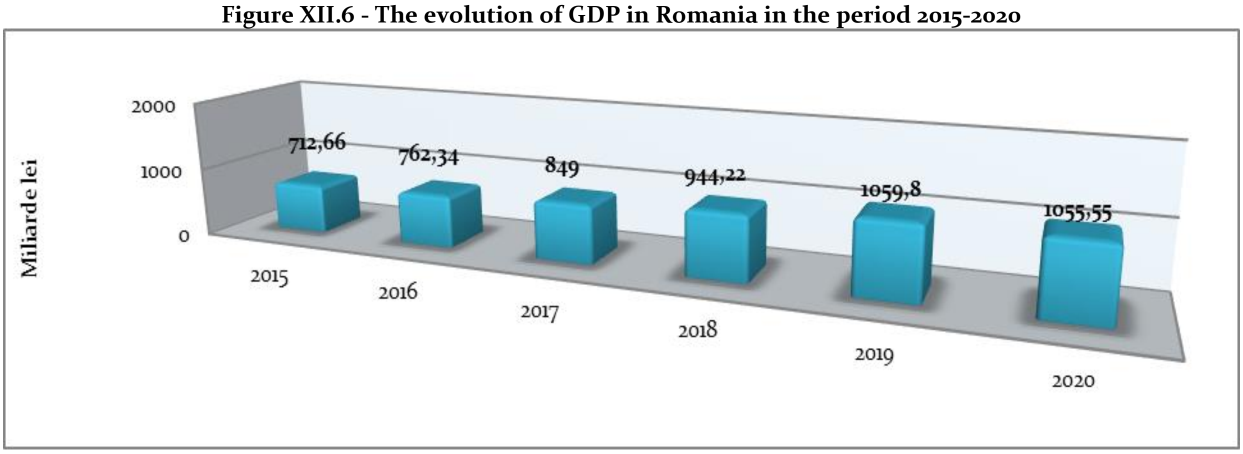
Figure XII.5 - Evolution of GDP per capita in Romania and EU 27 in the period 2015-2020



Sources: Eurostat, statistical database,[*http://ec.europa.eu/eurostat/*](http://ec.europa.eu/eurostat/)

In Romania, in 2020 ***the actual individual consumption****, which measures the well-being of the population, is by 21 percentage points below the European average, while the GDP per capita is by 28.4 points below this level (figure XII.7). The indicator was expressed in the Purchasing Power Standards (PPS), an artificial currency that eliminates price differences between countries.*Actual individual consumption consists of goods and services consumed by individuals regardless of whether they are bought and paid for by them, the Government or non-profit organizations.

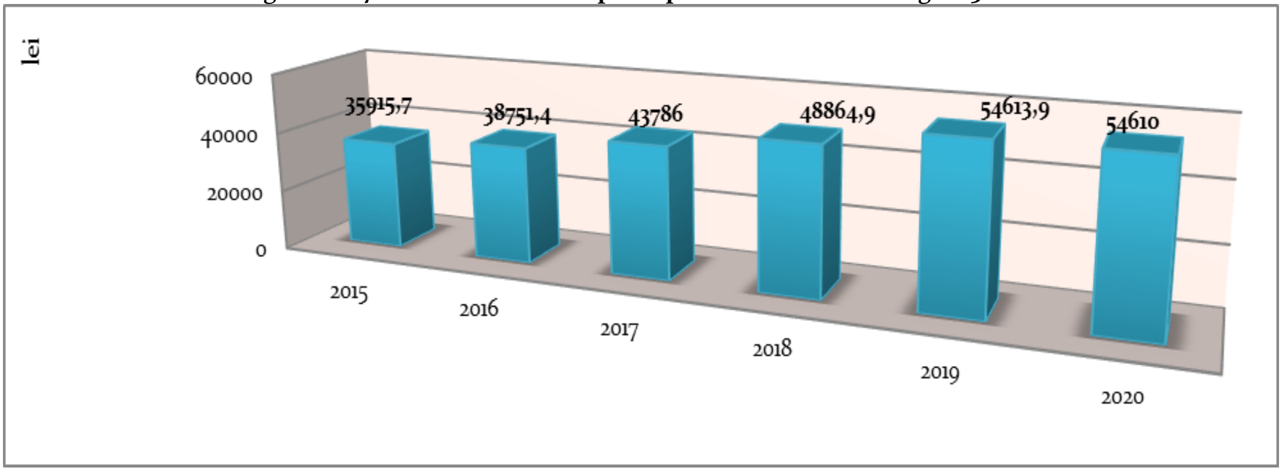
Figure XII.6 - The evolution of GDP in Romania in the period 2015-2020



Source: NIS Tempo online database

After the economic and financial crisis of 2008, Romania's GDP registered a decrease in 2009, and from 2010 it started to grow and the same trend of progressive growth was registered in the period 2011 - 2019. This trend was interrupted in 2020 by the Covid-19 crisis. ***The 2020 value of gross domestic product is 1055.55 billion lei current prices, 342.89 billion lei more than in 2015 and 4.25 billion lei lower than in 2014, decreasing - in real terms - by 0, 4% compared to 2019.***

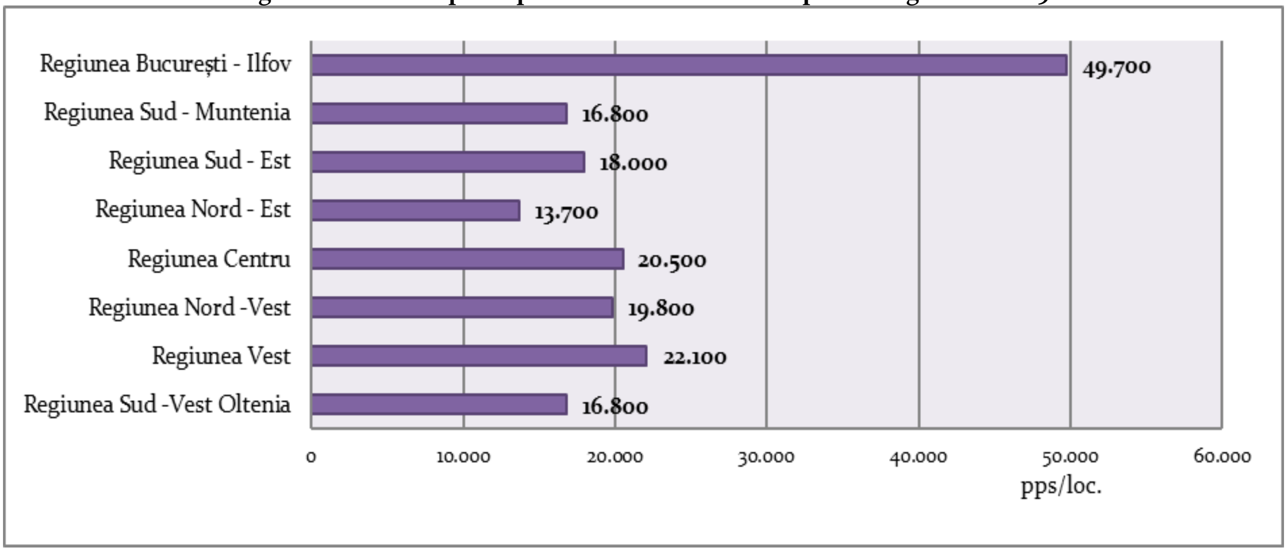
Figure XII.7 - Evolution of GDP per capita in Romania during 2015-2020



Source: http://statistici.insse.ro/shop/

According to data published in 2021 by the European statistical office Eurostat, in 2019 onlya region in Romania, respectively North-East, had a GDP per capita below 50% of the European Union average. The North-East region is still one of the poorest regions with 44% of the EU28 average, increasing by 3 percentage points compared to 2018. It was ahead of the South-West Oltenia Region and the South-Muntenia Region, both with 54% from the EU average. At the opposite pole was the Bucharest-Ifov region, which registered a GDP / inhabitant of 160% of the EU average, followed by the West Region with 71% (*figure XII.8*).

Figure XII.8 - GDP per capita at the level of development regions in 2019



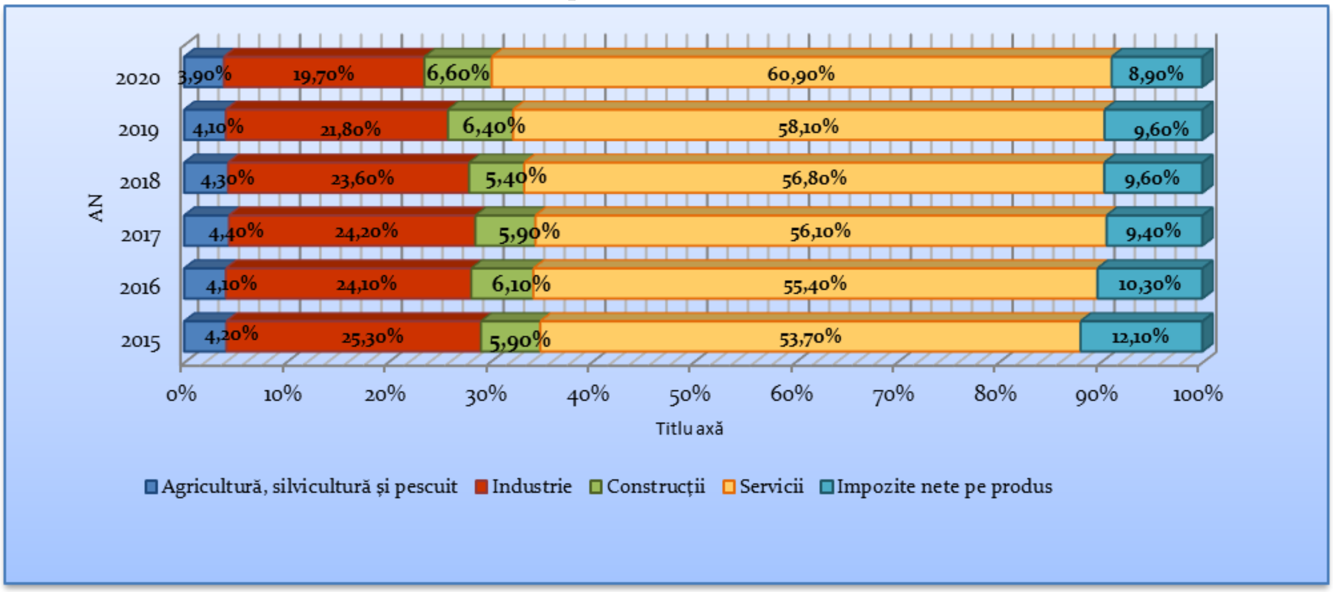
Sources: Eurostat, statistical database, http://ec.europa.eu/eurostat/ data available in August 2021

GDP evolution by main activity sectors

In recent decades, European economies have undergone a structural change, which has consisted of a reorientation towards services. The development of this sector has led to GDP growth. As the economic focus shifts from heavy industry and service-intensive agriculture, there is also a reduction in environmental pressure. But it depends on the technologies used.

In the period 2015-2020, the share of the main sectors of activity in the realization of the gross domestic product in Romania had different evolutions. Thus, in the period 2015-2020, the "*Agriculture*", "*Construction*" and "*Industry*" sectors registered decreases of the GDP weights compared to 2013, while the "*Services*" sector registered an increase. In 2020, the "*Construction*" sector registered a return compared to previous years, marking a maximum of the last 5 years. The "*Services*" sector registered a progressive increase in the contribution to GDP formation, from 44.9% in 2011 to 60.9% in 2020, holding the first place in the share of GDP formation. In second place, as a share in GDP, was the "*Industry*" sector, with 19.70%, but in a trend of gradual decrease in the last 6 years (*figure XII.9*).

Figure XII.9 - The evolution of the contribution of the main sectors of activity to the achievement of GDP in Romania, period 2015 - 2020



Source: NIS -http://www.insse.ro/cms/ro/content/produsul-intern-brut-date-anuale
http://www.insse.ro/cms/ro/comunicate-de-presa-view

ENVIRONMENTAL POLICIES

European Union environmental policy(EU) was created by the Treaty of the European Community and aims to ensure the sustainability of environmental protection measures. With the Maastricht Treaty, environmental protection has become a key priority of the European Union, where the need to integrate and implement environmental policy into sectoral policies such as agriculture, energy, industry, transport has been signaled. The main pillar of environmental policy is the concept of sustainable development, which is across-cutting policy that encompasses all other Community policies, emphasizing the need to integrate environmental protection requirements into the definition and implementation of all European policies.

In Romania, **strategic environmental planning** is a permanent process that establishes the direction and objectives necessary to correlate economic development with environmental protection aspects. The stages of elaboration and realization of a strategic plan form a continuous cycle, through the system of monitoring, evaluation and updating based on the mechanism of the strategic partnership.

National strategies and local action plans in the field of environmental protectionhave been developed and are updated to ensure a coherent vision of Romania's environmental policy and how it can be reflected in practice. The action programs for environmental protection developed in the countries of Central and Eastern Europe had, among others, the following objectives:

- improving environmental conditions within the community, by implementing cost-effective action strategies;
- raising public awareness of environmental protection responsibilities and increasing public support for strategies and investments needed for environmental protection actions;
- strengthening the local institutional capacity and NGOs regarding the management of environmental protection programs and promoting the partnership between citizens, local authorities, NGOs, scientific communities and the business environment;
- identification and assessment of environmental priorities based on scientific data and community resources;
- elaboration of an action plan for the environment, identifying the specific actions necessary to solve the problems and promote the vision of the community; - developing the skills of the authorities involved in identifying national and international funding sources;
- compliance with national environmental legislation.

Environmental action plansis a tool to support the community in setting priorities on environmental issues and solving them at national, regional or local level. These involve developing a collective vision, by assessing the quality of the environment at a given time, identifying existing environmental problems, establishing the most appropriate strategies to solve them and allocating implementation actions that lead to a real improvement of the environment and public health.*The Environmental Action Plan* provides a starting point for the development of a sustainable community and ensures that the community has properly addressed and examined the main environmental issues that adversely affect human health and the ecosystem. *Environmental action plans* are closely linked to other activities, such as: sustainable development programs, Local Agenda 21, environmental management systems, strategies and implementation plans of the acquis communautaire, etc. *The Local Action Plan for Environmental Protection represents the short, medium and long term strategy for solving environmental problems within a county by addressing the principles of sustainable development and in full accordance with plans, strategies and other specific legislative documents, existing at local, regional level and national. So far, the environmental action plans have been elaborated, updated and revised in all the 8 Development Regions of Romania at county level. At regional level, after the dissolution of the regional environmental protection agencies, the regional plans for environmental protection are monitored until their completion*.

At the end of 2020, at the level of Romania, the situation of monitoring the actions for fulfilling the objectives proposed in the environmental action plans for the 8 Development Regions was as follows:

- **out of a total of 11545environmental actions**:

✓ **6240 performed actions**(54.05%);
✓ **693 performed in advance actions**(6%);
✓ **2270 in progress actions**(19.66%);
✓ **2068 unfulfilled actions**(17.91%)
✓ **137 postponed actions**(1.19%);
✓ **137 canceledactions**(1.19%).

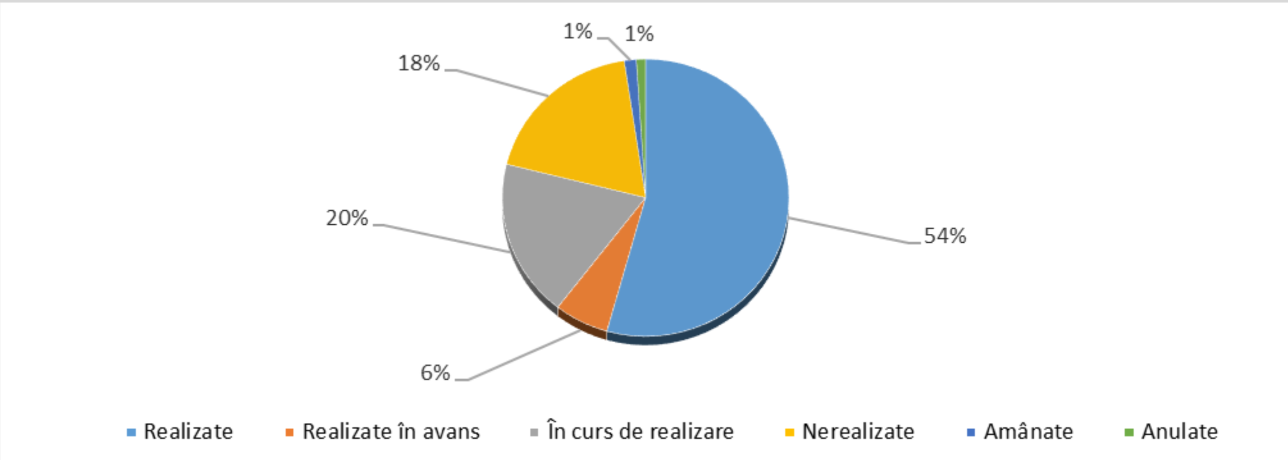
Table XII.1 - Status of monitoring actions to meet the objectives proposed in the action plansfor the environment on the 8 Development Regions - year 2020

REGION	Number of actions performed	Number of actions performed in advance	Number of actions in progress	Number of unfulfilled actions	Number of postponed actions	Number of canceled actions	Total actions
REGION 1 NORTHEAST	542	22	254	324	31	8	1181
REGION 2 SOUTHEAST	557	1	330	55	42	8	993
REGION 3 SOUTH	1947	465	288	1270	6	8	3984

MUNTENIA							
REGION 4 SOUTHWEST OLTENIA	343	1	177	28	14	3	566
REGION 5 WEST	481	11	388	15	4	17	916
REGION 6 NORTHWEST	983	188	559	211	17	89	2047
REGION 7 CENTER	702	5	227	85	21	4	1044
REGION 8 BUCHAREST ILFOV	685	0	47	80	2	0	814
Total	6240	693	2270	2068	137	137	11545
Percentage (%)	54.05%	6.00%	19.66%	17.91%	1.19%	1.19%	100%

Source: National Environmental Protection Agency

Figure XII.10 - The stage of accomplishment of the environmental actions at national level, year 2020, (%)



Source: National Environmental Protection Agency

ASSESMENT OF ROMANIA'S ENVIRONMENTAL PERFORMANCE

INTENSITY OF GHG EMISSIONS AND GHG EMISSIONS PER CAPITA

RO 10
Romania indicator code: RO 10 EEA indicator code: CSI 10
TITLE:**TRENDS OF GREENHOUSE GAS EMISSIONS**
DEFINITION:The indicator represents the trends (total and by sectors) of greenhouse gas emissions in relation to the obligations of Member States to meet the targets of the Kyoto Protocol

***Definitions (according to UNFCCC** -United Nations Framework Convention on Climate Change): Emissions*: release of greenhouse gases and / or their precursors into the atmosphere over a certain area and period of time. *Greenhouse gases*: represent those gaseous components of the atmosphere, both natural and anthropogenic, which absorb and re-emit infrared radiation. *Disposal*: any process, activity or mechanism that removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere.*Source*: any process or activity that releases a greenhouse gas, an aerosol or a precursor ofa greenhouse gas in the atmosphere. *Gases*: The greenhouse gases provided under the UNFCCC are: CO2,

CH4, N2O, HFCs, PFCs, SF6 and NF3. This list does not include greenhouse gases, which are also ozone-depleting substances and are controlled by the Montreal Protocol. *Emission sources*: The indicator provides information on emissions from the main anthropogenic sources of greenhouse gases, distributed over the following emission sectors (according to the IPCC nomenclature): energy supply and use, transport, industry, agriculture, waste, etc. The indicator does not cover emissions from international aviation and maritime transport, which are not covered by the Kyoto Protocol. In general, these sources are not taken into account in the calculation of total reported greenhouse gas emissions at national and European level. Also, emissions from land use, land use change and forestry (LULUCF) are not included in total greenhouse gas emissions.
[Bibliographic source:*EEA, indicators,*http://www.eea.europa.eu/data-and-maps/indicators]

Relevant environmental policies This indicator aims to support the European Commission's annual assessment of progress in reducing emissions in the EU and in the Member States, in order to meet the targets included in the Kyoto Protocol under the EU Greenhouse Monitoring Mechanism (European Union Regulation No 525/2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting, at national and Union level, other information relevant to climate change and repealing Decision No 280 / 2004 / CE*)*.The final objective of the *United Nations Framework Convention on Climate Change (UNFCCC)*is to stabilize greenhouse gas (GHG) concentrations" at a level that prevents dangerous (man-induced) anthropogenic interference with the climate". The *Kyoto Protocol,*succeeding the *United Nations Framework Convention on Climate Change*is one of the most important international legal instruments in the fight against climate change. It sets binding targets for reducing greenhouse gas emissions for industrialized countries and the European Union. The Annual Inventory of the European Union on Greenhouse Gases and the inventory report, officially submitted to the UNFCCC Secretariat, is prepared on behalf of the European Commission by the European Thematic Centre on Air and Climate Change of the European Environment Agency (ETC/ACM), supported by the Joint Research Centre and Eurostat. The EC inventory is elaborated according to the EU Regulation no. 525/2013. The purpose of this Regulation and subsequent legislation is to:

- monitor all anthropogenic GHG emissions covered by the Kyoto Protocol in the Member States;
- assess progress towards meeting GHG reduction commitments under the UNFCCC and the Kyoto Protocol;
- the UNFCCC and the Kyoto Protocol as regards the national programmes, greenhouse gas inventories, national systems and registers of the European Union and its Member States, as well as the relevant procedures provided for in the Kyoto Protocol;
- ensure that Member States and the Community communicate complete, accurate, consistent, comparable and transparent information to the UNFCCC Secretariat in a timely manner.

Law 24/1994- Romania has ratified the United Nations Framework Convention on Climate Change (UNFCCC) which creates the general framework for intergovernmental action on climate change. One of the main objectives of the UNFCCC is to stabilize the atmosphere by keeping greenhouse gas concentrations at a level that prevents disruption of the climate system. ***Romania was the first country, included in Annex I of the United Nations Framework Convention, which ratified by Law no. 3/2001 Kyoto Protocol, thus committing itself to an 8% reduction of greenhouse gases, in the period 2008-2012, compared to the base year considered to be 1989***.

National strategy on climate change and low-carbon growth for 2016-2020, adopted by Government Decision no. 739/2016.The general objectiveof this strategy is to mobilize and enable private and public actors to reduce GHG emissions from economic activities in line with national targets and commitments to the EU and to adapt to the impact of climate change, both current and future. The implementation of the strategy will help Romania to make the transition to a climate resilient economy and to determine an advantageous situation for all parties involved. ***National Action Plan for the implementation of the National Strategy on Climate Change and Low Carbon Economic Growth for the period 2016-2020***, adopted by the aforementioned Government Decision.

Directive 2003/87 / EC- regarding the establishment of a scheme for the commercialization of greenhouse gas emission certificates transposed in the Romanian legislation by GD no. 780/2006, allows economic agents from the sectors covered by the Directive to participate in the greenhouse gas emissions trading exchange, offering the opportunity for the issue of climate change to be viewed economically as well. For the implementation of H.G. nr. 780/2006 on the establishment of the greenhouse gas emission allowance trading scheme, was elaborated ***the National Allocation Plan***

(NAP) through which the Romanian Government establishes and assigns the number of greenhouse gas emission certificates that it intends to allocate at national level. Decision No. Regulation (EC) No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions so as to meet the Community's commitments to reduce greenhouse gas emissions by 2020.

Specific legislationregarding the National System for Estimating the Level of Anthropic Emissions from Sources or Detentions by Sequestration of All Greenhouse Gases (SNEEGES):

- *H. G. no. 1570/2007* on the establishment *of the National System for Estimating the level of anthropogenic Emissions from sources or sequestration of all Greenhouse Gases, regulated by the Kyoto Protocol, with subsequent amendments and additions*;
- *Order of the Minister of Environment no. 1376/2008*- for the approval of the Procedure regarding the reporting of INEGES (National Inventory of Greenhouse Gas Emissions) and regarding the way of answering the observations and questions arising from the INEGES review;
- *Order of the Minister of Environment no. 1474/2008*- for the approval of the procedure regarding the processing, archiving and storage of data specific to the National Inventory of Greenhouse Gas Emissions.
- *Order of the Minister of Environment and Climate Change no. 1442/2014*on approving the procedure for selecting the estimation methods and emission factors necessary for estimating the level of greenhouse gas emissions;
- *Order of the Minister of Environment and Climate Change no. 1602/2014*for the approval of the Plan on quality assurance and control (QA / QC) of the National Inventory of Greenhouse Gas Emissions.

The greenhouse gases covered by the UNFCCC are: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6) and trifluoride. of nitrogen (NF_3). According to the provisions of this law, an annual assessment of greenhouse gas emissions is performed.

Targets and objectivesThe indicator analyzes trends in total GHG emissions in the EU since 1990 in connection with EU and Member States' targets. ***The European Union and its Member States, including Romania, have independently announced a 20% reduction target for greenhouse gas emissions associated with economic activities by 2020 compared to 1990 levels***. The emission reduction target for Romania for the years 2013-2020 is part of the common target of the European Union. The European Union's target is being implemented in the context of the EU's Energy and Climate Change Package.***At national level, the limitation and reduction of greenhouse gas emissions is achieved by applying the GHG Emissions Trading Scheme (EU ETS) (the target set at European level for Romania being - 21% in 2020, compared to the hypothetical level of emissions from the EU ETS sector since 2005) and by applying the provisions included in Decision no. 406/2009 / CE.Taking into account the obligations to comply with the annual national GHG emission reduction targets in accordance with the provisions of Decision no. 406/2009 / EC, it is necessary at the level of each economic sector to elaborate strategies and action plans that identify the necessary measures and resources to ensure at national level the linear emission trajectory in the period 2013-2020.***

The national GHG emission reduction policy aims at the European approach, namely on the one hand ensuring that some economic operators participate in the implementation of the GHG emissions trading scheme and on the other hand, adopting sectoral policies and measures in so that at national level the GHG emissions related to these sectors comply with the linear trajectory of the emission limits established by the application of Decision no. 406/2009 / CE. The GHG Emissions Trading Scheme (EU ETS) regulates emissions from installations with considerable production capacity and emissions from the Energy and Industrial Processes sectors.

In order to optimize the planning of GHG emission reductions from other sources that are not covered by the EU ETS scheme, it is necessary to correlate the sectoral annual emission plans from the regulated sources by applying Decision no. 406/2009 / EC (non EU ETS), taking into account the emissions and reduction potential of each sector, as well as national economic development priorities. Analyzing the amount of CO_2 emissions in the European Union, it was found that the highest amount results from the production of electricity and heat. For example, coal-based energy production in the EU generated around 973 million tonnes of CO_2 emissions in 2005, representing 23% of total EU CO_2 emissions. As far as Romania is concerned, CO_2 emissions from different sectors of activity also highlight the major contribution of the energy and transport sectors, which means that these are the areas where it is necessary to implement measures and actions to reduce CO_2 emissions. According to the National Inventory of Greenhouse Gas Emissions 2021 made by our country, in 2019, GHG emissions related to the Energy sector represent about 90.58% of the total, including LULUCF and 66.09% of the total, excluding LULUCF. At the level of the European Union, the Transport Sector remains the sector with the greatest impact on greenhouse gas emissions in terms of the variation of the associated level, with an increasing trend. In 2019, emissions from the Transport Sector increased by 52.23% compared to the emissions recorded in 1990, respectively by 2.71% compared to those of 2018, increases mainly due to the increase in demand for the transport of passengers and goods, as well as the preference for using roads as a mode of transport in exchange for other less polluting modes of transport.

Since 2002, Romania submits annually to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), the National Inventory of Greenhouse Gas Emissions (INEGES), carried out according to the relevant IPCC methodology, in accordance with the national provisions on SNEEGES.The UNFCCC requires accurate and regularly updated data on greenhouse gas emissions from industrialized countries, using comparable methodologies. To estimate anthropogenic greenhouse gas emissions, all countries must use the 2006 IPCC Guide to National Greenhouse Gas Inventories. To be aggregated in a single figure, the emissions of different individual gases are converted to CO_2 equivalent, using the global warming potential (GWP), as provided in the IPCC guide. GWP is an estimation measure given by the contribution of each greenhouse gas to global warming.

Table XII.2 - GWP for GHGs

Gas	Global warming potential (GWP)
carbon dioxide	1
methane	25
nitrous oxide	298
fluorinated gases (HFCs, PFCs, SF6, NF3)	11-22800

Source: National Environmental Protection Agency according to IPCC guide

HFCs and PFCs comprise a large number of different gases with different GWPs. Countries report HFCs and PFCs inCO_2 equivalent in millions of tonnes. Total emissions exclude emissions of greenhouse gases and absorbents from land use, land use change and forestry (LULUCF), Strategic Directions for Sustainable Development in Romania, European Institute of Romania - Strategy and Policy Studies, 2006,http://www.ier.ro/documente/SPOS2006_ro/Spos2006_studiu_3_ro.pdf).

Table XII.3 and Figure XII.11 show the levels of total annual greenhouse gas emissions for the period 2000-2019. ***Note:*** *The differences that occur in the data in the report associated with 2020 compared to the data in the report associated with 2019 are due to the implementation of recalculations at the level of the National Inventory of Greenhouse Gas Emissions and the introduction of elements characteristic of 2019 (Source: Climate Change Directorate of the NEPA)*

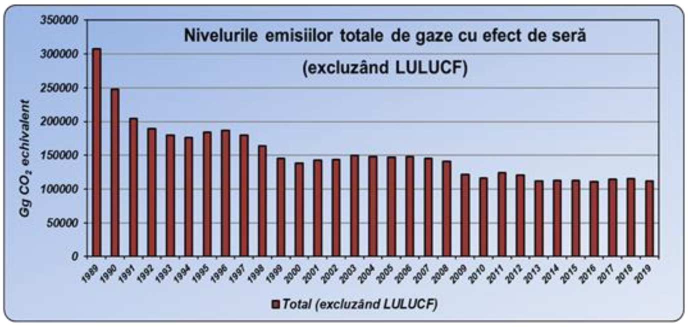
Table XII.3 - Levels of total annual greenhouse gas emissions in the period 2000 - 2019, thousand tons of CO_2 equivalent

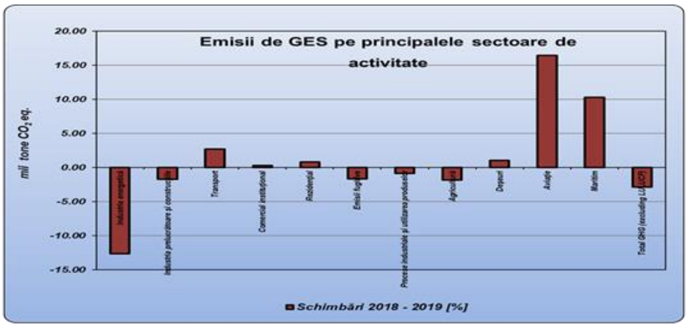
Year	Total emissions (excluding LULUCF)	Total emissions (including LULUCF)
2000	138,766.96	110,716.27
2001	142,383.73	113,427.23
2002	143,913.34	117,032.31
2003	149,600.07	122,222.19
2004	147,819.50	120,719.50
2005	146,944.76	118,575.08

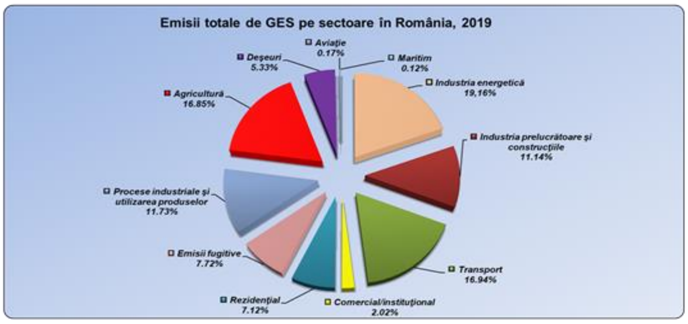
2006	148,442.79	120,466.13
2007	145,429.71	117,985.13
2008	140,785.56	112,730.50
2009	121,699.30	93,448.66
2010	116,143.75	87,112.31
2011	123,862.20	96,401.49
2012	121,086.33	90,428.11
2013	111,881.72	81,143.20
2014	112,485.91	81,771.38
2015	113,193.87	82,594.64
2016	110,762.21	79,992.76
2017	114,245.64	85,609.17
2018	115,090.96	88,911.24
2019	111,767.06	81,550.34

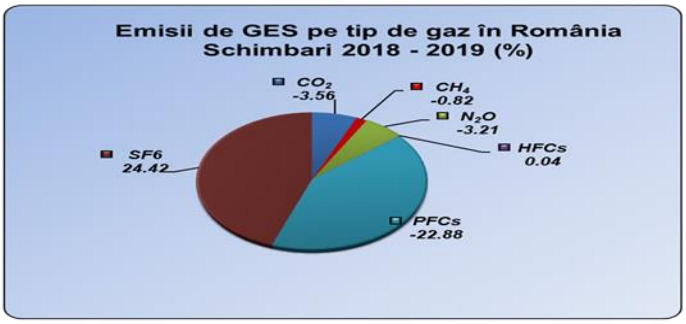
Source: National Environmental Protection Agency

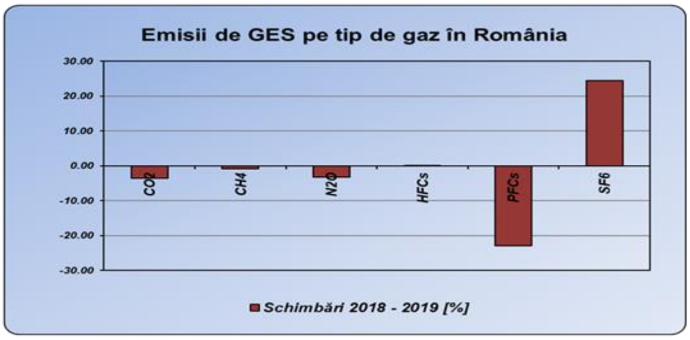
Figure XII.11 Graphical representation of total annual greenhouse gas emission levels in the period 1989 – 2019 (thousand tons CO2 equivalent) by sector of activity and per inhabitant in Romania and compared for the EU27(*Source: NEPA)*

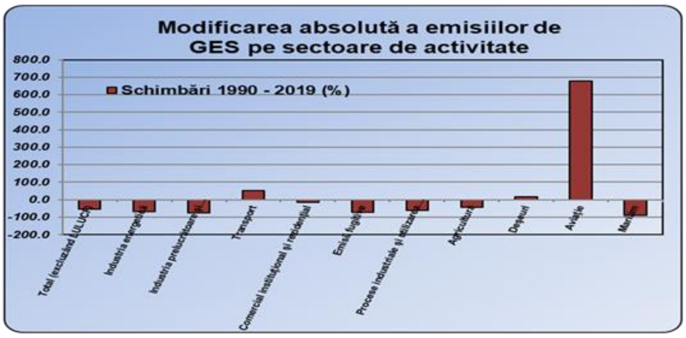

Nivelurile emisiilor totale de gaze cu efect de seră
(excluzând LULUCF)
Gg CO2 echivalent
Total (excluzând LULUCF)

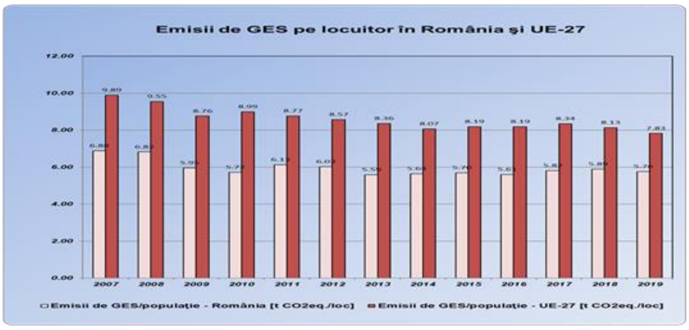

Emisii de GES pe principalele sectoare de activitate
mil tone CO2 eq.
Schimbări 2018 - 2019 [%]

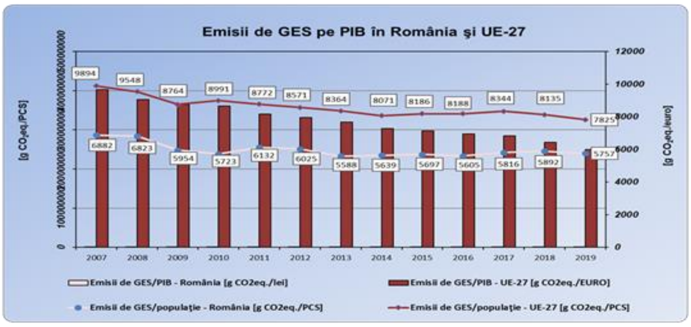

Emisii totale de GES pe sectoare în România, 2019
Aviație 0.17%
Deșeuri 5.33%
Maritim 0.12%
Industria energetică 19,16%
Agricultură 16.85%
Industria prelucrătoare și construcțiile 11.14%
Procese industriale și utilizarea produselor 11.73%
Emisii fugitive 7.72%
Transport 16.94%
Rezidențial 7.12%
Comercial/instituțional 2.02%

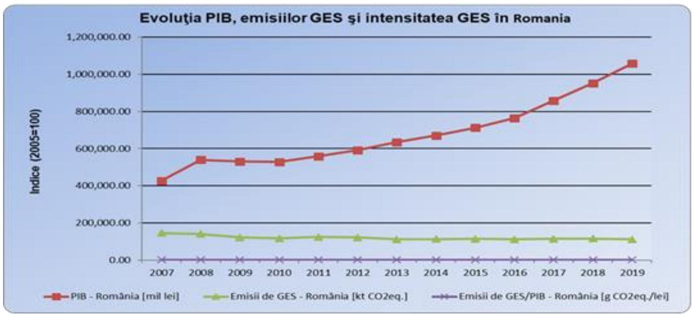

Emisii de GES pe tip de gaz în România
Schimbari 2018 - 2019 (%)
CO2 -3.56
CH4 -0.82
N2O -3.21
HFCs 0.04
SF6 24.42
PFCs -22.88

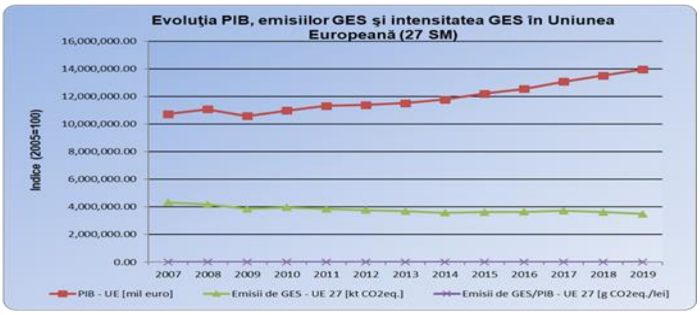

Emisii de GES pe tip de gaz în România
CO2
CH4
N2O
HFCs
PFCs
SF6
Schimbări 2018 - 2019 [%]


Modificarea absolută a emisiilor de GES pe sectoare de activitate
Schimbări 1990 - 2019 (%)


Emisii de GES pe locuitor în România și UE-27
Emisii de GES/populație - România [t CO2eq./loc]
Emisii de GES/populație - UE-27 [t CO2eq./loc]


Emisii de GES pe PIB în România și UE-27
Emisii de GES/PIB - România [g CO2eq./lei]
Emisii de GES/PIB - UE-27 [g CO2eq./EURO]
Emisii de GES/populație - România [g CO2eq./PCS]
Emisii de GES/populație - UE-27 [g CO2eq./PCS]


Evoluția PIB, emisiilor GES și intensitatea GES în Romania
Indice (2005=100)
PIB - România [mil lei]
Emisii de GES - România [kt CO2eq.]
Emisii de GES/PIB - România [g CO2eq./lei]


Evoluția PIB, emisiilor GES și intensitatea GES în Uniunea Europeană (27 SM)
Indice (2005=100)
PIB - UE [mil euro]
Emisii de GES - UE 27 [kt CO2eq.]
Emisii de GES/PIB - UE 27 [g CO2eq./lei]

PRIMARY ENERGY INTENSITY AND TOTAL ENERGY CONSUMPTION PER CAPITA

RO 28
Romania indicator code: RO 28 EEA indicator code: CSI 28 / ERNER 017
TITLE:**TOTAL PRIMARY ENERGY INTENSITY**
DEFINITION:The indicator represents the ratio between gross domestic energy consumption and gross domestic product (GDP), calculated for a calendar year

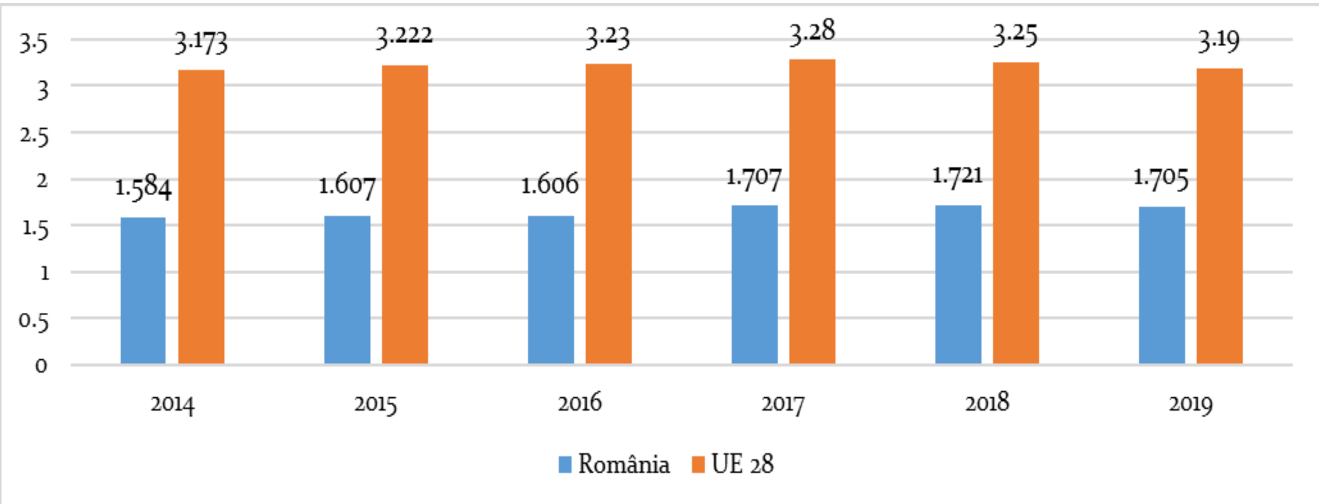
In 2011, the gross domestic energy consumption (GDEC) in the EU-28 was 1707.8 million toe, but the decline in economic activity led to a decrease in this indicator between 2011 and 2014, to a minimum of 1613 , 4 million toe in 2014. Starting with 2015, the gross domestic energy consumption (GDEC) in the EU-28 started to increase reaching the value of 1677.57mil. toe in 2017, a decrease of approximately 1.77% compared to 2011, but also an increase of 3.98% compared to the minimum of 2014, due to the recovery of economic activity. In 2018 and 2019, GDEC decreased in the EU 28 to 1664.4 million toe in 2018 and 1636.65 million toe in 2019, a level that exceeds only the minimum of 2014.

In Romania, GDEC, the gross domestic energy consumption in 2011 was 35,751 thousand toe and represented the peak of gross domestic energy consumption, because in the period 2012-2014 it decreased to a minimum of 31,538 thousand toe. In the period 2015 - 2018, the gross domestic energy consumption registered a recovery due to the economic activity, 31844 thousand toe in 2015 and 33596 thousand toe in 2018. In 2019 GDEC Romania registered a decrease in value to 33107.4 thousand toe by approximately 7 , 4% lower than in 2011.

Gross domestic energy consumption per capita

Gross domestic energy consumption per capita is the amount of energy per capita, where the amount of energy is obtained by summing up primary energy production, recovered products, imports and stocks at the beginning of the reference period from which exports are deducted, bunker and stock at the end of the reference period. In the period 2011 - 2014, the gross domestic energy consumption per inhabitant in Romania registered a decrease of approximately 10.46%, increasing slightly in the period 2015-2018 to the value of 1.721 toe / inhabitant, so that in 2019 the mentioned indicator to decreases to 1,705 toe / inhabitant. At the level of 2019, Romania stood at approx. half of the average consumption in the EU-28 (53.44%). *Figure XII.12* shows the evolution of the gross domestic energy consumption per inhabitant in Romania compared to the EU-28 in the period 2014-2019.

Figure XII.12 - Gross domestic energy consumption per capita in Romania and the EU28 in the period 2014-2019,toe / inhabitant

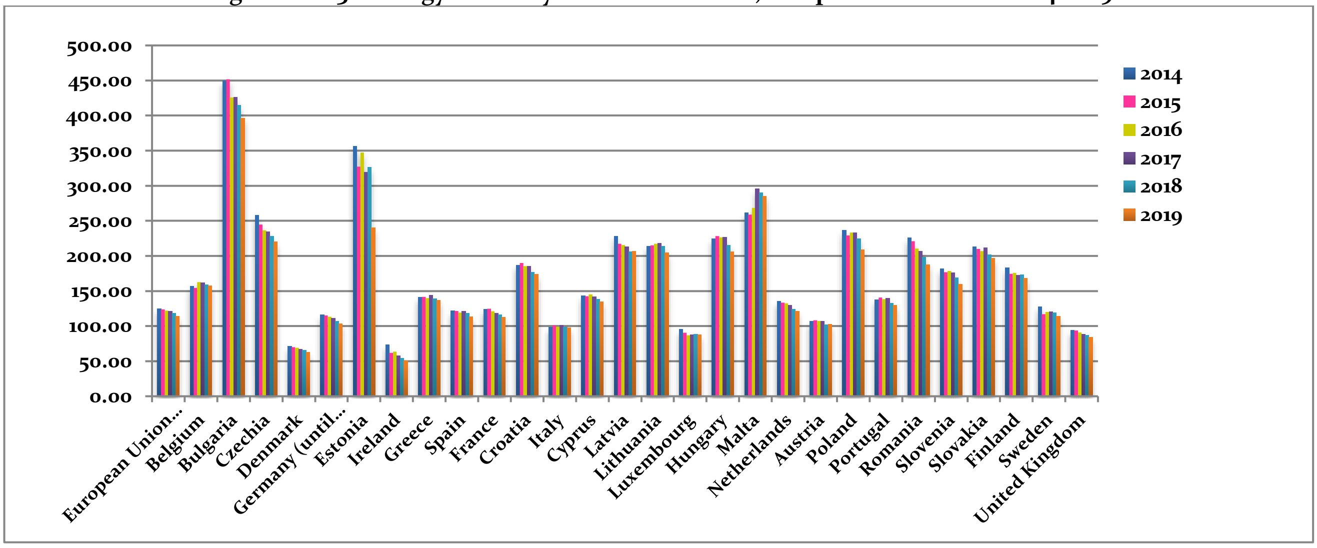


Sources: NIS, Tempo online database; Eurostat, statistical database

Gross domestic energy consumption (GDEC) relative to gross domestic product (GDP)

GDEC in each country depends, to a large extent, on the structure of its energy system, on the natural resources available for the production of primary energy, as well as on the structure and level of development of its economy. Energy intensity is measured as the ratio between gross domestic energy consumption and production unit - GDP, being a key indicator for measuring progress in the Europe 2020 Strategy. The ratio is expressed in kilograms of oil equivalent per 1000 euros, and to facilitate the analysis over time, calculations are based on GDP at constant prices at 2010 prices. If an economy becomes more energy efficient and GDP remains relatively constant, then these indicators should decline.***In 2019, the energy intensity in Romania was 187.73 kgep / 1000 euro, compared to the level registered in the EU-28 which was 114.21 kgep / 1000 euro, and this thing places Romania among the EU-28 member states with relatively high levels of energy intensity (19th place out of 28*****)**.However, in the period 2014-2019 in Romania the energy intensity of the economy marked a continuous decrease, in total by 16.84% (*figure XII.13 and figure XII.14*). During the same period, the energy intensity of the economy in the EU-28 decreased by 3.17%.

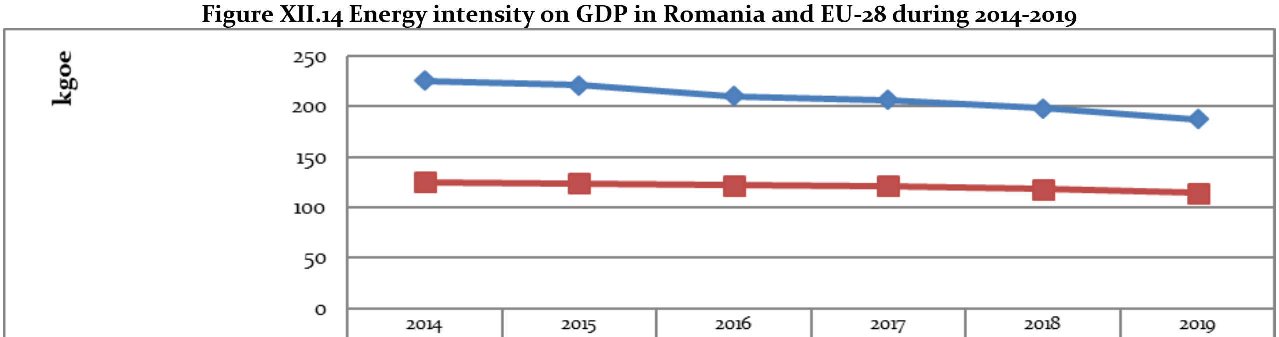
Figure XII.13 - Energy intensity level in the EU 28, comparison between 2014-2019



Sources: Eurostat, statistical database

It should be noted that the structure of an economy plays an important role in determining energy intensity, that post-industrial economies where the service sector is developed will have relatively low levels of energy intensity, while developing economies, where economic activity may have a considerable share, are characterized by higher values of energy intensity.

Figure XII.14 Energy intensity on GDP in Romania and EU-28 during 2014-2019



	2014	2015	2016	2017	2018	2019
România	225.73	221	210.47	206.81	198.24	187.73
UE 28	124.82	123.71	122.16	121.05	117.95	114.21

Sources: NIS, Tempo online database; Eurostat, the statistical database

ELECTRICITY FROM RENEWABLE ENERGY SOURCES

RO 31

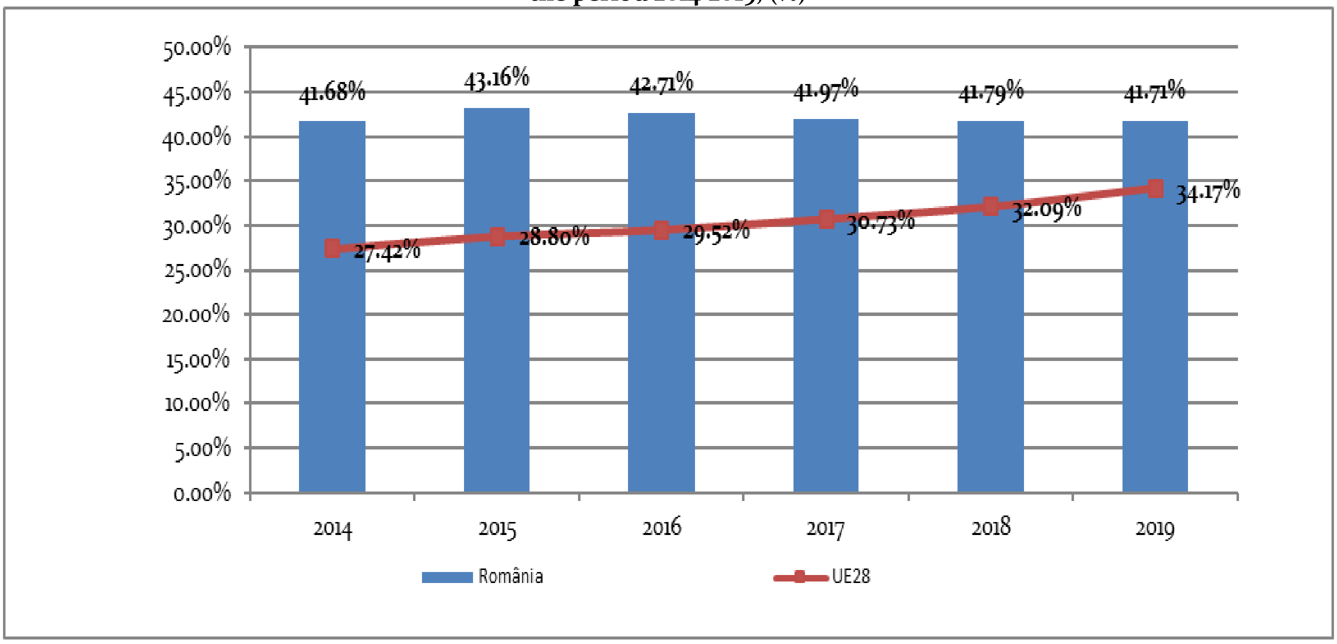
Romania indicator code: RO 31
EEA indicator code: CSI 31

TITLE: **CONSUMPTION OF ELECTRICITY PRODUCED FROM RENEWABLE ENERGY SOURCES**

DEFINITION:The indicatorrepresents the ratio betweenelectricityproducedfromrenewableenergy sources and grossdomesticelectricityconsumption, expressed as a percentage.

The EU-28 target for 2020 was for ***electricity from renewable sources*** to account for at least 21% of total electricity production. The latest available information for 2019 (*see Figure XII.15*) shows that electricity produced from renewable energy sources contributed 34.17% to the total electricity consumption in the EU-28. The increase in electricity produced from renewable energy sources in the last decade largely reflects an expansion into two renewable energy sources, namely wind energy and energy produced from biomass.In 2019 at national level, 41.71% of the total value of electricity was obtained by capitalizing on renewable energy sources. Supporting environmentally friendly (low environmental impact) solutions for renewable electricity production contributes to reducing greenhouse gas emissions from the energy sector.

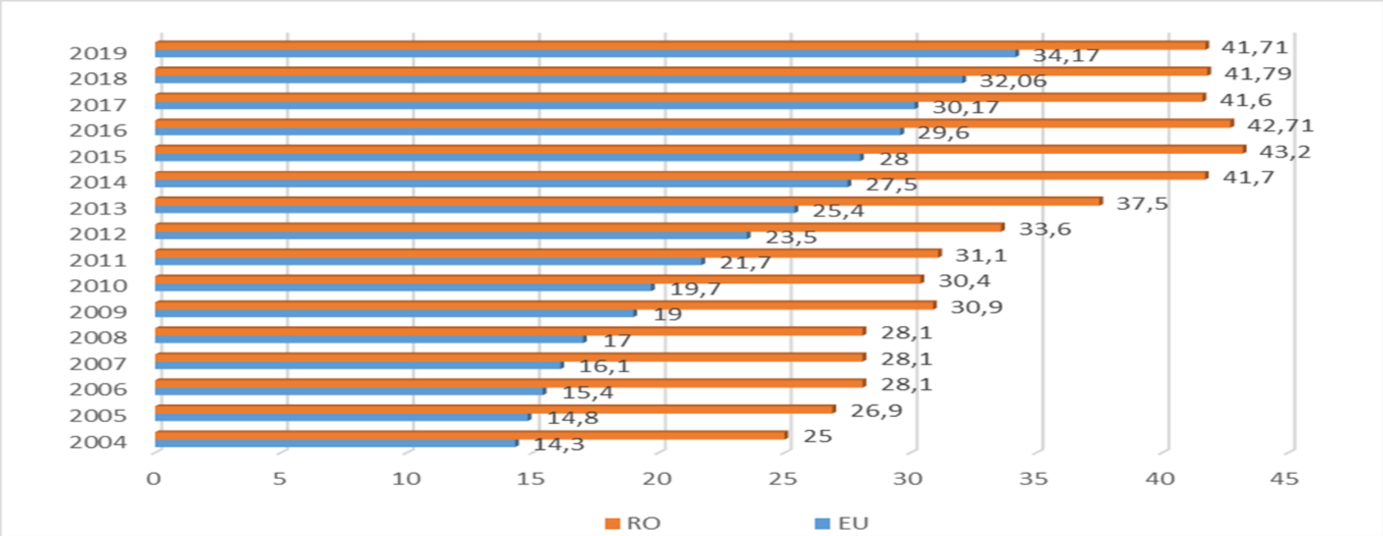
Figure XII.15 - The share of electricity from renewable energy sources in the total electricity in Romania and the EU28 in the period 2014-2019, (%)



Source: Eurostat, statistical database

Between 2014 and 2019, the share of electricity from renewable energy sources at EU level 28 shows a slight upward trend. During this period there is an increase from 27.42% to 34.17% of the share of electricity from renewable sources in the EU28. In recent years there has been an increase in the share of electricity produced in nuclear power plants and wind farms. The share of electricity from renewable energy sources in Romania (*see figure XII.16*), experienced in the period 2010 - 2015 an upward trajectory, from 30.38% in 2010 to 43.16% in 2015, with a capping trend or even rebound in the period 2014 - 2019. In 2019 the value of 41.71% was registered, representing the minimum value for the period 2015 - 2018.

Figure XII.16 - The share of electricity from renewable energy sources in the total electricity in Romania and the EU28 in the period 2004-2019, (%)



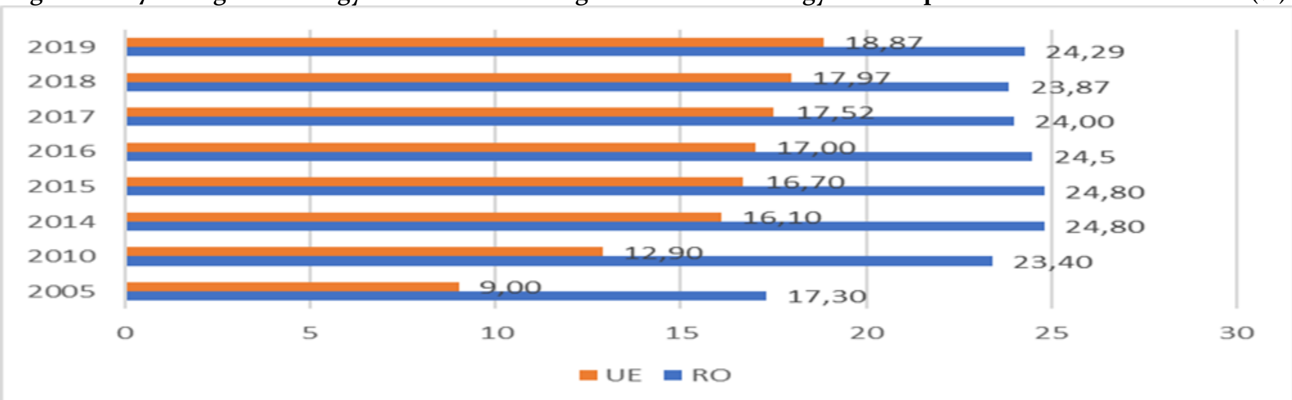
Source:Eurostat[*https://ec.europa.eu/eurostat/web/energy/data/shares*](https://ec.europa.eu/eurostat/web/energy/data/shares)

Primary energy consumption produced from renewable sources

RO 30
Romania indicator code: RO 30 EEA indicator code: CSI 30 / ENER 29
TITLE:**PRIMARY ENERGY CONSUMPTION PRODUCED FROM RENEWABLE ENERGY SOURCES**
DEFINITION:The share of renewable energy consumption is the ratio between gross domestic energy consumption produced from renewable energy sources and total gross domestic energy consumption, calculated for a calendar year, expressed as a percentage.

At the level of the European Union, the share of renewable energy in the total gross domestic energy consumption shows for the period 2005-2019 an ascending evolution, from the value of approximately 9% registered in 2005 to the value of approximately 18.87% registered in 2019. Also , at national level, the share of renewable energy in total gross domestic energy consumption for the period 2014-2018 shows a slightly downward trend, and in 2019 there was an increase of approximately 1.17% compared to the value established in the previous year (*Figure XII .17*).

Figure XII.17 - Weight of energyrenewable in total gross domestic energy consumption in Romania and EU-28 (%)



Source: Eurostat https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_ren&lang=en

EMISSIONS OF ACIDIFYING SUBSTANCES

The acidity of the air is mainly determined by the presence of mineral acids which are in the form of aerosols and come from various chemical industries, aluminum factories, etc. Increased air acidity has implications for all environmental factors, construction and human health. Emissions of sulfur oxides, nitrogen oxides and ammonia come mainly from the burning of fossil fuels, chemical processes and transport. These pollutants are transported over long distances from the source of impurities, where in contact with solar radiation and water vapor they form acidic compounds. Through precipitation they are deposited on the ground or enter the composition of the water.

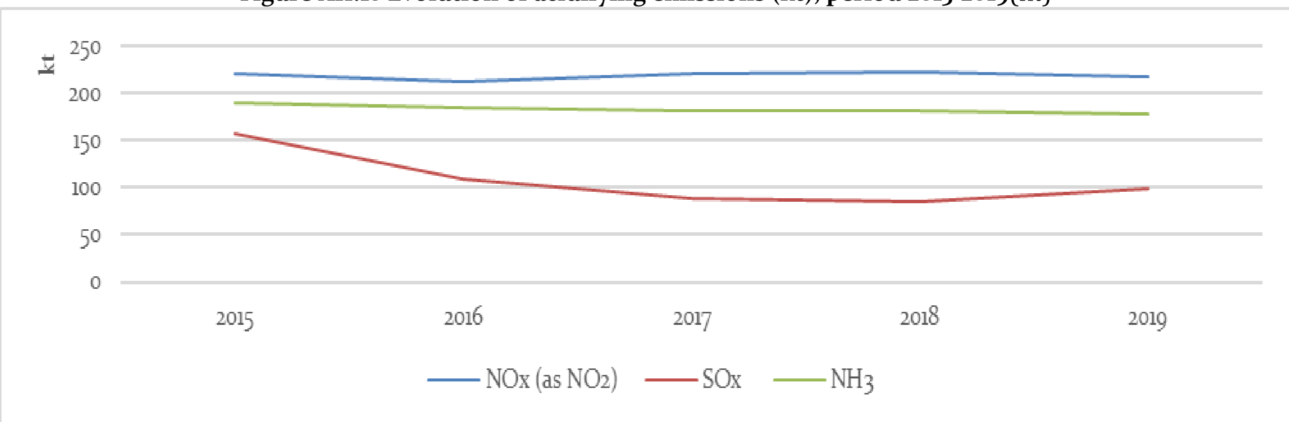
For SOx there was a major decrease, by 35.7%, in the period 2015-2019, influenced by economic developments, especially for those air pollutants that result mainly from energy production, industrial processes and road transport.

From the analysis of the data on the trend of pollutant emissions from the activity sectors it is observed that the reduction of air pollutant emissions, in order to comply with air quality standards for certain areas can be predicted / anticipated as an effect of their impact depending on the form of "input" data (complexity of data, their organization, etc.), but also that of "output" (***tables, graphs, see subchapter 1.3 Trends and forecasts on ambient air pollution in Chapter I - Air quality and pollution***).

Between 2008 and 2017, Romania reduced SOx emissions. This is the consequence of environmental policy, of reducing pollutant emissions at national level in the energy, industrial, transport, agriculture and waste sectors. NOx pollutant emissions increased by 1%, and NH_3 emissions decreased by 4% in 2019 compared to 2015(*figure XII.18*).

RO 01
Romania indicator code: RO 01
EEA indicator code: CSI 01
TITLE:**EMISSIONS OF ACIDIFYING SUBSTANCES**
DEFINITION: The indicator follows the trends of anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH_3) and sulfur oxides (SOX, SO_2) in each of them taking into account its acidifying potential.The indicator also provides information on changes in emissions from the main source sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

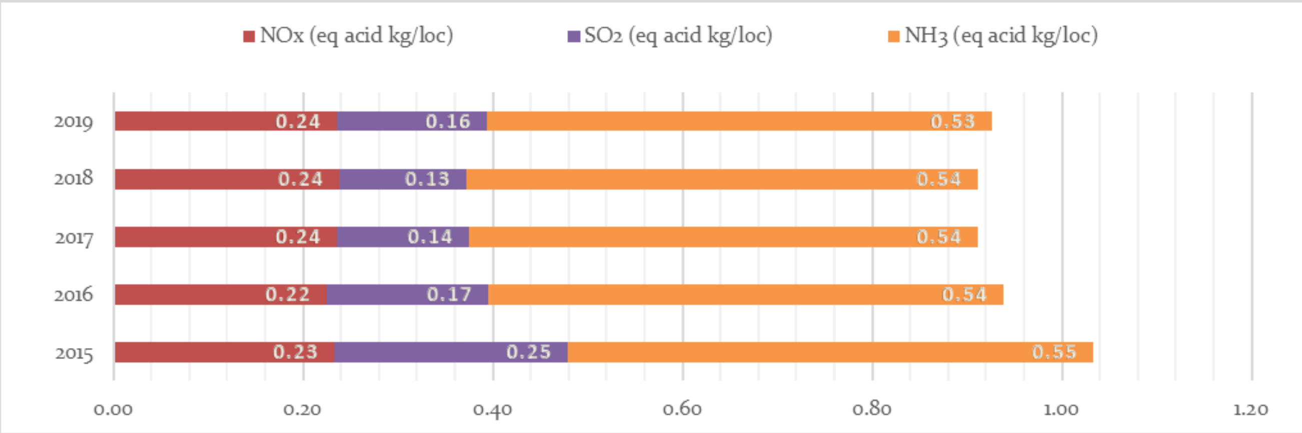
Figure XII.18 Evolution of acidifying emissions (kt), period 2015-2019(kt)



Source NEPA- Inventory of Atmospheric Pollutant Emissions

In 2019, the level of emissions of air pollutants with acidifying effect per capita in Romania was 0.9 kg equivalent acid / place. *Figure XII.19* shows the evolution of acidifying emissions in *eq acid kg / inhabitant* in the period 2015-2019, which decreased *from 1,033 total eq acid kg / inhabitant in 2015 to 0.926 total eq acid kg / inhabitant* in 2019, meaning -10.4%.

Figure XII.19 - Emissions of acidifying substances per capita, period 2015-2019(*eq acid kg / inhabitant*)



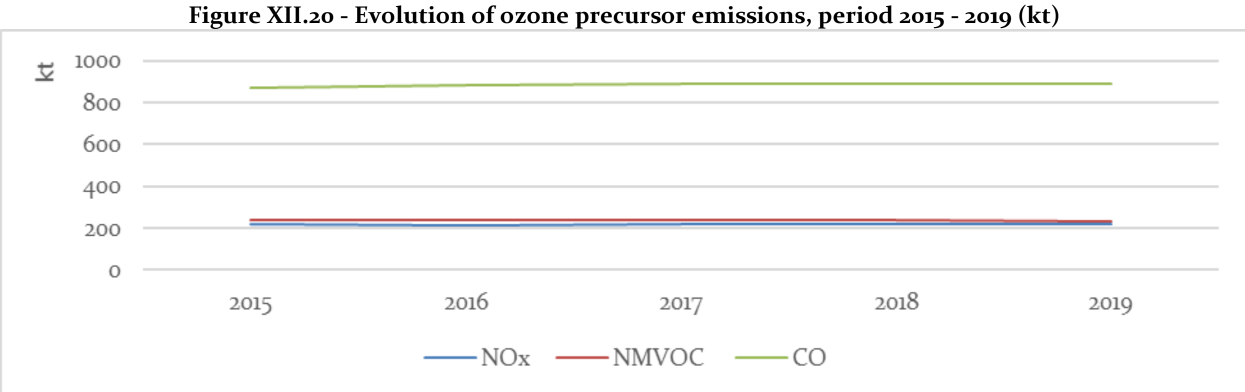
Source NEPA- Inventory of Air Pollutant Emissions, revised edition

OZONE PRECURSOR EMISSIONS

RO 02
Romania indicator code: RO 02
EEA indicator code: CSI 02
TITLE: **EMISSIONSOF OZONE PRECURSORS**
DEFINITION:The indicatortracks trends in anthropogenicemissions of ozone precursorpollutants: nitrogen oxides (NOX), carbonmonoxide (CO), methane (CH_4) and non-methane volatile organic compounds (NMVOCs)coming from the sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; commercial, industrial and household sector; use of solvents and products; agriculture; waste; others.

In the period 2015-2019, the emissions of air pollutants responsible for the formation of tropospheric ozone had minimal variations ± depending on the intensities of activities in energy, industry, transport and agriculture, the general trend being slightly lower in 2019 compared to previous years to emissionsofNOx -1.3%, and for NMVOC emissions -3.9% compared to 2015, CO emissionshaving an increase of 2.7% compared to 2015,*figure XII.20*.

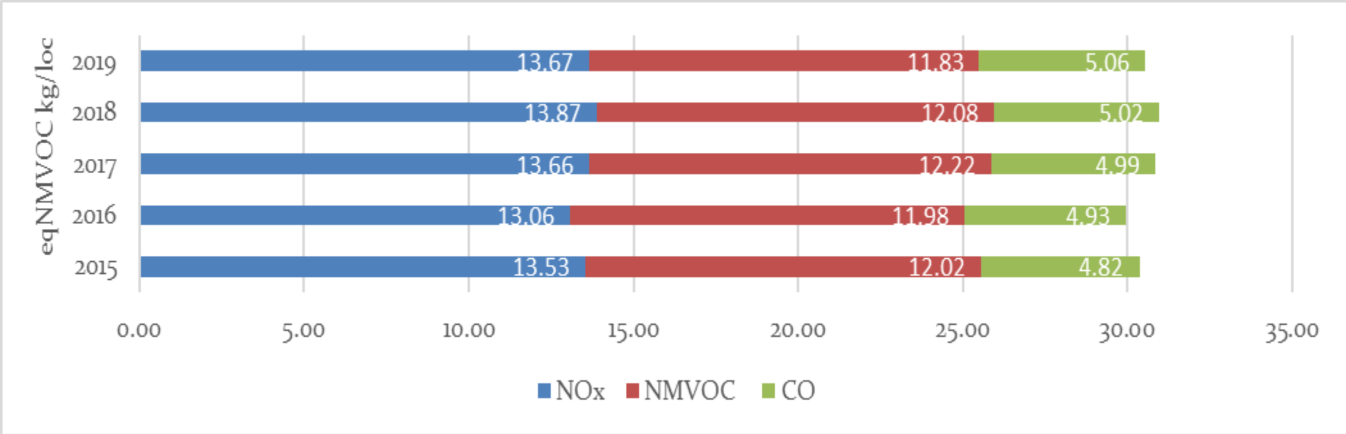
Figure XII.20 - Evolution of ozone precursor emissions, period 2015 - 2019 (kt)



Source NEPA- Inventory of Atmospheric Pollutant Emissions

Emissions of acidifying substances from ozone precursors per capita in Romania (total kg eq NMVOC / inhabitant) registered in 2019 an increase of 0.63% compared to 2015, from 30.36 eqNMCOVkg / inhabitant in 2015, to 30.55 eqNMCOVkg / inhabitant in 2019. *Figure XII.21* shows the evolution of ozone precursor emissions per capita in the period 2015-2019 in Romania, where small fluctuations of decrease and increase are observed during this period.

Figure XII.21 - Evolution of ozone precursor emissions per capita, 2014-2018(eqNMVOC kg / loc)



Source NEPA- Inventory of Air Pollutant Emissions, revised edition

Emissions of pollutants released into the atmosphere have a generally downward trend due to the implementation of the principles of sustainable development and the adoption of environmental policies, such as: production of green electricity - wind energy, photovoltaic energy, hydro, etc .; reducing the sulfur content of fuels and introducing biodiesel and bioethanol into fuels; replacing the heating of rural households (traditional wood stoves) with modernized stoves that use pellets as fuel; introduction into operation of hybrid and electric vehicles; the provision of economic-financial mechanisms that would allow the replacement of installations with a significant polluting effect on the environment with less polluting ones; the provision of installations for the retention, capture, storage of pollutants (ex.carbon capture and storage at large combustion plants-IMA, electrostatic filters, low NOx burners, scrubbers, etc.)

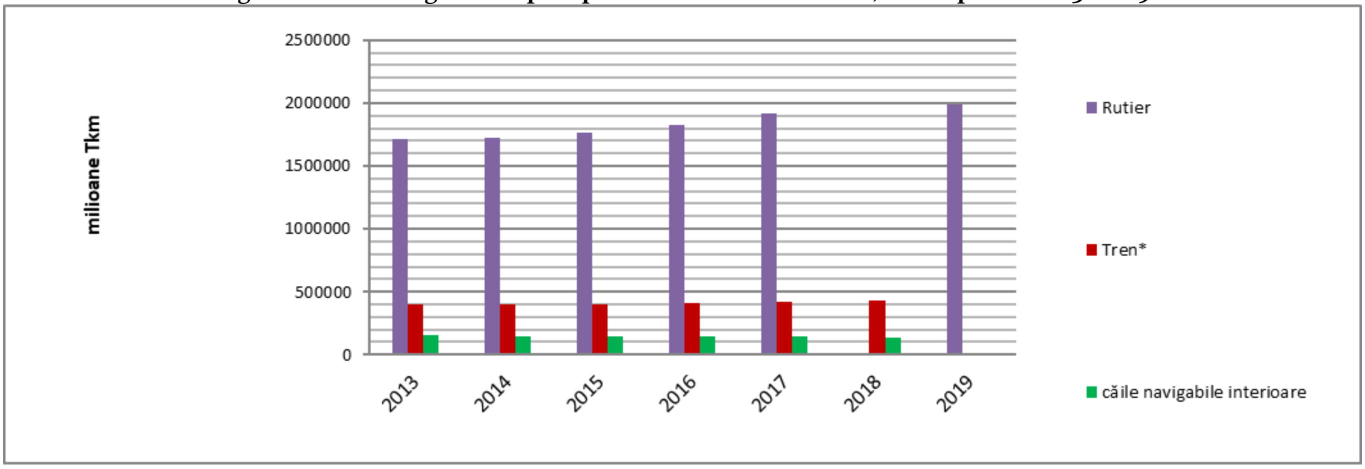
FREIGHT TRANSPORT DEMAND

Demand for freight transport per unit of GDP

RO 36
Romania indicator code: RO 36
EEA indicator code: CSI 36
TITLE: **FREIGHT TRANSPORT DEMAND**
DEFINITION:The indicatorisdefined by the quantity of goodstransported on the national territory (road, rail and inlandwaterway transport), expressed in tonne-kilometrestravelledinternallyeachyear

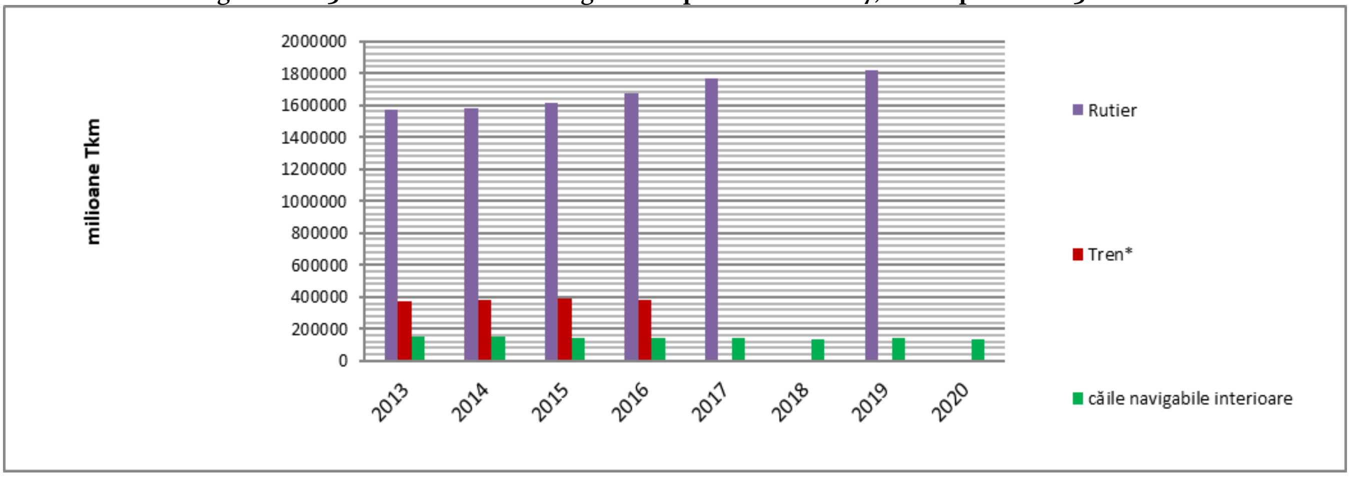
The level of domestic freight transport (measured in tonne-kilometers) can be expressed in relation to GDP. This indicator provides information on the relationship between freight demand and the size of the economy, and allows the intensity of freight demand to be monitored in relation to economic developments. In 2019, the share of domestic road freight transport in the EU hasrepresented over three quarters (77.4%) of the total domestic freight transport (per tonne-kilometers performed). With the exception of a slight decrease in the period 2010-2012, (by 2.3 percentage points) of total freight transport, the share of domestic road freight transport in the EU recorded a continuous increase in the period 2013-2019 from 74.8% to the maximum rate of 77.4% in 2019, *the last year with available data*.After the sharp decrease in 2010 (from 52.4 in 2009 to 36.9% in 2010), in Romania the road transport of goods marked a recovery in the period 2011 - 2019 from 36.9% to 45%, with a decline isolated in 2015 at 38%.
The railway transport of goods, in the period 2011 - 2019, in the EU - 28, registered a gradual decrease, from 18.7% to 17%. Also, in Romania, the railway freight transport registered a decrease in the same period from 35.4% to 26.8%. The transport of goods by inland waterways experienced a gradual reduction of the share in the total transport of goods in the period 2012-2019 from 7.4% to 6.1% (*Figure XII.22*).

Figure XII.22 - Freight transport performance in the EU-28, in the period 2013 - 2019



Source: Eurostat, statistical database - for 2019 no data are available except for road transport
** Data for rail transport in the EU 28 do not include data for Belgium, Malta and Cyprus for the whole period analyzed 2013-2019, more recent data have not been published*

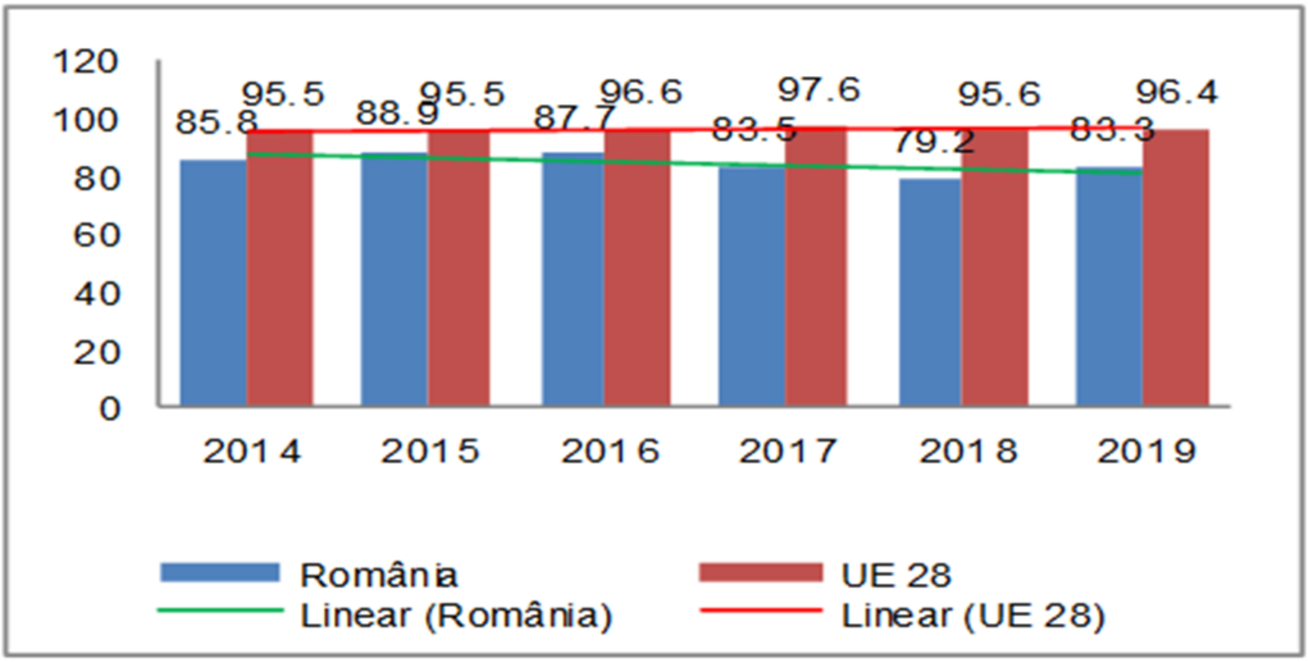
Figure XII.23 - Performance of freight transport in the EU-27, in the period 2013 - 2020



Source: Eurostat, statistical database - for 2019 no data are available except for road transport
** Data for rail transport in the EU 28 do not include data for Belgium, Malta and Cyprus for the whole period analyzed 2013-2019, more recent data have not been published*

The evolution of the ratio between the volume of goods transported domestically and GDP (expressed in euro constant prices, at the exchange rate of the reference year 2005) shows a slight downward trend of this indicator at the level of Romania, except for the years 2015 and 2019, when there were increases. This evolution is in trend with the average of the EU-28 countries. Thus, in the period 2015 - 2019, the level of the volume of goods transported internally in relation to the unit of GDP in Romania decreased by 6.3%. In the EU-28, after the increase recorded in 2011, decreased in 2012, oscillating in the following years in the range of 95.5-97.6, the maximum value being recorded in 2017. evolution of the ratio between the volume of goods transported internally and the GDP (expressed in PCS and in euro 2005) in Romania and EU-28, is shown in *Figure XII.24*.

Figure XII.24 - Volume of freight transport relative to GDP in Romania and EU-28 in 2014-2019

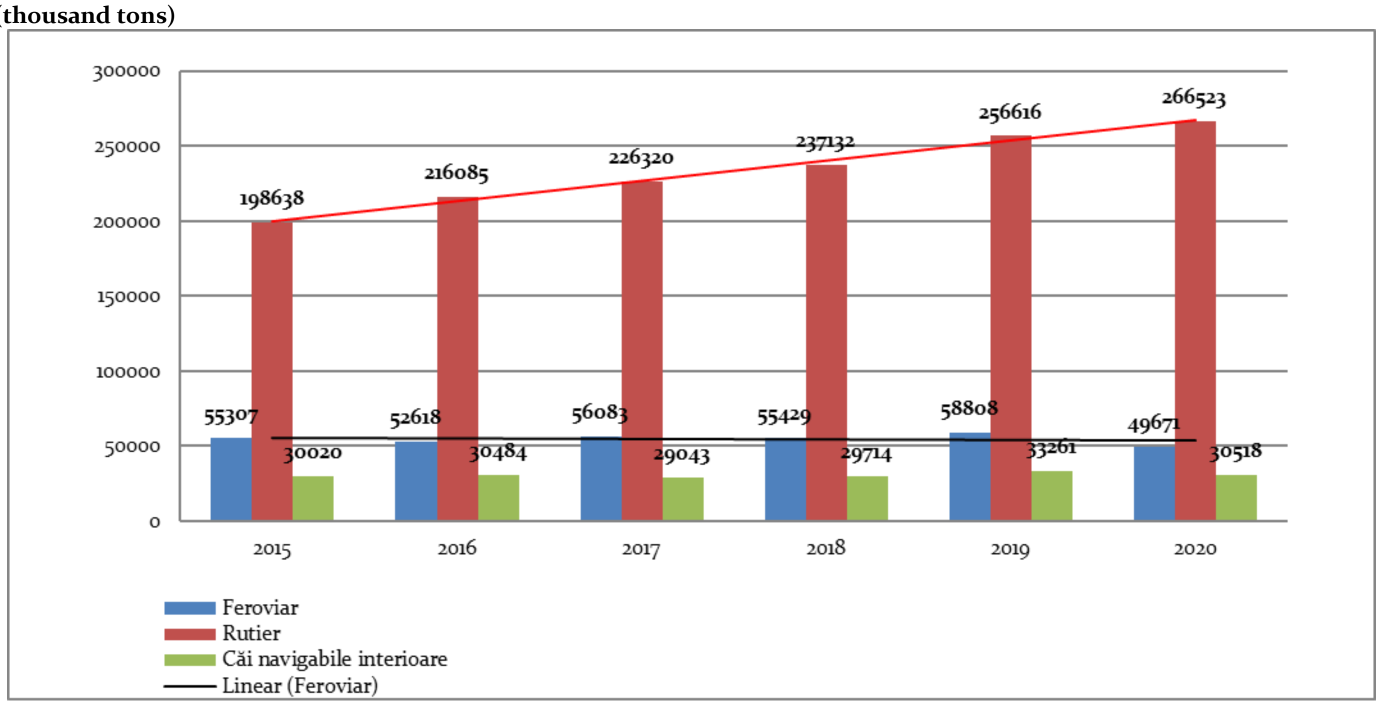


Source: Eurostat, statistical database

Freight transport demand

The volume of goods transported internally in 2020 in Romania recorded a reduction of 1973 thousand tons (0.56%) compared to 2019, a probable effect of the pandemic crisis, and an increase of 62747 thousand tons (22.1%) compared to 2015(figure XII.25).

Figure XII.25 - Volume of goods transported in Romania, by rail, road and inland waterways, in the period 2015 - 2020 (thousand tons)



Source:National Institute of Statistics , nMinistry of Transport and Infrastructure

AREA FOR ORGANIC FARMING

RO 26
Romania indicator code: RO 26
EEA indicator code: CSI 26
TITLE: **AREA DESIGNATED FOR ECOLOGICAL AGRICULTURE**
DEFINITION:The indicator expresses the share of the area destined for organic farming (the sum of the current areas with organic farming and the areas under ongoing transformation) out of the total area used in agriculture.

Organic farming is a production system that places great importance on the protection of the environment and animals, by reducing or eliminating genetically modified organisms and synthetic chemicals such as fertilizers, pesticides and growth regulators.Organic farming is a dynamic sector in Romania that has seen an upward trend in recent years. In 2013, the total cultivated area according to the organic production method in Romania was 301,148 thousand ha, and at the level of 2020 it was 468,887 thousand ha, representing an increase of cultivated areas in the organic system by 18.63% compared to 2019 and by 55.69% compared to 2013 (*table XII.4 and figure XII.26*).

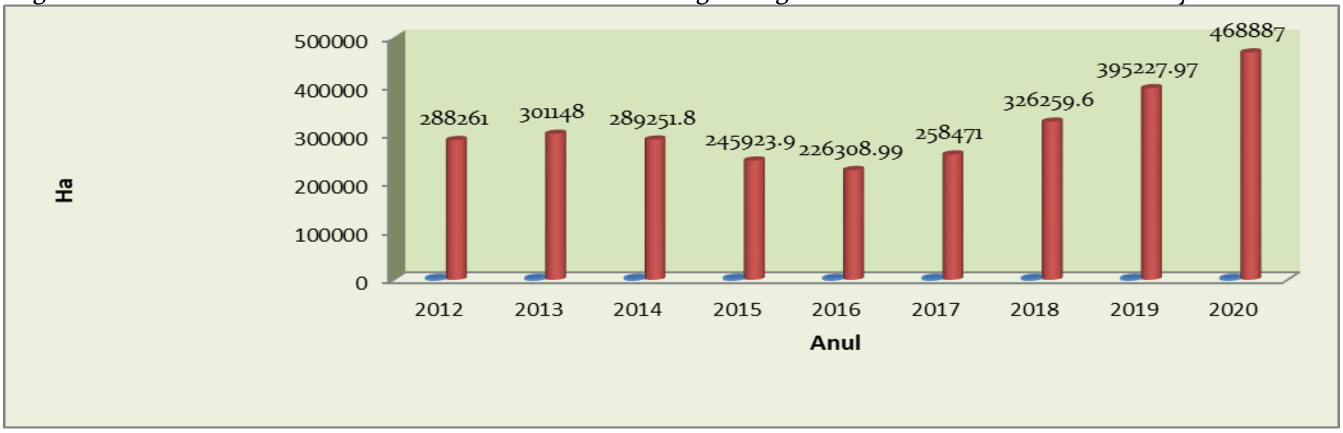
Table XII.4 - Dynamics of operators and areas in organic farming in the period 2013-2020

Indicator	2013	2014	2015	2016	2017	2018	2019	2020
Total number of certified operators in organic farming	15194	14470	12231	10562	8434	9008	9821	10210
Total area in organic farming (ha)	301148	289251,79	245923,9	226309	258470,927	326259,55	395227.97	468887,05
Total cereals (ha)	109105	102531.47	81439.5	75198.3	84925,51	114427,49	126842.95	134170.21
Dried legumes and protein crops for the production of grain (including seeds and mixtures of cereals and legumes) (ha)	2397.34	2314.43	1834,352	2203.78	4994.66	8751.13	7411.05	5709.97
Total tuberous and root plants (ha)	740.75	626.99	667,554	707,026	665.54	505.66	515.63	387.30
Industrial crops (ha)	51770.8	54145,17	52583,11	53396.9	72388,33	80193.08	78350.29	91638.97
Green harvested plants (ha)	13184.1	13493.53	13636,48	14280.5	20350.75	28253.75	37660,85	53718,20
Other arable crops (ha)	263.95	29.87	356.22	258.47	88.25	112.79	1774.15	0
Fresh vegetables (including melons and strawberries) (ha)	1067.67	1928.36	1210.08	1175.33	1458.78	983.10	804.29	847.79

Permanent crops orchards, vines, fruit bushes, nuts, etc. (Ha)	9400.31	9438.53	11117.26	12019.8	13165.41	18569.27	22143.43	22219.42
Permanent crops pastures and hayfields (ha)	103702	95684.78	75853,57	57611.7	50685.74	66890.44	115420,14	155038,18
Uncultivated land (ha)	9516.33	9058.66	7225,852	9457.2	9747.94	7572.80	6077.27	5157.18

Source: MARD- Data provided by control bodies approved by MADR

Figure XII.26 - The evolution of the areas cultivated in the organic agriculture in Romania between the years 2012-2020



Source: MARD - Data provided by control bodies approved by MARD

The evolution of the cultivated areas in organic agriculture recorded significant increases in the period 2016-2020 compared to previous years. Thus, during this period, the areas cultivated in organic agriculture doubled, with an increase of 107.19% between 2016 and 2020.

Certified organic livestock had oscillating evolutions, with increases on the bee, poultry sectors, but also decreases in herds in other sectors *(table XII.5 - No MARD data for 2020 were identified*).

Table XII.5 - Certified ecological livestock - period 2013-2019

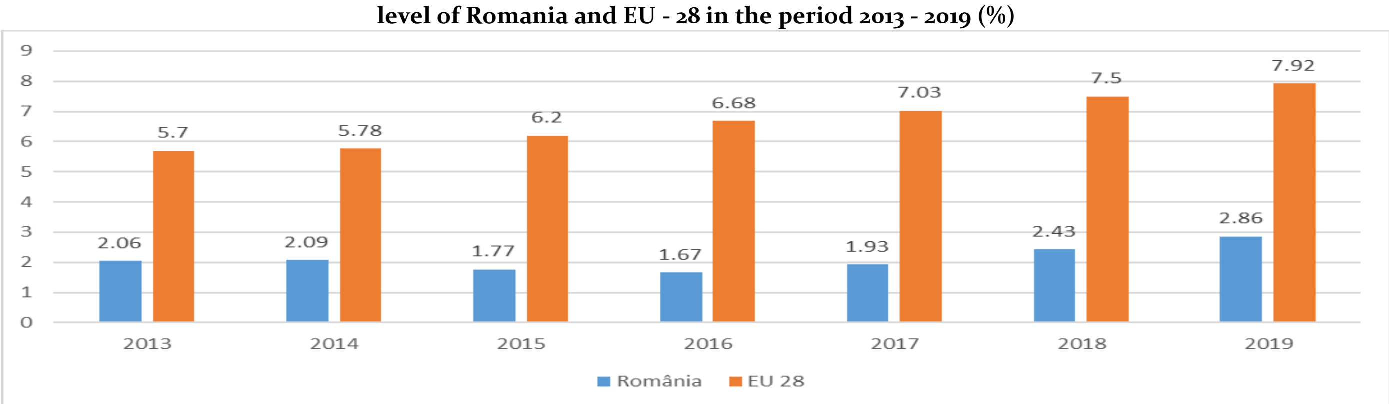
Certified ecological livestock								
		year 2013	year 2014	year 2015	year 2016	year 2017	year 2018	year 2019
Livestock	**unit of measure ment**	**number**	**number**	**number**	**number**	**number**	**number**	**number**
Cattle (total)	**heads**	**20113**	**33782**	**29313**	**20093**	**19939**	**16890**	**19419**
Animal cattle for slaughter	heads	1101	244	491	478	481	701	482
Dairy cows	heads	10088	23906	21667	15171	12472	10694	15724
Other cattle	heads	8924	9632	7155	4444	6386	5495	3213
Pigs (total)	**heads**	**258**	**126**	**86**	**20**	**20**	**20**	**9**
Pigs for fattening	heads	125	18	43	13	17	-	9
Breeding sows	heads	77	33	14	7	3	-	0
Other pigs	heads	56	75	29	0	0	9	0

Sheep (total)	**heads**	**72193**	**114843**	**85419**	**66401**	**55483**	**32579**	**19367**
Sheep, breeding females	heads	47472	96737	-	-	-	-	14832
Other sheep	heads	24721	18106	-	-	-	-	4535
Goats (total)	**heads**	**3032**	**6440**	**5816**	**2618**	**1653**	**1360**	**8161**
Goats, breeding females	heads	-	5637	-	-	-	-	8112
Other goats	heads	-	803	-	-	-	-	49
Birds (total)	**heads**	**74220**	**57797**	**107639**	**63254**	**78681**	**83859**	128596
Meat chicken	heads	-	-	-	-	285	-	-
Laying hens	heads	-	57797	-	60220	77096	-	127136
Breeding birds	-	-	-	-	-	-	-	-
Other birds	-	-	-	-	-	-	-	-
Turkeys			-	-	-	-	-	1460
Other	-			-	-	1300	-	-
Equine	heads	two hundred	626	485	-	202	-	297
Bees (bee families)	number of hives	81772	81583	-	86195	1086323	138557	175959
Other animals	heads	4878	2667	79654	86195	1791	-	1893

Source: MARD- No MARD data for 2020 have been identified

At EU-28 level, ***the share of areas devoted to organic farming in the total area used in agriculture*** has grown steadily, from 5.7% in 2013 to 7.92% in 2019.In Romania, the share of the area destined for organic agriculturerecorded an insignificant increase in 2013 and 2014 followed by a decrease between 2015 and 2017 and a resumption of growth in 2018 and 2019.*Figure XII.27* shows the evolution of the share of the area destined for ecological agriculture from the total area used in agriculture in the period 2013-2019 in Romania and in the European Union.

Figure no.XII.27 - The share of the area destined for ecological agriculture from the total area used in agriculture at the level of Romania and EU - 28 in the period 2013 - 2019 (%)



Sources: MARD, NIS, Eurostat, statistical database.www.madr.ro/agricultura-ecologica/dinamica-operatorilor-si-a-suprafetelor-in-agricultura-ecologica.html;
[http://statistici.insse.ro /shop/index.jsp?page=tempo3&lang=ro&ind=AGR 101A;http://www.organic-world.net/statistics/statistics-data-tables/statistics-data-tables-excel.html](http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=AGR101A)

MUNICIPAL WASTE GENERATION

RO 16
Romania indicator code: RO 16
EEA indicator code: CSI 16
TITLE:**MUNICIPAL WASTE GENERATION**
DEFINITION:indicatorexpresses the total amount of municipal wastegenerated per capita (kg per capita and year)

In accordance with the provisions of the National Waste Management Plan, approved by GD no. 942/2017, "*municipal waste is household waste and other waste, which, by nature or composition, are similar to household waste*". According to the Decision 2011/753 / EU establishing the norms and calculation methods for verifying the observance of the objectives set in art. 11 align.(2) of Directive 2008/98 / EC of the European Parliament and of the Council, "*municipal waste*" means household and similar waste, where *"household waste"* means waste from households, and *"similar waste"* means waste which, from the point of view of nature and composition, is comparable to household waste, excluding industrial waste and agricultural waste and forestry activities.

Generated municipal waste

The value was calculated by summing the quantities generated for the following types of waste:
- household and similar waste and municipal services collected by sanitation operators, excluding inert waste;
- household waste generated and not collected by sanitation operators;
- recyclable waste from the population, collected through authorized economic operators, other than sanitation operators (paper and cardboard, metals, plastics, glass, wood, textiles, WEEE, waste batteries and accumulators).

This includes bulky waste, waste from parks, gardens and street cleaning, including the contents of street rubbish bins, as well as waste electrical and electronic equipment from households.

The following are excluded:
- Sludges from urban wastewater treatment;
- Construction and demolition waste.

According to the collection method, the municipal waste is:
- Collected by or on behalf of municipalities;
- Collected directly by private economic operators - valid for WEEE and other types of recyclable waste;
- Generated and uncollected by a sanitation operator, but managed directly by the generator.

The quantities of waste generated by the population that is not served by sanitation services are calculated using the generation indices provided in the National Waste Management Plan: 0.65 kg / inhabitant / day for the urban environment and 0.3 kg / inhabitant / day for rural environment.

Table XII.6 shows the quantities of municipal waste generated by waste categories in the period 2015-2019.

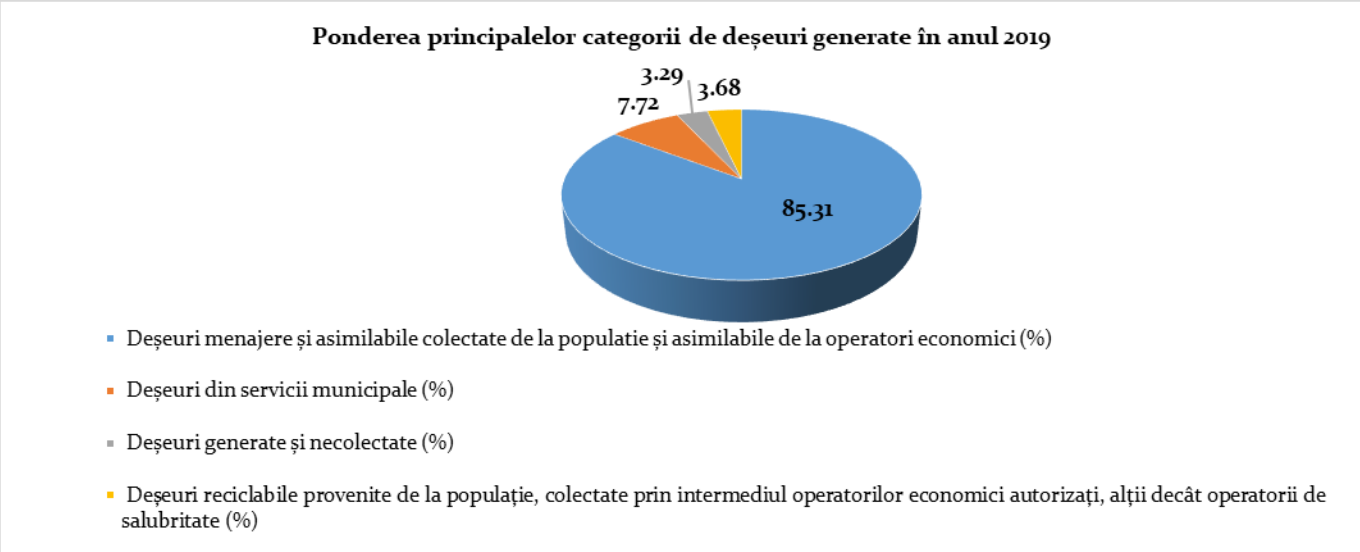
Table XII.6 - Quantities of municipal waste generated in the period 2015-2019

Indicator name	2015	2016	2017	2018	2019
Amount of municipal waste generated (tons)	4903535	5142542	5333171	5296239	5430341
From which:					
- Household waste collected from the population and assimilated from economic operators (tonnes)	3685250	3894853	4162921	4249988	4632802
- Municipal waste (tonnes)	429286	454170	400228	430097	419429
- Waste generated and uncollected (tonnes)	600345	523670	419444	314022	178470
- Recyclable waste from the population, collected through authorized economic operators, other than sanitation	188654	269849	350578	302132	199640

operators (tonnes)						

Source: National Environmental Protection Agency

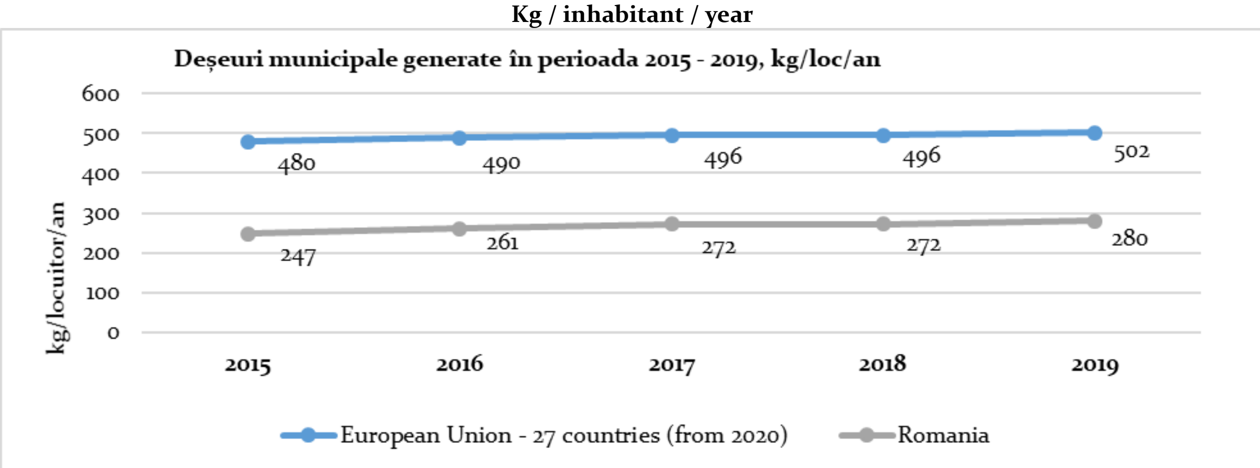
Figure XII.28. - The share of the main categories of municipal waste generated in 2019



Source: National Environmental Protection Agency

Figure XII.29 shows the evolution of the municipal waste generation indicator in Romania compared to the average registered in the European Union.

Figure XII.29. Evolution of the municipal waste generation indicator in Romania compared to the EU average, 2015 - 2019, Kg / inhabitant / year



Source: EUROSTAT

Sustainable development indicators on municipal waste

Sustainable development indicators on municipal waste refers to:

- Municipal waste generated;
- Municipal waste treated by: recycling (excluding composting and anaerobic digestion), composting, energy recovery and storage.

The EUROSTAT guide also recommends that recyclable waste streams (paper, plastic, metal, etc.) resulting from sorting facilities that are subsequently sent to recycling facilities be considered as recycled.

Considering all the above, the following indicators of sustainable development on municipal waste have been calculated at national level:

- ***Degree of connection to the sanitation service***- the data were reported by the sanitation operators.
- ***Municipal waste generated***- presented in the previous table.
- ***Recycled municipal waste***(including composting).

The value was calculated by summing the recycled quantities for the following types of waste:

- wastes from municipal waste sorting facilities, by type of material, sent for recycling;
- household and similar waste and municipal services reported by sanitation operators as sent for recycling;
- recyclable waste from the population, collected through authorized economic operators, other than sanitation operators (paper and cardboard, metals, plastics, glass, wood, biodegradable, textiles, WEEE, waste batteries and accumulators).

- ***Recycling degree achieved for municipal waste***- The value was calculated by relating the quantities of municipal waste recycled to the total quantities of municipal waste generated.
- ***Municipal energy waste*** -The value was calculated by summing the quantities reported by sorting station operators, TMBs and economic sanitation operators as sent for co-incineration.
- ***Biodegradable waste stored***- The value was calculated by summing the quantities reported by sanitation operators sent to municipal landfills.

The main specific indicators of sustainable developmentfor municipal waste *are presented in table XII.7.*

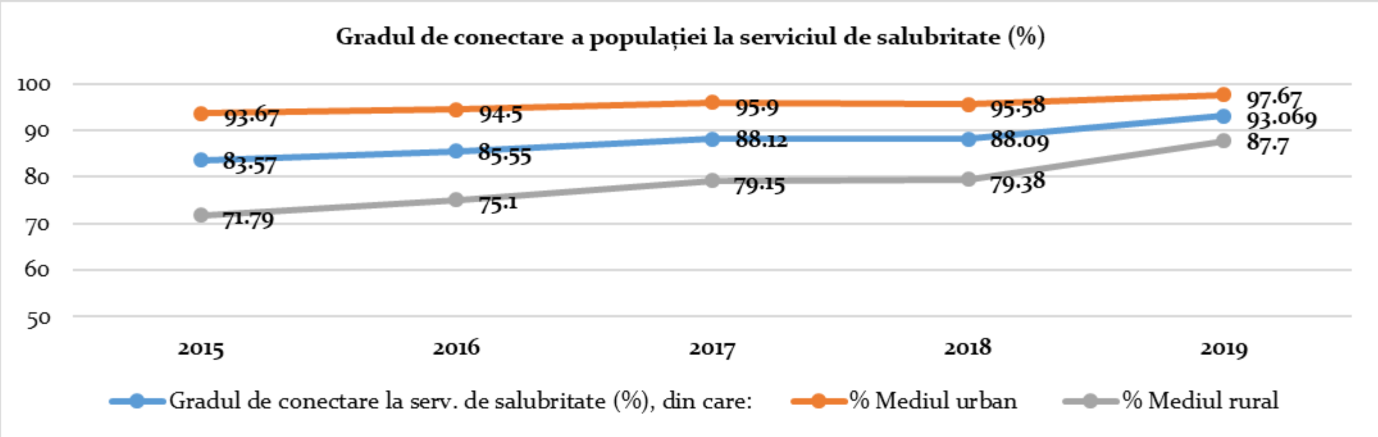
Table XII.7 - Specific information on municipal waste in the period 2015-2019

Indicator name	2015	2016	2017	2018	2019
Degree of connection to the sanitation service (%)	83.57	85.55	88.12	88.09	93.07
- Urban area	93.67	94.5	95.9	95.58	97.67
- Rural area	71.79	75.1	79.15	79.38	87.7
Amount of municipal waste collected separately (tonnes)	430305	580602	696742	634536	576816
Amount of recycled municipal waste * (tonnes)	649591	689443	745427	586406	623214
Degree of recycling achieved for municipal waste (%)	13.25	13.41	13.98	11.07	11.48
Amount of municipal energy waste (tonnes)	116296	219608	227280	241445	251277
Amount of biodegradable waste from municipal waste landfill (tonnes)	1856416	1913329	2159103	2068288	2120022
Number of compliant municipal depots in operation	35	37	42	43	44
Number of transfer stations in operation	36	51	52	53	84
Number of sorting stations in operation, including manual sorting activities	99	101	103	105	103

**recycled waste comes from both separate collection and mixed collection waste, entered into treatment processes*
Source: National Environmental Protection Agency

According to those presented in the table above, at national level, in 2019 the degree of connection of the population to the sanitation service increased to 93%. In urban areas it is about 98% and in rural areas it has increased to 88%. *Figure XII.30* shows the evolution of the degree of connection to the sanitation service in the period 2015-2019.

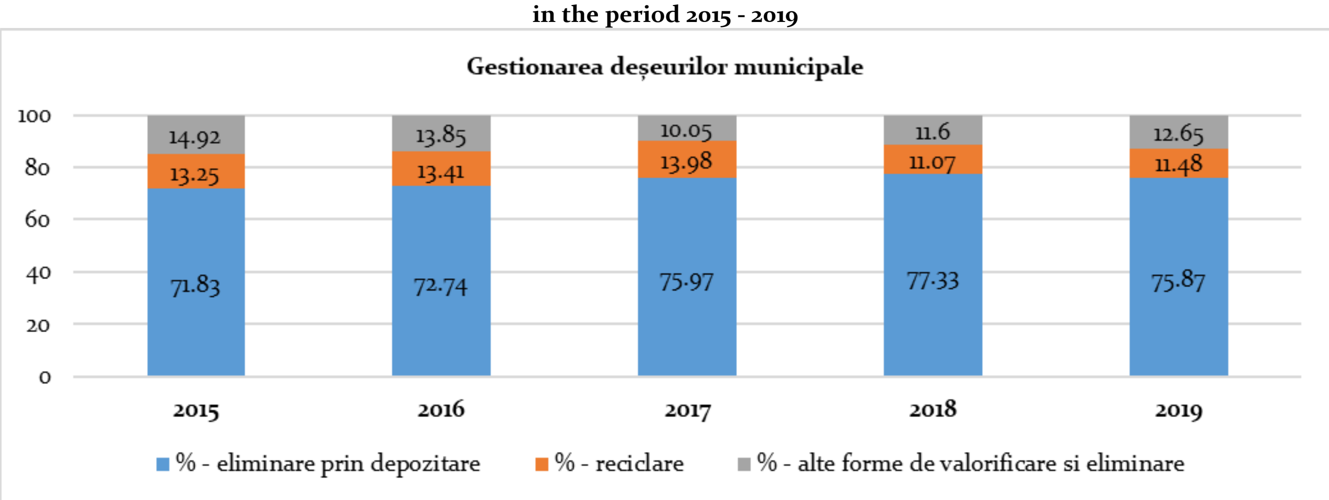
Figure XII.30 - The degree of connection of the population to the sanitation service in the period 2015-2019



Source: National Environmental Protection Agency

Municipal waste managementinvolves their collection, transport, recovery and disposal, including the supervision of these operations and the subsequent maintenance of disposal sites. **The responsibility for municipal waste management lies with the local public administrations**, which, by their own means or by delegating the sanitation service to an authorized operator, must ensure the collection (including separate collection), transport and treatment of this waste. For certain waste flows that fall into the category of municipal waste, collection from the population and by authorized economic operators is allowed. Part of the municipal waste collected is sent directly to final recovery (material or energy), respectively to disposal, while another part is sent to intermediate treatment plants (sorting plants, composting). ***Municipal waste is disposed of exclusively by landfill***. ***So far, no municipal waste incineration plants have been put into operation in Romania. At the end of 2019, 44 compliant landfills for municipal waste were authorised and operated.***

Figure XII.31 - The share of the main municipal waste management activities, compared to the amount of waste generated, in the period 2015 - 2019



Source: National Environmental Protection Agency

Note: The decrease in the share of recycled waste from 2018 is determined by the change of calculation methodology - starting this year, the amount of individually composted biodegradable waste was no longer considered recycled, taking into account the provisions of PNGD and European legislation

Figure XII.31 shows that in 2019 there is a slight reduction in the quantities of municipal waste stored. However, the amount of waste deposited remains high, which is inconsistent with the principles and objectives adopted by the EU through the circular economy legislative package.

Reducing the amount of biodegradable waste stored

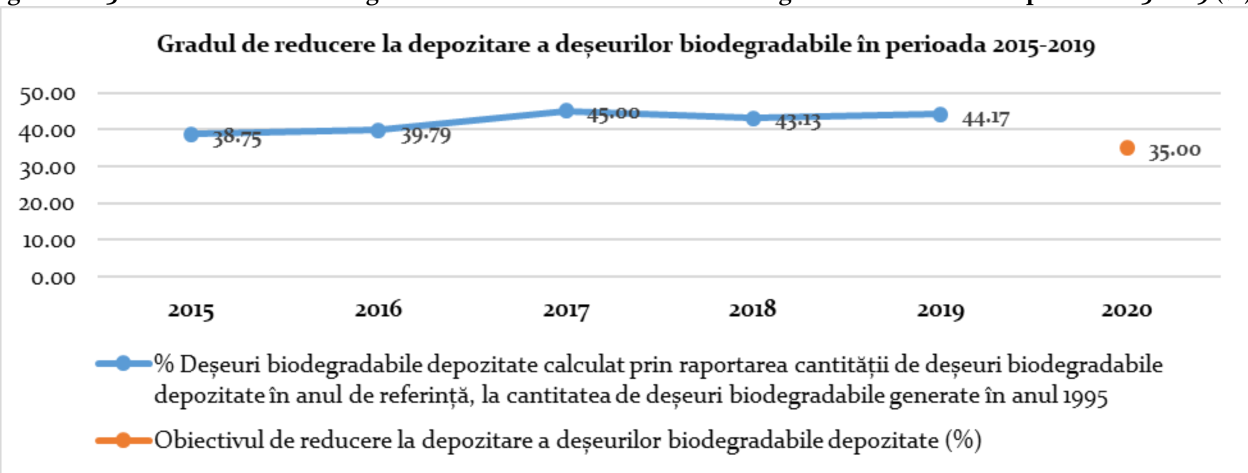
Biodegradable waste, according to the legislation on waste storage, is any waste that can undergo aerobic or anaerobic decomposition, such as food, garden waste, paper or cardboard.
According to the provisions of GD no. 349/2005 on the storage of waste, in a maximum of 15 years from 16 July 2001, it was necessary to reduce the storage of biodegradable waste to 35% of the total quantity, expressed gravimetrically, produced in 1995. Romania requested and received a four-year derogation to achieve this goal, thus, the deadline was 16 July 2020. *Table XII.8* shows the quantities of biodegradable waste generated and stored in the period 2015-2019.

Table XII.8 -Quantities of biodegradable waste generated and stored in the period 2015-2019

Indicator name	1995	2015	2016	2017	2018	2019
Quantity of biodegradable waste generated (million tonnes)	**4.80**	**2.57**	**2.64**	**2.89**	**2.81**	**2.99**
Quantity of biodegradable waste stored (million tons)		1.86	1.91	2.16	2.07	2.12
Biodegradable waste stored compared to 1995 (%)		38.75	39.79	45.00	43.13	44.17

Source: National Environmental Protection Agency

Figure XII.32 - Evolution of the degree of reduction in landfill of biodegradable waste in the period 2015-2019 (%)



Source: National Environmental Protection Agency

USE OF FRESH WATER RESOURCES

RO 18
Romania indicator code: RO 18
EEA indicator code: CSI 18
TITLE:**USE OF FRESH WATER RESOURCES**
DEFINITION: The water exploitation index (WEI) represents the average annual total freshwater catchment divided by the total average annual renewable water resources at national level and is expressed as a percentage

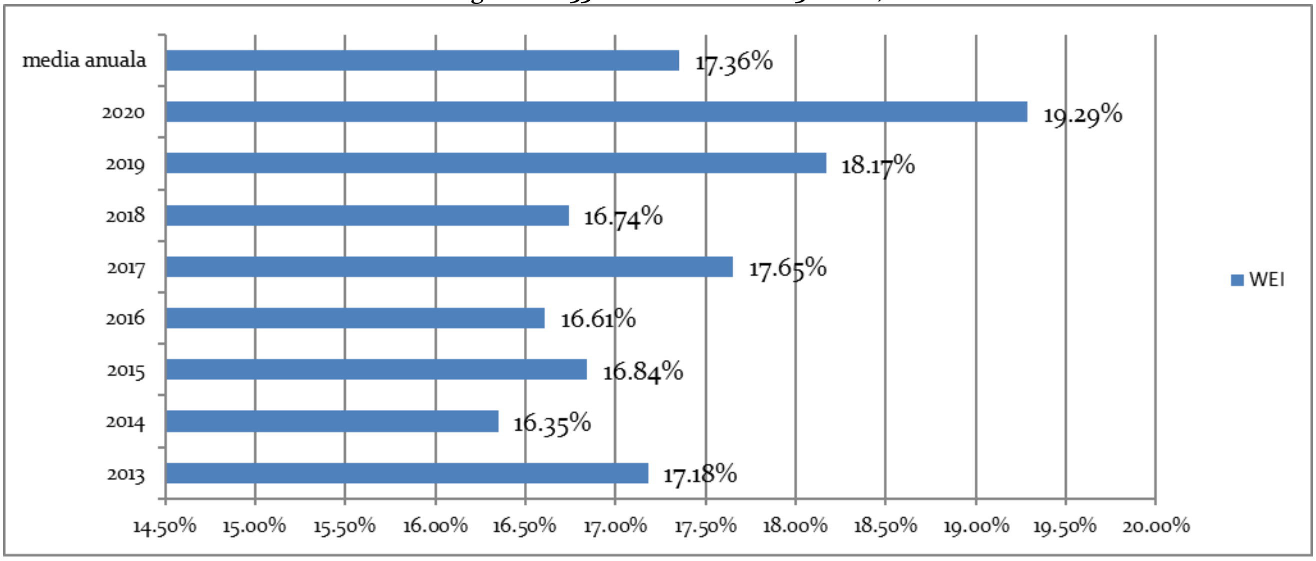
A notion used in the management of water resources is the *pressure on water*. It is generally directly related to an over-sampling of water that exceeds the resources available in certain areas. The ratio of total freshwater abstractions to total resources generally indicates the existence of pressure on water resources and is called the *Water Exploitation Index* (*WEI*). According to the document prepared byEuropean Commission in 2009 Water Scarcity & Drought, if this indicator is below 10%, then it is considered that water resources are not under pressure. If this indicator is between 10% and 20% then it is considered that the water resources are subjected to a reduced pressure. Values of the operating index higher than 20% indicate the existence of a pressure on the water resources, and an index of over 40% is a signal of severe stress on the water resources.WEI values (%) in the period 2013-2020 (represented in *table XII.9 and figure XII.33*) are below the percentage of 20% so that it can be considered that ***Romania's water resources are subject to a reduced operating pressure***.

Table XII.9 - Evolution over time of water consumption in Romania 2013-2020 (billion m3)

Years	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Average years*
Usable resource mld m³	38.35	38.35	38.35	38.35	38.35	38.35	38.35	38.35	38.35
Total water sampling mld m³	6.59	6.27	6.46	6.37	6.77	6.42	6.97	7.40	6.56
WEI indicator,%	17.18%	16.35%	16.84%	16.61%	17.65%	16.74%	18.17%	19.29%	17.36%

Source: National Administration "Romanian Waters"

Figure XII.33 WEI indicator 2013 - 2020,%



Source: National Administration "Romanian Waters"

At national level, Romania's water resources are relatively poor and unevenly distributed in time and space. These theoretically amount to approx. 134.6 billion cubic meters, being made up of surface waters, respectively rivers, lakes, Danube river and groundwater, of which the usable resource, according to the degree of arrangement of the hydrographic basins, is 38.35 billion cubic meters. Compared to 2015, the water demand in Romania increased by 1.21 billion cubic meters in 2020, from 6.7 billion cubic meters of water to 7.91 billion cubic meters, being broken down by the three categories of users as follows: for the **population** 1.23 billion cubic meters of water in 2020 compared to 1.07 billion cubic meters in 2015, **agriculture** 1.84 billion cubic meters of water in 2020 compared to 1.21 billion cubic meters in 2015 and 4.84 billion cubic meters of water for the **industrial sector** in 2020 compared to 4.42 billion cubic meters in 2015. Compared to the previous year, the water demand increased in 2020 by 0.54 billion cubic meters. The volume of water taken (used) in 2020 was 7.40 billion cubic meters, increasing by 0.43 billion cubic meters of water compared to 2019, when the volume of water taken was 6.97 billion cubic meters.

Breakdown by the three categories of users (population, industry, agriculture):

- the volume of water taken in the agricultural sector increased from 1.29 billion cubic meters in 2015 to 2.28 billion cubic meters in 2020;
- the industrial sector consumed 4.04 billion cubic meters in 2020, down from the consumption of 4.14 billion cubic meters recorded in 2015;

- for the population the volume of water taken in 2020 was approx. 1.08 billion cubic meters, up from the one taken in 2015 (1.03 billion cubic meters).

The situation explained is presented in *tables XII.10 and XII.11* (*Source: National Administration "Romanian Waters"*).

Table XII.10 - Evolution of water demand compared to water volumes in Romania 2015-2020 (thousand m3)

Source	*Population*		*Industry*		*Agriculture*		*TOTAL*	
	Requirement	*collected*	*Requirement*	*collected*	*Requirement*	*collected*	*Requirement*	*collected*
Surface	568137	546977	1782359	1285454	875837	910626	3226333	2743057
	579424	536969	1690074	1244955	998258	888659	3267756	2670583
	594990	535160	1707998	1350532	942300	1035709	3245288	2921401
	593806	557945	1307286	1255395	1099659	951952	3000751	2765292
	615797	612211	1730382	1322859	1120766	1028841	3466945	2963911
	627178	593018	1909807	1155263	1171368	1135911	3708353	2884192
Underground	434383	420464	173783	134530	35993	35365	644159	590359
	472993	454977	166987	140553	40674	39518	680654	635048
	482213	452958	162548	147014	44805	46458	689566	646430
	498167	467129	167239	159826	55458	51737	720864	678692
	521195	492378	184000	159092	60841	53341	766036	704811
	539058	411372	195651	198892	67492	185296	802201	795560
Danube	69200	62869	2449641	2716769	302339	344753	2821180	3124391
	69170	59187	2336364	2684657	363069	314452	2768603	3058296
	67599	60042	2595753	2725887	387068	408583	3050420	3194512
	68575	59876	2593468	2479875	502860	423146	3164903	2962897
	67222	71904	2592137	2719039	467507	508740	3126866	3299683
	68523	73362	2720136	2676840	599604	958882	3388263	3709084
Black Sea	61	49	11803	7011			11864	7060
	60	65	9503	9533			9563	9598
	58	52	10287	10253			10345	10305
	65	46	10179	9238			10244	9284
	74	47	10339	6405			10413	6452
	74	27	9602	7320			9676	7347
TOTAL 2015	*1071781*	*1030359*	*4417586*	*4143764*	*1214169*	*1290744*	*6703536*	*6464867*
TOTAL 2016	*1121647*	*1051198*	*4202928*	*4079698*	*1402001*	*1242629*	*6726576*	*6373525*
TOTAL 2017	*1144860*	*1048212*	*4476586*	*4233686*	*1374173*	*1490750*	*6995619*	*6772648*
TOTAL 2018	*1160613*	*1084996*	*4078172*	*3904334*	*1657977*	*1426835*	*6896762*	*6416165*
TOTAL 2019	*1204288*	*1176540*	*4516858*	*4207395*	*1649114*	*1590922*	*7370260*	*6974857*
TOTAL 2020	*1234833*	*1077779*	*4835196*	*4038315*	*1838464*	*2280089*	*7908493*	*7396183*

Source: National Administration "Romanian Waters"

Table XII.11 - Evolution of water demand compared to water volumes in Romania 2015-2020 (%)

Sursa	*Anii*	*Populație*			*Industrie*			*Agricultură*			*TOTAL*		
		Cerință	*Prelevat*	*Grad de realizare (%)*	*Cerință*	*Prelevat*	*Grad de realizare (%)*	*Cerință*	*Prelevat*	*Grad de realizare (%)*	*Cerință*	*Prelevat*	*Grad de realizare (%)*
Suprafață	2015	568137	546977	96.3%	1782359	1285454	72.1%	875837	910626	104.0%	3226333	2743057	85.0%
	2016	579424	536969	92.7%	1690074	1244955	73.7%	998258	888659	89.0%	3267756	2670583	81.7%
	2017	594990	535160	89.9%	1707998	1350532	79.1%	942300	1035709	109.9%	3245288	2921401	90.0%
	2018	593806	557945	94.0%	1307286	1255395	96.0%	1099659	951952	86.6%	3000751	2765292	92.2%
	2019	615797	612211	99.4%	1730382	1322859	76.4%	1120766	1028841	91.8%	3466945	2963911	85.5%
	2020	627178	593018	94.6%	1909807	1155263	60.5%	1171368	1135911	97.0%	3708353	2884192	77.8%
Subteran	2015	434383	420464	96.8%	173783	134530	77.4%	35993	35365	98.3%	644159	590359	91.6%
	2016	472993	454977	96.2%	166987	140553	84.2%	40674	39518	97.2%	680654	635048	93.3%
	2017	482213	452958	93.9%	162548	147014	90.4%	44805	46458	103.7%	689566	646430	93.7%
	2018	498167	467129	93.8%	167239	159826	95.6%	55458	51737	93.3%	720864	678692	94.1%
	2019	521195	492378	94.5%	184000	159092	86.5%	60841	53341	87.7%	766036	704811	92.0%
	2020	539058	411372	76.3%	195651	198892	101.7%	67492	185296	274.5%	802201	795560	99.2%
Dunăre	2015	69200	62869	90.9%	2449641	2716769	110.9%	302339	344753	114.0%	2821180	3124391	110.7%
	2016	69170	59187	85.6%	2336364	2684657	114.9%	363069	314452	86.6%	2768603	3058296	110.5%
	2017	67599	60042	88.8%	2595753	2725887	105.0%	387068	408583	105.6%	3050420	3194512	104.7%
	2018	68575	59876	87.3%	2593468	2479875	95.6%	502860	423146	84.1%	3164903	2962897	93.6%
	2019	67222	71904	107.0%	2592137	2719039	104.9%	467507	508740	108.8%	3126866	3299683	105.5%
	2020	68523	73362	107.1%	2720136	2676840	98.4%	599604	958882	159.9%	3388263	3709084	109.5%
Marea Neagră	2015	61	49	80.3%	11803	7011	59.4%				11864	7060	59.5%
	2016	60	65	108.3%	9503	9533	100.3%				9563	9598	100.4%
	2017	58	52	89.7%	10287	10253	99.7%				10345	10305	99.6%
	2018	65	46	70.8%	10179	9238	90.8%				10244	9284	90.6%
	2019	74	47	63.5%	10339	6405	61.9%				10413	6452	62.0%
	2020	74	27	36.5%	9602	7320	76.2%				9676	7347	75.9%
TOTAL	2015	*1071781*	*1030359*	*96.1%*	*4417586*	*4143764*	*93.8%*	*1214169*	*1290744*	*106.3%*	*6703536*	*6464867*	*96.4%*
TOTAL	2016	*1121647*	*1051198*	*93.7%*	*4202928*	*4079698*	*97.1%*	*1402001*	*1242629*	*88.6%*	*6726576*	*6373525*	*94.8%*
TOTAL	2017	*1144860*	*1048212*	*91.6%*	*4476586*	*4233686*	*94.6%*	*1374173*	*1490750*	*108.5%*	*6995619*	*6772648*	*96.8%*
TOTAL	2018	*1160613*	*1084996*	*93.5%*	*4078172*	*3904334*	*95.7%*	*1657977*	*1426835*	*86.1%*	*6896762*	*6416165*	*93.0%*
TOTAL	2019	*1204288*	*1176540*	*97.7%*	*4516858*	*4207395*	*93.1%*	*1649114*	*1590922*	*96.5%*	*7370260*	*6974857*	*94.6%*
TOTAL	2020	*1234833*	*1077779*	*87.3%*	*4835196*	*4038315*	*83.5%*	*1838464*	*2280089*	*124.0%*	*7908493*	*7396183*	*93.5%*

Source: National Administration "Romanian Waters"

Romania's water resources consist of surface waters - rivers, lakes, the Danube River - and groundwater. The potential and technically usable water resources for 2020 (***Water balance*** - ***Requirement for 2020***) are presented in *Table XII.12.*

Table XII.12 - Potential and technically usable water resources for 2020

Water source Characterization indicator	Total thousands. mc.
A. Inland rivers	
1. Theoretical resource	40,000,000
2. The existing resource according to the degree of arrangement of the basins	13 679 121
3. Water requirement of the uses, according to the capture capacities in operation	3,708,353
B. Danube (direct)	
1. Theoretical resource (in the entry section) **	85,000,000
2. The resource usable in the current arrangement regime	20,000,000
2. The water requirement of the uses according to the capture capacities	3 388 263
Water source Characterization indicator	**Total thousands. mc.**
C. Underground	
1. Theoretical resource	9,600,000
from which:	
• groundwater	4,700,000
• deep waters	4,900,000
2. Usable resource	4,667,639
3. Water requirement of the uses, according to the capture capacitiesin operation	802 201
D. Black Sea	
Water requirement of the uses, according to the capture capacities in operation	9,676
Total resources	
1. Theoretical resource	**134,600,000**
2. The existing resource according to the degree of arrangement of the basins	**38 346 760**
3. Water requirement of the uses, according to the capture capacities in operation	**7,908,493**

Source: National Administration "Romanian Waters"

Note

** - also includes the network of coastal lakes, as well as the resource provided by direct external reuse along the river;*
*** - ½ from the average multiannual stock, upon entering the country;*
**** - including the volumes transferred to the Seaside basin*

Compared to the current population of Romania, it results:

- ***a specific resource usable in natural regime, of approx. 2660 m³ / inh. and year, taking into account the contribution of the Danube;***
- ***specific, theoretical resource of approx. 1770 m³ / inh. and year, taking into account only the contribution of inland rivers, placing from this point of view Romania in the category of countries with relatively low water resources compared to the resources of other states.***

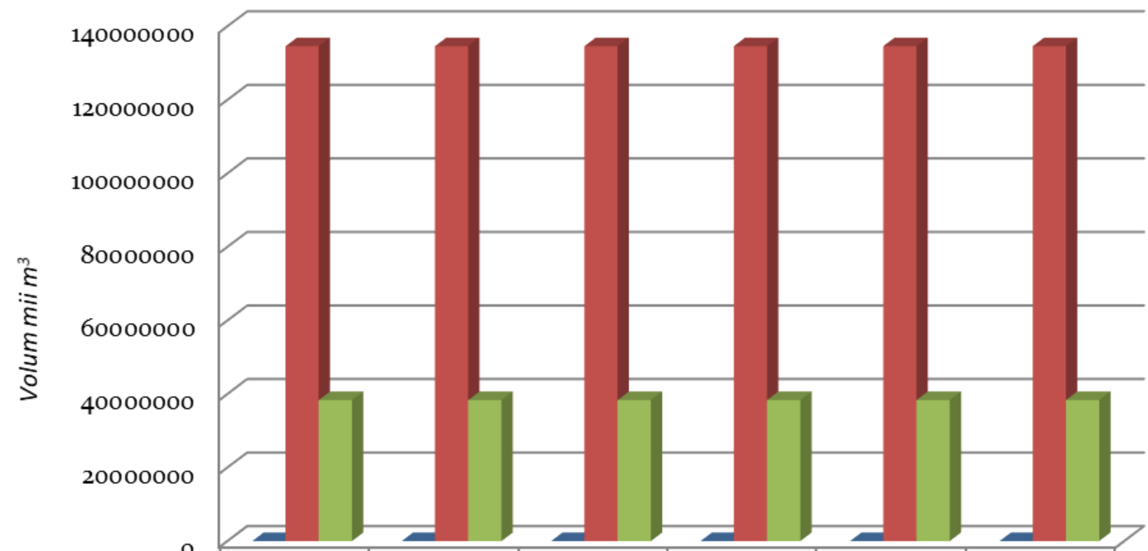
Natural water resources are the surface and groundwater reserves of a territory that can be used for various purposes. The natural resource is the amount of water expressed in units of volume accumulated in water bodies in a given time interval, in this case during 2020. The theoretical resource is given by the average annual stock representing the total natural water resources so surface as well as underground. The technically usable resource is the share of the theoretical resource that can be taken to serve to meet the water requirements of the economy (see *Table XII.13 and Figure XII.34*).

Table XII.13 - Potential and technically usable water resources, 2015 - 2020 (theoretical and usable)

Years	Theoretical resource (thousand mc)	Usable resource (thousand mc)
2015	134600000	38346760
2016	134600000	38346760
2017	134600000	38346760
2018	134600000	38346760
2019	134600000	38346760
2020	134600000	38346760

Note: The usable resource, according to the degree of arrangement of the river basins, also includes the resource related to the coastal lakes, as well as the resource provided by indirect external reuse along the river (Source: National Administration „Romanian Waters")

Figure XII.34 - Evolution of water resource (theoretical and usable) in thousands of m³, 2015 - 2020



	1.0	2.0	3.0	4.0	5.0	6.0
Anii	2015	2016	2017	2018	2019	2020
Resursa teoretică	134600000	134600000	134600000	134600000	134600000	134600000
Resursa utilizabilă	38346760	38346760	38346760	38346760	38346760	38346760

Source: National Administration „Romanian Waters

Romania's surface water resources come from inland rivers (including natural lakes) and the Danube River. I n Romania, the main share in providing the necessary water resource is held by the inland rivers. Natural lakes have low volumes of water, with the exception of coastal lakes in the Razelm - Sinoe lagoon system which, although they have appreciable volumes, have brackish water due to their connections with the Black Sea waters.

Danube river, although it has priority over the total volume of the resource, being located eccentrically to the national territory, it is less used as a source of usable water. So far the only use of the water resource offered by the Danube has been in agriculture (for irrigation). The natural water resource of 2020 coming from inland rivers represented a drained volume of 29705 * 106m^3 which places it with 25.6% below the level of the average multiannual volume calculated for a long period (1950 - 2019), respectively 39920 * 106m^3. In this context, the year 2020 can be considered a dry year as well as the year 2017. Compared to the last 5 years (2015 - 2019), the volume spent in 2020 is lower by about 18.9% compared to the multiannual average of the annual stock (36605.6 * 106m^3) drained in the mentioned interval (see *table XII.14 and figure XII.35)*

Table XII.14 - Water resources of 2020, compared to the previous period (2015-2019)

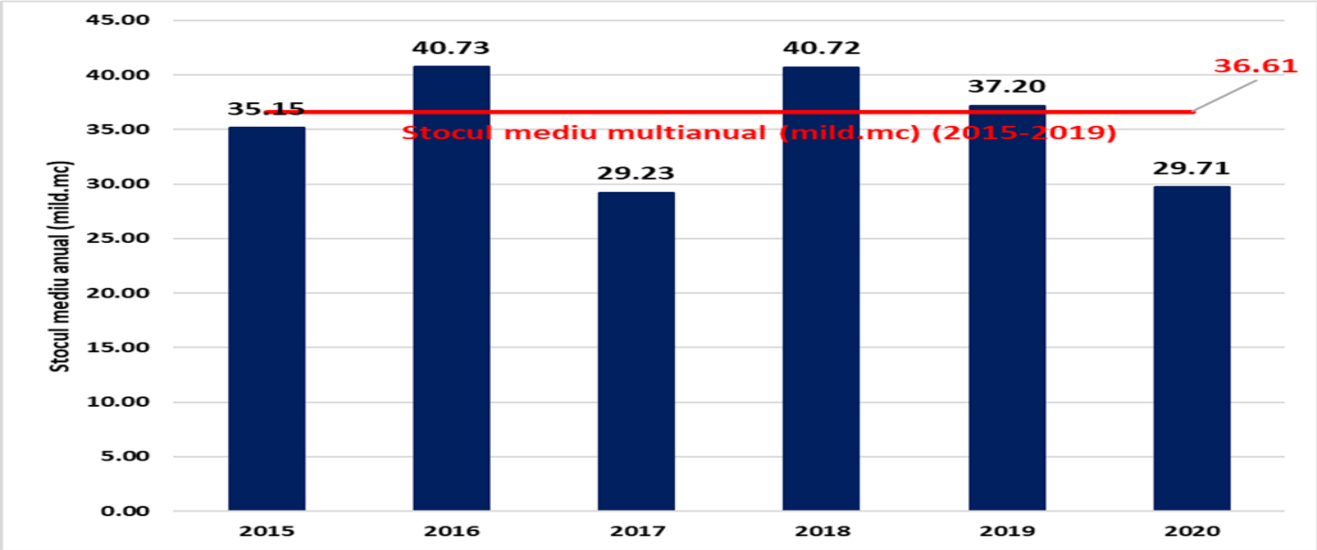
River basin	Parameter	F (km^2)	Q annual average (m^3 / s)							Q2020 / Qmed (%)
			2015	**2016**	**2017**	**2018**	**2019**	**AVG** 2015-2019	**2020 ***	
TISA*	Q	4540	50.1	62.2	74.57	70.7	65.87	64,688	62.1	96.0
	V		1579	1980	2352	2230	2077	2043.6	1964	
SOMEȘ	Q	17840	92.6	129.8	95.21	93.21	109.38	104.04	80.3	77.2
	V		2919	4105	3003	2939	3450	3283.2	2539	
CRIŞURI	Q	14860	55	90.4	64.92	81.48	79.88	74,336	52.1	70.1
	V		1734	2859	2047	2569	2519	2345.6	1648	
MUREȘ	Q	29390	124	176.4	116.1	159.4	139.2	143.02	135.2	94.5
	V		3910	5578	3661	5027	4391	4513.4	4275	
BEGA – TIMIȘ - CARAȘ	Q	13060	57.13	78.85	46.61	66.3	80.86	65.95	65.9	99.9
	V		1802	2487	1470	2091	2550	2080	2084	
NERA - CERNA	Q	2740	41.75	35.8	19.38	33.01	32.4	32,468	31.1	95.8
	V		1317	1132	611	1041	1022	1024.6	983	
JIU	Q	10080	129	154	70.8	111	92.7	111.5	79.0	70.9
	V		4068	4870	2233	3500	2923	3518.8	2498	
OLT	Q	24050	168	162	134	205	156	165	135	81.8
	V		5298	5123	4226	6465	4920	5206.4	4269	
VEDEA	Q	5430	17.6	15.9	7.15	25.1	10.28	15,206	4.81	31.6
	V		555	503	225	791	324	479.6	152	
ARGEȘ	Q	12550	83.8	75	57.68	74.85	89.27	76.12	48.8	64.1
	V		2642	2372	1819	2361	2815	2401.8	1543	
IALOMITA	Q	10350	42.5	45.1	40.2	45	33	41.16	28.8	70.0
	V		1340	1426	1268	1419	1041	1298.8	911	
DUNĂREA	Q	34141	36.9	33.1	23.55	35.17	32.09	32,162	21.1	65.6
	V		1164	1047	743	1109	1012	1015	667	
SIRET	Q	42890	206	217	160.3	272.57	241.45	219,464	187.2	85.3
	V		6481	6862	5055	8596	7614	6921.6	5920	
PRUT**	Q	10990	6.92	7.39	13.72	15.16	15,363	11.7106	6.86	58.6
	V		218	234	433	478	484	369.4	217	
DOBROGEA	Q	5480	3.92	4.88	2.63	3.34	1.67	3,288	1.12	34.1
	V		124	154	82.8	105	53	103.76	35	
Total Romania without the Danube river	Q	238391	1115	1288	926.83	1291.29	1179.45	1160,114	939.39	81.0
	V		**35151**	**40732**	**29228**	**40722**	**37195**	**36605.6**	**29705**	

Note: Q - Flow Q (m^3 / s), V - total volume (106m^3) *Source: "Romanian Waters" National Administration*

** - does not include the flow and volume of the river Tisa*

*** does not include the flow and volume of the Prut River (92.5 m^3 / s), this being a border watercourse*

Figure XII.35 - Water resources (volume 106 m3) of 2020, compared to the previous period (2015-2019)



Source: National Administration "Romanian Waters"

Romania's main water resource is ***inland rivers***. A basic feature of this category of resource is the very high variability in space:

- the mountain area, which brings half of the drained volume;
- variability of the average specific flow (1 l / s and km² in low areas, up to 40 l / s and km² in high areas).

Another characteristic is the very pronounced variability in time, so that in spring there are important floods, followed by prolonged droughts.

Danube, the second largest river in Europe (with a length of 2850 km, of which 1075 km in Romania) has an average stock at the entrance to the country of 174 x 109 m³

Groundwater resources consist of existing water deposits in groundwater aquifers and deep layers. The distribution of underground runoff varies over the large tectonic units in the country as follows:

- 0.5-1 l / s and km² in North Dobrogea;
- 0.5-2 l / s and km² in the Moldavian Plateau;
- 0.1-3 l / s and km² in the Transylvanian Depression and the Pannonian Depression;
- 0.1-5 l / s and km² in North Dobrogea and the Danube Platform;
- 5-20 l / s and km² in the Carpathian area, especially in the Southern Carpathians and in the karst areas of the Jiu and Cerna basins.

In 2020, ***the total raw water samples*** were 7.4 billion m³ of which:

- population 1,078 billion.m³
- industry 4,038 billion.m³
- agriculture 2.28 billion.m³

Water samples decreased from 7.96 billion m³ in 2000 to 7.4 billion m³ in 2020, due to:

- diminishing industrial activity;
- reducing water consumption in technological processes;
- loss reduction;
- application of the economic mechanism in water management.

For the year 2020, the requirement / sampling ratio for water resources is presented in *table XII.15*.

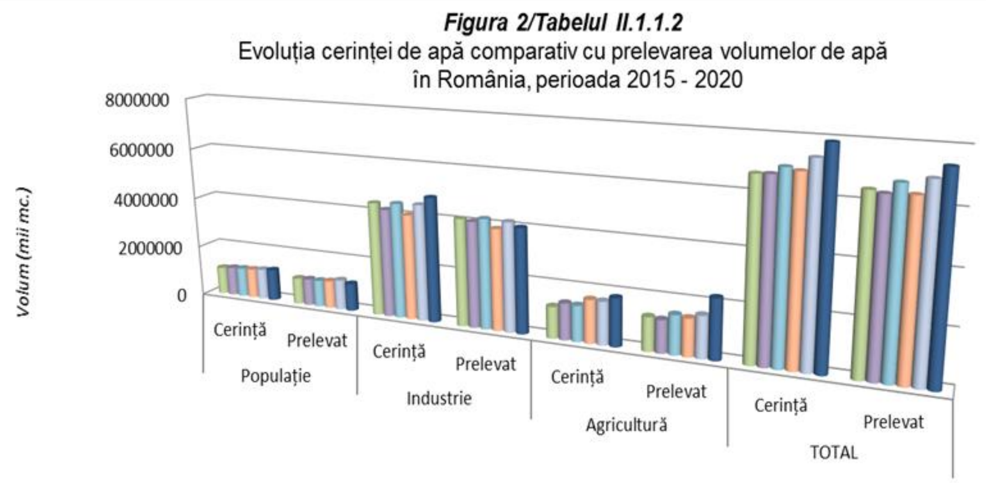
Table XII.15 - Requirement / sampling ratio for water resources in 2020

Water demand		Water samples		Degree of achievement
Activity	Value (mld.mc)	Activity	Value (mld.mc)	%
Population	1,235	Population	1,078	87.3%
Industry	4,835	Industry	4,038	83.5%
Agriculture	1,838	Agriculture	2.28	124.0%
Total	7.91	Total	7.40	93.5%

Source: National Administration "Romanian Waters"

Total water requirement for 2020 summed up 7,908,493 thousand cubic meters increasing by 538,233 thousand cubic meters compared to 2019 (7,370,260 thousand cubic meters). The actual water samples from direct sources, within the provided services, were of 7 396 183 thousand cubic meters, up by 421 326 thousand cubic meters compared to 2019, the year in which 6 974 857 thousand cubic meters of water were taken. ***At the current stage of hydrographic basin development, it was possible to ensure the water requirement of the users, both for surface and underground sources***.

Figure XII. 36 -The evolution of the water requirement compared to the sampling of water volumes (thousand m3) in Romania, 2015 - 2020, thousand m3



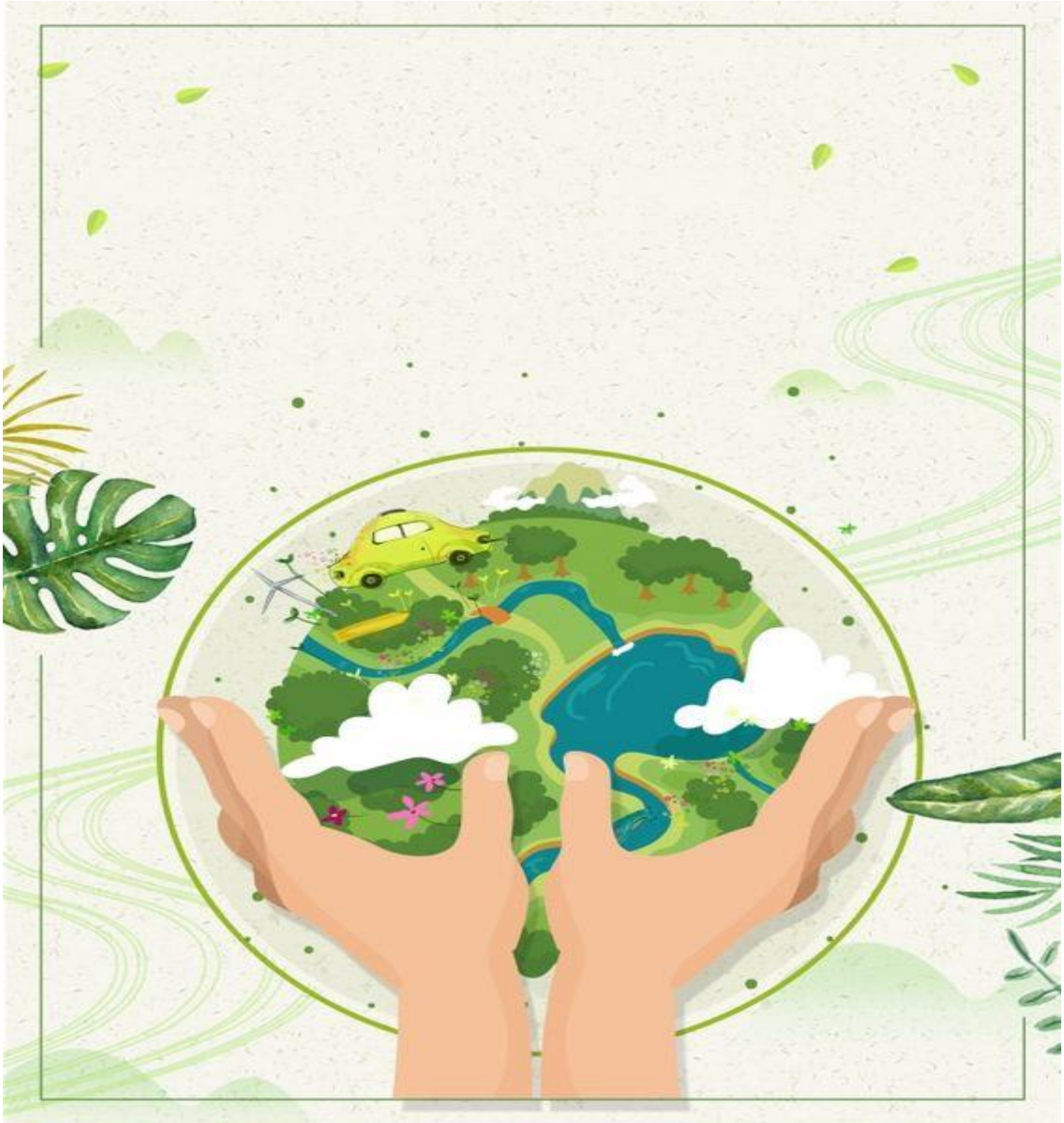
	Populație		Industrie		Agricultură		TOTAL	
	Cerință	Prelevat	Cerință	Prelevat	Cerință	Prelevat	Cerință	Prelevat
TOTAL 2015	1071781	1030359	4417586	4143764	1214169	1290744	6703536	6464867
TOTAL 2016	1121647	1051198	4202928	4079698	1402001	1242629	6726576	6373525
TOTAL 2017	1144860	1048212	4476586	4233686	1374173	1490750	6995619	6772648
TOTAL 2018	1160613	1084996	4078172	3904334	1657977	1426835	6896762	6416165
TOTAL 2019	1204288	1176540	4516858	4207395	1649114	1590922	7370260	6974857
TOTAL 2020	1234833	1077779	4835196	4038315	1838464	2280089	7908493	7396183

Source: National Administration "Romanian Waters"

Specialists from the National Institute of Hydrology and Water Management (NIHWM) show that the average annual flows of rivers will decrease by 20-30% between 2021-2050 and by 30-40% by 2071-2100. Changes in river flows require a number of adaptation measures to ensure water resources for the population, industry and agriculture. Thus, new criteria and techniques for the design of dams and constructions are needed, but also the elaboration of new procedures for the exploitation of water management systems that take into account the degree of uncertainty in the evolution of the hydrological regime.

National Environmental Protection Agency

INDICATORS REPORT 2020
SELECTIVE BIBLIOGRAPHY
GLOSSARY OF TERMS



SELECTIVE BIBLIOGRAPHY

I).PUBLICATIONS

- ***INSSE - Statistical databases - TEMPO-Online
- *** Statistical data, National Institute of Statistics (*http://www.insse.ro/cms/*)
- *** ICPA, Annual Reports on the State of Soils in Romania, ICPA Scientific Archive
- *** Masterplan "Protection and rehabilitation of the coastal area", September 2012
- *** MARSPLA-BS project, "Detailed studies for a complete analysis of the Romanian and Bulgarian maritime areas", 2017
- *** Project phase reports PN19260101 "Study of the dynamics of physical and hydro-geo-morphological processes in order to assess the risks and vulnerabilities of the marine and coastal area in the context of climate change and anthropogenic pressures"
- *** Internal reports INCDM "Grigore Antipa"
- *** Port Statistics, Maritime Ports Administration (*http://www.portofconstantza.com/apmc/portal/static.do?package_id=st_generale&x=load)*
- *** EMODNet Human activities *https://www.emodnet-humanactivities.eu/view-data.php*
- *** EMODNet Seabed Habitats *https://www.emodnet-seabedhabitats.eu/*
- *** National Institute of Statistics, Statistical Yearbook of Romania 2016/2017
- *** County offices for pedological and agrochemical studies, 2004-2008, Inventory on agricultural soil pollution and other processes that affect their quality status
- ***Activity report of the National Agency for Land Improvements for 2020(*https://www.anif.ro/wp-content/uploads/2021/02/Raport-de-activitate-2020.pdf*, accessed June 24, 2021)
- "Marine Research Journal", 2019
- "Green Cadastre of Bucharest - Register of Green Spaces", Bucharest City Hall
- "Treaty on ecological reconstruction of meadow habitats and degraded mountain lands", 2010, Teodor Marușca - coordinator
- Abaza, V., Dumitrache C., Spinu AD, and Filimon A., 2018. Ecological quality assessment of circalittoral broad habitats using M-AMBI * (n) index. Journal of Environmental Protection and Ecology, 19 (2): 564-572.
- Abboud-Abi Saab, M., 2008. Tintinnids of the Lebanese Coastal Waters (Eastern Mediterranean). CNRS-Lebanon / UNEP / MAP / RAC / SPA, 192 pp
- National Administration "Romanian Waters", report "Status of works for the treatment of urban wastewater and capacities in execution and commissioned for human settlements"
- Bojariu R, Bîrsan MV, Cică R, Velea L, Burcea S, Dumitrescu A, Dascălu SI, Gothard M, Dobrinescu A, Cărbunaru F, Marin L (2015) Climate change - from physical bases to risks and adaptation. Printech Publishing House, Bucharest. 200 p.
- Bojariu R, Gimeno L (2003) Predictability and numerical modeling of the North Atlantic Oscillation. Earth-Science Reviews, doi: 10.1016 / S0012-8252 (03) 00036-9.
- Bojariu R, Paliu D (2001) North Atlantic Oscillation projection on Romanian climate fluctuations in the cold season. Detecting and Modeling Regional Climate Change and Associated Impacts, M. Brunet and D. Lopez Eds., Springer-Verlag Berlin-Heidelberg, 345-356.
- Borja, Á., Mader, J., Muxika I., 2012. Instructions for the use of the AMBI index software (Version 5.0). Journal of Marine Research, AZTI-Tecnalia, 19 (3): 71-82
- Building on World Development Indicators, The World Bank (accessed 2021 - no data available for the period 2017 - 2020)
- Canarache, A., 1990, Physics of agricultural sites, Ceres Publishing House
- Clarke, KR, and Gorley, RN, 2015. Getting started with PRIMER v7. FIRST-E: Plymouth, Plymouth Marine Laboratory, 20 pp.

- CPA, 1988, Monitoring the quality of soils in Romania, vol. 2, pp. 253-258, Publistar Publishing House
- Diaconeasa D., 2009. Geodynamics of the Romanian Black Sea coast, University Publishing House
- Dulvy, NK, Metcalfe, JD, Glanville, J., Pawson, MG, Reynolds, JD, 2000. Fishery stability, local extinctions and shifts in community structure in skates. Conserv. Biol. 14: 283-293.
- Dumitru, M., Ciobanu, C. et al., 1999-2008, Phase reports on the Realization / updating of the National Soil-Land Monitoring System for Agriculture, ICPA Scientific Archive, Monitoring Works Database, ICPA
- Dumitru, M., Mashali, AM, Ciobanu, C. et al., 2000, Monitoring the quality of soils in Romania, GNP Publishing House - Bucharest, 54p + 24 maps (A3 format)
- Dumitru, M., Simota, C. et al., 2003, Code of good agricultural practices, Expert Publishing House, Bucharest
- Eurostat Energy Questionnaire - Oil
- **Eurostat**, statistical database.
- FAO, 2019. Monitoring the incidental catch of vulnerable species in Mediterranean and Black Sea fisheries: Methodology for data collection. FAO Fisheries and Aquaculture Technical Paper No. 640
- Extreme meteorological phenomena in Romania - implications on agriculture, 5th edition ICAR Forum
- Global Footprint Network National Footprint Accounts 2019
- Global Footprint Network National Footprint and Biocapacity Accounts 2019
- Hiddink, JG, Jennings, S., Kaiser, MJ, 2007. Assessing and predicting the relative ecological costs of disturbance to habitats with different sensitivities. J. Appl. Ecol. 44: 405-413.
- Hilborn, R., Quinn, TP, Schindler, DE, Rogers, DE, 2003. Biocomplexity and fisheries sustainability. Ecol. Monogr. 75: 3-36.
- INSE, Energy Balance 2019,*https://insse.ro/cms/ro/tags/balanta-energetica-si-structura-utilajului-energetic*
- INSP - "Development of the occupational medicine report model as a tool for standardized data collection on the health of workers at risk of exposure to carcinogens. Final report for 2020
- INSP - ReTox National Toxicological Information Registry. 2020 Report
- INSP - National synthesis on chemical and bacteriological risk assessment of foods for specific groups (2020)
- INSP - National synthesis "Development of the occupational medicine report model as a tool for standardized collection of data on the health of workers at risk of exposure to carcinogens lot 2. Final report for 2020"
- Jacob, D., et al., (2014) EURO-CORDEX: new high-resolution climate change projections for European impact research. Reg. Approx. Change, 14 (2), 563-578. DOI: 10.1007 / s10113-013-0499-2.
- Long, E., Macdonald, D., Smith, S., Calder, F., 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentration in Marine and Estuarine Sediments. Environmental Management. 19. 81-97. 10.1007 / BF02472006.
- LRTAP-RO 2021
- Methodology for elaborating pedological studies, part III, Ecopedological indicators, Bucharest, 1997, ICPA, Center for didactic material and agricultural propaganda
- Ministry of Agriculture, Forests and Rural Development, 1999-2018, Statistical data on the consumption of fertilizers, plant protection products, the evolution of agricultural arrangements, data on organic agriculture, etc.
- Ministry of Environment, Waters and Forests - National Waste Sludge Management Strategy - project POSM / 6 / AT / I.1.2010, "Development of the national sewage sludge management policy"
- Ministry of Environment, Waters and Forests - Romania's Fourth Biennial Report under the UNFCCC December 2020
- The official monitor of Romania, no. 303 bis, Order of the Minister of Waters, Forests and Environmental Protection no. 756/1997, pp. 27-29
- National Footprint Accounts 2020 edition (Data Year 2017)
- National Summary for Article 17 Romania - 2007-2012 by EC
- National_emission_projections_2019_Annex_IV
- Oros A., V. Coatu, D. Secrieru, D. Ţigănuş, D. Vasiliu, H. Atabay, C. Beken, L. Tolun, S. Moncheva, L. Bat, 2016. Results of the Assessment of the Western Black Sea Contamination Status in the Frame of the MISIS Joint Cruise. Marine Research Nr. 46: 61-81. ISSN 0250-3069, 2016.
- Palmer, WC (1965) Meteorological drought. Research Paper No. 45. US Weather Bureau. NOAA Library and Information Services Division, Washington, DC 20852.

- Peixoto JP Oort AH (1992) Physics of Climate, American Institute of Physics, New York, 520 pp.
- Petran, A., 1958 (b). Infusoria Class, in the Guide to the Fauna of the Black Sea and the Sea of Azov (Ed. Vodyanitskiy, VA), Naukova dumka, Kyiv, 21-34 (in Russian)
- RichirJ andGobertS., 2016. Trace Elements in Marine Environments: Occurrence, Threats and Monitoring with Special Focus on the Coastal Mediterranean. J Environ Anal Toxicol 2016, Vol 6 (1): 349.
- Romania's Informative Inventory Report 2021
- Saliot A., 2005. The Mediterranean Sea. The Handbook of Environmental Chemistry. Springer-Verlag, Berlin Heidelberg.
- Shiganova TA, Anninsky B., Finenko GA, Kamburska L., Mutlu E., Mihneva V., Stefanova K., 2015. Black Sea Monitoring Guidelines Macroplankton (Gelatinous plankton) *http://emblasproject.org/wp-content/uploads/2017/01/Macroplankton-findraft-March2015-PA3.pdf*
- Sigovini, M., Keppel, E., and Tagliapietra, D., 2013. M-AMBI revisited: looking inside a widely-used benthic index. Hydrobiology, 717 (1): 41-50.
- Spînu A., 2017. The lagoon shore of the Black Sea in the Perișor-Cap Midia sector. Study of coastal geomorphology ", Ex Ponto Publishing House, 148 pages.
- Spînu A., Diaconeasa D., Petrișoaia S., Pătrașcu V., Mihailov E., 2015. Preliminary results regarding beach behavior in the context of coastal protection works in Constanta-Mamaia sector, Proceedings "15th International Multidisciplinary Geoconference 2015", SGEM2015 Conference Proceedings, Book2 Vol 2: 1035-1042.
- Statistics of Forestry Activities in 2020 *https://insse.ro/cms/ro/content/statistica-activit%C4%83%C5%A3ilor-din-silvicultur%C4%83-%C3%AEn-anul-2020*
- Romania's energy strategy 2019 - 2030, with the perspective of 2050, http://energie.gov.ro/
- GfK Purchasing Power in Europe 2020 Study
- Tankere SPC, Muller FLL, Burton JD, Statham PJ, C.Guieu, Martin J.-M., 2001. Trace metal distributions in shelf waters of the northwestern Black Sea. Continental Shelf Research 21: 1501–1532.
- Thompson, GA & Alder, VA, 2005. Patterns in tintinnid species composition and abundance in relation to hydrological conditions of the southwestern Atlantic during austral spring, Aquat Microb Ecol,40: 85-101.
- Todorova, V., Abaza, V., Dumitrache, C., Todorov, E., Wolfram, G., and Salas Herrero, F., 2018. Coastal and Transitional Waters Black Sea Geographic Intercalibration Group. Benthic Invertebrate Fauna Ecological Assessment Methods, EUR, 29555.
- Treatise on the Geography of Romania vol. I, 1983
- Trenberth KE, Hoar TJ (1997) The Child and climate change. Geophysical Research Letters 24 (23): 3057-3060.
- UN Food and Agriculture Organization
- Verity, PG & Langdon, C., 1984. Relationships between lorica volume, carbon, nitrogen, and ATP content of tintinnids In Narragansett Bay, J. of Plankt. Research,6 (5): 859-868.
- Wells, N., Goddard, S., Hayes, M., (2004) A Self-Calibrating Palmer Drought Severity Index, J. Clim., 17, 2335-2351. DOI: 10.1175 / 1520-0442 (2004) 017 <2335: ASPDSI> 2.0.CO; 2
- WISE bathing water quality database (data from annual reports by EU Member States)
- Zhuang W, Gao X., 2014. Integrated Assessment of Heavy Metal Pollution in the Surface Sediments of the Laizhou Bay and the Coastal Waters of the Zhangzi Island, China: Comparison among Typical Marine Sediment Quality Indices. PLoS ONE 9 (4): e94145.*https://doi.org/10.1371/journal.pone.0094145*

II). LINKS

http://acm.eionet.europa.eu/download/spat_interp_aqmaps_shapesets/2014-aq-data/Supplementary_material_to_ETCACM_TP_2016_6.pdf
http://ananp.gov.ro/wp-content/uploads/Procedura-decizia-307-05.08.2020.pdf)
http://apepaduri.gov.ro/paduri/
http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=proj_15npms&lang=en
http://data.footprintnetwork.org/#/countryTrends?cn=183&type=BCpc,EFCpc
http://easin.jrc.ec.europa.eu/
http://ec.europa.eu/environment/nature/invasivealien/index_en.htm
http://ec.europa.eu/eurostat
http://ibis.anpm.ro
http://invazive.ccmesi.ro
http://iswim.rmri.ro/maps/maps1.shtml
http://prtr.anpm.ro
http://PSM-platform.rmri.ro/
http://PSM-platform.rmri.ro/marsplan.html.
http://statistici.insse.ro
http://statistici.insse.ro /shop/index.jsp?page=tempo3&lang=ro&ind=AGR 101A;
http://www.organic-world.net/statistics/statistics-data-tables/statistics-data-tables-excel.html
http://statistici.insse.ro/shop
http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=AGR101A
http://wwf.panda.org/
http://www.anpm.ro/debit-doza-gama
http://www.capital.ro/
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtmlhttp://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao.shtml
http://www.eea.europa.eu/data-and-maps/figures/illustration-of-the-level-of
http://www.ier.ro/documente/SPOS2006_ro/Spos2006_studiu_3_ro.
http://www.insse.ro
http://www.insse.ro (TEMPO_IND107A_14_8_2018)
http://www.insse.ro/cms/ro/comunicate-de-presa-view
http://www.insse.ro/cms/ro/content/produsul-intern-brut-date-anuale
http://www.marine-research-journal.org/index.php/cmrm
http://www.marsplan.ro/
http://www.marsplan.ro/en/238-about-marsplan-%E2%80%93-bs-project.html.
http://www.mmediu.ro/app/webroot/uploads/files/Ambrozia%20prezentare%20si%20combatere.pdf
http://www.mmediu.ro/categorie/comisie-deee/213
http://www.ms.ro/organizare/directia-generala-de-asistenta-medicala-si-sanatate-publica-2
http://www.ms.ro/wp-content/uploads/2017/02/Ape-de-imbaiere_2019.pdf
http://www.recensamantromania.ro
http://www.rivm.nl/thema/images/CCE08_Country_Romania_tcm61-41923.pdf
http://www.rmri.ro
http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/wwdr/wwdr4-2012/
https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nrg_ind_ren&lang=en
https://cdr.eionet.europa.eu/ro/eu/n2000/
https://earthobservatory.nasa.gov/images/147794/2020-tied-for-warmest-year-on-record

https://ec.europa.eu/environment/basics/green-economy/sustainable-development/index_en.htmhttps://ec.europa.eu/regional_policy/ro/policy/themes/urban-development/#
https://ec.europa.eu/environment/ecolabel/products-groups-and-criteria.html
https://ec.europa.eu/eurostat/web/energy/data/shares
https://en.unesco.org
https://en.unesco.org/biosphere/eu-na
https://industry.eea.europa.eu.
https://insp.gov.ro/sites/Biocide/public_html/html/home2019.html
https://insse.ro/cms/ro/tags/bilanturi-alimentare
https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf - Press release no.140 / 7 June 2021
https://insse.ro/cms/sites/default/files/com_presa/com_pdf/abf_2020r.pdf - Press release no.140 / 7 June 2021 "Domain: Standard of living"
https://insse.ro/cms/sites/default/files/field/publicatii/transportul_de_pasageri_si_marfuri_pe_moduri_de_transport_in_anul_2020.pdf
https://rowater.ro/despre-noi/descrierea-activitatii/managementul-european-integrat-resurse-de-apa/planurile-de-management-ale-bazinelor-hidrografice/planuri-de-management-nationale
https://rowater.ro/wp-content/uploads/2020/12/Planul-National-de-Management-actualizat.pdf
https://statistici.insse.ro
https://wwf.ro/noutati/comunicate-de-presa)
https://www.eea.europa.eu/data-and-maps/daviz/exposure-of-agricultural-area-to-4#tab-chart_10
https://www.eea.europa.eu/data-and-maps/daviz/exposure-of-forest-area-to-7#tab-chart_2
https://www.eea.europa.eu/data-and-maps/daviz/water-exploitation-index-plus#tab-chart_3
https://www.eea.europa.eu/data-and-maps/figures/rural-concentration-map-of-the-ozone-indicator-aot40-for-crops-year-14/120149-map11-1- rural-concentration.eps / image_large
https://www.eea.europa.eu/data-and-maps/figures/rural-concentration-of-the-ozone-6/120150-map11-2-rural-concentration.eps/image_large
https://www.eea.europa.eu/data-and-maps/indicators/atmospheric-greenhouse-gas-concentrations-7/assessment
https://www.eea.europa.eu/ro/pressroom/infografica/schimbarile-climatice-si-agricultura/view
https://www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-17-national-summary-dashboards
https://www.facebook.com/INCDM
https://www.facebook.com/profile.php?id=100057171861586
https://www.icpdr.org/main/public-participation-interim-overview-swmi
https://www.PSM-platform.eu/
https://www.ramsar.org/wetland/romania
https://www.researchgate.net/publication/301602561_AMPRENTA_ECOLOGICA_-_Metode_de_Evaluare_si_Analiza
https://www.viitorplus.ro/Sustenabilitatea-noastr-71
https://www.worldometers.info/world-population/romania-population/
www.inpcp.ro
www.madr.ro/agricultura-ecologica/dinamica-operatorilor-si-a-suprafetelor-in-agricultura-ecologica.html
www.marsplan.ro/en
www.mmediu.ro
www.mt.ro
www.nodc.ro
www.pmb.ro
www.rowater.ro
www.sor.ro
www.wunderground.com

III). LEGISLATION

- *Commission Directive (EU) 2015/996 of 19 May 2015* establishing common methods of noise assessment in accordance with Directive 2002/49 / EC of the European Parliament and of the Council
- *Directive (EU) 2016/2284 of the European Parliament and of the Council of 14 December 2016* on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35 / EC and repealing Directive 2001/81 / EC
- *Directive 1999/13 / EC* on the reduction of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations
- *Directive 2000/60 / EC* of the European Parliament and of the Council on the establishment of a framework for Community action in the field of water policy
- *Directive 2000/76 / EC* on waste incineration
- *Directive 2001/80 / EC (LCP)* on the limitation of emissions of certain pollutants into the air from large combustion plants (LCPs)
- *Directive 2003/87 / EC of the European Parliament and of the Council of 13 October 2003*establishing a system for the trading of greenhouse gas emission allowances in the Community and amending Council Directive 96/61 / EC
- *Directive 2004/107 / EC* of the European Parliament and of the Council on arsenic, cadmium, mercury, nickel, polycyclic aromatic hydrocarbons in ambient air
- *Directive 2004/37 / EC of the European Parliament and of the Council of 29 April 2004*on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth Special Directive within the meaning of Article 16 (1) of Council Directive 89/391 / EEC
- *Directive 2006/11 / EC of the European Parliament and of the Council of 15 February 2006*on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community
- *Directive 2006/118 / EC of the European Parliament and of the Council of 12 December*2006 on the protection of groundwater against pollution and damage
- *Directive 2007/60 / EC* of the European Parliament and of the Council of 23 October 2007 on the assessment and management of floods
- *Directive 2008/1 / EC* on Integrated Pollution Prevention and Control (IPPC)
- *Directive 2008/105 / EC of the European Parliament and of the Council of 16 December 2008*on environmental quality standards in the field of water, amending and repealing Council Directives 82/176 / EEC, 83/513 / EEC, 84/156 / EEC, 84/491 / EEC, 86/280 / EEC and amendment of Directive 2000/60 / EC
- *Directive 2008/50 / EC* of the European Parliament and of the Council on ambient air quality and cleaner air for Europe
- *Directive 2008/56 / EC of the European Parliament and of the Council of 17 June 2008*establishing a framework for Community action in the field of marine policy (Marine Strategy Framework Directive)
- *Directive 2008/98 / EC of the European Parliament and of the Council of 19 November 2008*on waste and repealing certain Directives
- *Directive 2010/75 / EU*on industrial emissions (FDI)
- *Directive 2012/18 / EU of the European Parliament and of the Council of 4 July 2012*on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82 / EC
- *Directive 2013/39 / EU of the European Parliament and of the Council of 12 August 2013* amending Directives 2000/60 / EC and 2008/105 / EC as regards priority substances in the field of water policy
- *Directive 78/176 / EC* on waste from the titanium dioxide industry
- *Directive 82/883 / EC* on the methods of surveillance and control of areas where titanium dioxide emissions are present
- *Directive 91/271 / EEC of 21 May 1991*on urban wastewater treatment
- *Council Directive 91/676 / EEC of 12 December 1991*on the protection of waters against pollution caused by nitrates from agricultural sources
- *Directive 92/112 / EC* on procedures for the harmonization of programs for the reduction of pollution caused by waste from the titanium dioxide industry
- *Directive 92/43 / EEC* Decision of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

- *Directive 94/63 / EC of the European Parliament and of the Council of 20 December 1994*on the control of emissions of volatile organic compounds (VOCs) from fuel storage and distribution from terminals to service stations
- *Commission Directive 98/15 / EC of 27 February 1998*amending Council Directive 91/271 / EEC as regards certain requirements set out in Annex I
- *Council Directive 98/24 / EC of 7 April 1998*on the protection of the health and safety of workers from the risks related to the presence of chemical agents at work
- *Directive 98/83 / EEC* of the European Council on the quality of water intended for human consumption
- *Council Directive of 27 July 1990*amending Annex II to Directive 86/280 / EEC on limit values and quality objectives for discharges of certain dangerous substances included in List I of the Annex to Directive 76/464 / EEC
- *European Council Directive 79/409 / EEC* on the protection of wild birds
- *European Council Directive 80/68 / EEC* on the protection of groundwater against pollution caused by certain dangerous substances
- *Government Decision no. 780/2006 of June 14, 2006* on the establishment of the scheme for the marketing of greenhouse gas emission allowances, as subsequently amended and supplemented
- *Government Decision no. 1015/2004 of June 25, 2004* on the approval of the Regulation on the organization and functioning of the National Coastal Area Committee, as subsequently amended and supplemented
- *Government Decision no. 1048 of December 11, 2013 for the approval of the Management Plan and the Regulation of the Iron Gates Natural Park*
- *Government Decision no. 1066* of October 20, 2010 on the establishment of the protected natural area regime on some areas of the "Danube Delta" Biosphere Reserve and their classification in the category of scientific reservations
- *Government Decision no. 1074 of December 11, 2013* for the approval of the Management Plan of the Măcinului Mountains National Park
- *Government Decision no. 1096/2013 of December 11, 2013* for the approval of the mechanism for the transitional free allocation of greenhouse gas emission allowances to electricity producers for the period 2013-2020, including the National Investment Plan, as subsequently amended and supplemented
- *Government Decision no. 1143* of September 18, 2007 on the establishment of new protected natural areas
- *Government Decision no. 1217* of December 2, 2010 on the establishment of the protected natural area regime for the Cefa Natural Park
- *Government Decision no. 135/2019* for the approval of the National Action Plan on reducing the risks associated with the use of plant protection products
- *Government Decision no. 140/2008* on the establishment of measures for the application of the provisions of Regulation (EC) of the European Parliament and of the Council no. 166/2006 on the establishment of the European Register of Emitted and Transferred Pollutants and amending Council Directives 91/689 / EEC and 96/61 / EC
- *Government Decision no. 148/2020 of 20 February 2020* on the approval of the method of determination and calculation of the ecological flow
- *Government Decision no. 1570/2007 of 19 December 2007* on the establishment of the National System for Estimating Anthropogenic Emissions from Sources or Seizure Detections of All Greenhouse Gases, Regulated by the Kyoto Protocol, as subsequently amended and supplemented
- *Government Decision no. 1581* of 8 December 2005 on the establishment of the protected natural area regime for new areas
- *Government Decision no. 166/2019 of March 29, 2019* for the approval of the revenue and expenditure budget for 2019 of the Environment Fund and of the Administration of the Environment Fund, as subsequently amended and supplemented
- *Government Decision no. 170/2004* on the management of used tires
- *Government Decision no. 188 of 28 February* 2002 for the approval of some norms regarding the conditions for discharging wastewater into the aquatic environment
- *Government Decision no. 191/2018 of April 4, 2018* for the approval of the National Strategy in the field of occupational safety and health for the period 2018 - 2020

- *Government Decision no. 201 of 28 February 2002* for the approval of the Technical Norms regarding the water quality for molluscs
- *Government Decision no. 2151* of 30 November 2004 on the establishment of the protected natural area regime for new areas
- Government Decision no. 322/2013 of 29 May 2013 on restrictions on the use of certain hazardous substances in electrical and electronic equipment, as subsequently amended and supplemented
- *Government Decision no. 335/2019 of May 30, 2019* for the approval of the revenue and expenditure budget for 2019 of the Environment Fund and of the Administration of the Environment Fund, rectified
- *Government Decision no. 349/2016* on the declaration of the natural area "Accumulare Văcărești" as a natural park and the establishment of the protected natural area regime
- *Government Decision no. 352 of April 21, 2005* on amending and supplementing Government Decision no. 188/2002 for the approval of some norms regarding the conditions for discharging wastewater into the aquatic environment
- *Government Decision no. 398/2010 of April 21, 2010* on the establishment of measures for the application of the provisions of Regulation (EC) no. Regulation (EC) No 1.272 / 2008 of the European Parliament and of the Council of 16 December 2008 on the classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548 / EEC and 1.999 / 45 / EC and amending Regulation (CE) no. 1,907 / 2006, with subsequent amendments and completions
- *Government Decision no. 415/2019 of June 20, 2019* for the approval of the revenue and expenditure budget for 2019 of the Environment Fund and of the Administration of the Environment Fund, rectified
- *Government Decision no. 458/2019 of July 3, 2019*for the approval of the revenue and expenditure budget for 2019 of the Environment Fund and of the Administration of the Environment Fund, rectified
- *Government Decision no. 459 of May 16, 2002*on the approval of water quality standards in natural areas designed for bathing, as subsequently amended and supplemented
- *Government Decision no. 467 of April 12, 2006* for the modification of the Technical Norms regarding the water quality for mollusks, approved by the Government Decision no. 201/2002
- *Government Decision no. 526/2020 of July 9, 2020* for the modification and completion of article 6 of the Regulation on the organization and functioning of the National Committee of the coastal zone, approved by the Government Decision no. 1,015/2004
- *Government Decision no. 538 of May 18, 2011* for the approval of the Management Plan of the Balta Mică Natural Park of Brăila
- *Government Decision no. 546 of May 21, 2008* on the management of bathing water quality, as subsequently amended and supplemented
- *Government Decision no. 570/2016 of August 10, 2016* on the approval of the Program for the phase-out of discharges, emissions and losses of priority hazardous substances and other measures for major pollutants
- *Government Decision no. 587/2021 of May 27, 2021* for the amendment and completion of the annex to the Government Decision no. 964/2000 on the approval of the Action Plan for the protection of waters against pollution caused by nitrates from agricultural sources
- *Government Decision no. 617/2014 of July 23, 2014* on the establishment of the institutional framework and measures for the implementation of Regulation (EU) no. Regulation (EC) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products, as subsequently amended and supplemented
- *Government Decision no. 661 of June 29, 2011* on the establishment of measures to ensure the application at national level of the provisions of Regulation (EC) no. 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel
- *Government Decision no. 683/2015 of 19 August 2015* on the approval of the National Strategy and the National Plan for the Management of Contaminated Sites in Romania, with subsequent amendments and completions
- *Government Decision no. 707/2018* for the approval of the Methodological Norms for the application of Law no. 62/2018 on the control of ragweed weeds

- *Government Decision no. 735 of June 7, 2006* on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints, varnishes and vehicle surface refinishing products, as subsequently amended and supplemented
- *Government Decision no. 739/2016 of October 5, 2016* for the approval of the National Strategy on Climate Change and Growth based on low carbon for the period 2016 - 2020 and the National Action Plan for the implementation of the National Strategy on Climate Change and Growth based on low carbon for the period 2016 - 2020
- *Government Decision no. 749 of May 14, 2004* on establishing the responsibilities, criteria and manner of delimitation of the strip of land in the immediate vicinity of the coastal zone, in order to preserve the environmental conditions and the patrimonial and landscape value of the areas located near the shore
- *Government Decision no. 793/2016 of October 26, 2016* for the approval of the National Program for the rehabilitation of the main irrigation infrastructure in Romania, with subsequent amendments and completions
- *Government Decision no. 80 of January 26, 2011* for the approval of the National Management Plan afferent to the part of the international hydrographic basin of the Danube river which is included in the Romanian territory
- *Government Decision no. 83/2019 of February 15, 2019* on the establishment and functioning of the National Register of health risks in relation to environmental factors
- *Government Decision no. 846 of August 11, 2010* for the approval of the National Strategy for medium and long term flood risk management
- *Government Decision no. 859/2016 of 16 November 2016* for the approval of the updated National Management Plan related to the part of the international river basin of the Danube river that is included in the Romanian territory
- *Government Decision no. 876 of August 1, 2007* for establishing and sanctioning the contraventions to the naval transport regime, with the subsequent modifications and completions
- *Government Decision no. 942/2017 of December 20, 2017* on the approval of the National Waste Management Plan
- *Government Decision no. 964/2000 of 13 October 2000* on the approval of the Action Plan for the Protection of Waters against Pollution from Nitrates from Agricultural Sources, as subsequently amended and supplemented
- *Government Decision no. 972/2016 of December 21, 2016* for the approval of the flood risk management plans related to the 11 water basin administrations and the Danube river on the Romanian territory
- *Law no. 1/2000 of January 11, 2000* for the reconstitution of the property right over the agricultural and forest lands
- *Law no. 104/2011* on ambient air quality, as subsequently amended and supplemented
- *Law no. 107/1996 of September 25*1996 - Water Law, as subsequently amended and supplemented
- *Law no. 17/1990 of 7 August 1990 *** Republished*on the legal regime of inland maritime waters, the territorial sea, the contiguous zone and the exclusive economic zone of Romania, with subsequent amendments and completions
- *Law no. 205 of June 27, 2013* for the amendment of the Government Emergency Ordinance no. 71/2010 on establishing the strategy for the marine environment
- *Law no. 220/2019 of 15 November 2019* on amending and supplementing some normative acts in the field of environmental protection
- *Law no. 24 of May 6, 1994* for ratification of the United Nations Framework Convention on Climate Change, signed at Rio de Janeiro on 5 June 1992
- *Law no. 264/2017 of December 20, 2017* on the establishment of technical requirements for the limitation of emissions of volatile organic compounds (VOCs) resulting from the storage of petrol and its distribution from terminals to service stations, as well as during refueling of vehicles at service stations
- *Law no. 278/2013* on industrial emissions, as subsequently amended and supplemented
- *Law no. 280 of June 24, 2003* for the approval of the Government Emergency Ordinance no. 202/2002 on integrated coastal zone management
- *Law no. 3 of February 2, 2001* for the ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, adopted on 11 December 1997
- *Law no. 326 of December 3, 2013* on the approval of the Government Emergency Ordinance no. 60/2013 for completing art. 4 para. (1) of Law no. 349/2007 on the reorganization of the institutional framework in the field of chemicals management
- *Law no. 46/2008 - Forestry Code*, republished, as subsequently amended and supplemented

- *Law no. 49 of April 7, 2011* for the approval of the Government Emergency Ordinance no. 57/2007 on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna
- *Law no. 5 of January 25, 1991* for Romania's accession to the Convention on Wetlands of International Importance, in particular as Waterfowl Habitat
- *Law no. 5/2000 of 6 March 2000* on the approval of the National Spatial Planning Plan, with subsequent amendments and completions
- *Law no. 6 of March 1, 2011* for the approval of the Government Emergency Ordinance no. 71/2010 on establishing the strategy for the marine environment
- *Law no. 62/2018* on weed control
- *Law no. 74/2019* on the management of potentially contaminated and contaminated sites
- *Order of the Minister of Agriculture and Rural Development no. 895 of August 19, 2016* for the approval of the rules on the organization of the inspection and certification system, of the approval of inspection and certification bodies / control bodies and of the supervision of the activity of control bodies in organic farming, as subsequently amended and supplemented
- *Order of the Minister of Agriculture and Rural Development, of the Minister of Environment and of the Minister of Health no. 1356/1343/2018/51/2019* on the system of training and certification for the sustainable use of plant protection products, as subsequently amended and supplemented
- *Order of the Minister of Waters, Forests and Environmental Protection, no. 756 of November 3, 1997* for the approval of the Regulation on environmental pollution assessment
- *Order of the Minister of Environment and Sustainable Development No. 1474 of November 18, 2008* for the approval of the Procedure regarding the processing, archiving and storage of data specific to the National Inventory of Greenhouse Gas Emissions (INEGES)
- *Order of the Minister of Environment and Sustainable Development no. 1376 of October 29, 2008* on the approval of the Procedure for the Reporting of the National Inventory of Greenhouse Gas Emissions (INEGES), as well as the manner of answering the observations and questions arising from the INEGES review process
- *Order of the Minister of Environment and Forests no. 3299/2012* for the approval of the methodology for conducting and reporting inventories on emissions of pollutants into the atmosphere
- *Order of the Minister of Environment and Climate Change no. 1442 of 18 August 2014* on the approval of the procedure for selecting the estimation methods and emission factors necessary for estimating the level of greenhouse gas emissions
- *Order of the Minister of Environment and Climate Change no. 1602 of September 19, 2014* for the approval of the Plan on quality assurance and control (QA / QC) of the National Inventory of Greenhouse Gas Emissions
- *Order of the Minister of Environment, Waters and Forests no. 1060/2016* on the approval of the Management Plan and the Regulation of the Cozia National Park and of the Natura 2000 sites in its area ROSCI0046 Cozia and ROSPA0025 Cozia - Buila - Vânturarița
- *Order of the Minister of Environment, Waters and Forests no. 1121/2016* on the approval of the Management Plan and the Regulation of the Domogled National Park - Cerna Valley and of the Natura 2000 sites ROSCI0069 and ROSPA0035
- *Order of the Minister of Environment, Waters and Forests no. 1151/2016* on the approval of the Management Plan and the Regulation of the Buila-Vânturarița National Park, of the Natura 2000 sites ROSCI0015 Buila - Vânturarița, ROSPA0025 Cozia-Buila-Vânturarița and of the protected natural areas included in them
- *Order of the Minister of Environment, Waters and Forests no. 1157/2016* on the approval of the Management Plan and the Regulation of the Maramureș Mountains Natural Park, of the site of community importance ROSCI0124 Maramureș Mountains, of the special avifauna protection area ROSPA0131 Maramureș Mountains and of the overlapping protected natural areas of national interest
- *Order of the Minister of Environment, Waters and Forests no. 1224/2016* regarding the approval of the Management Plan and of the Regulation of the Lunca Mureșului Natural Park
- *Order of the Minister of Environment, Waters and Forests no. 1246/2016* on the approval of the Management Plan and the Regulation of the Vânători Neamț Natural Park and of the Natura 2000 sites ROSCI0270 Vânători Neamț and ROSPA0107 Vânători Neamț

- *Order of the Minister of Environment, Waters and Forests no. 1523/2016* on the approval of the Management Plan and the Regulation of the Cheile Bicazului - Hășmaș National Park and of the Natura 2000 sites ROSCI0027 and ROSPA0018 Cheile Bicazului - Hășmaș
- *Order of the Minister of Environment, Waters and Forests no. 1642/2016* on the approval of the Management Plan and the Regulation of the Cheile Nerei - Beușnița National Park and of the Natura 2000 sites ROSCI0031 Cheile Nerei - Beușnița and ROSPA0020 Cheile Nerei - Beușnița
- *Order of the Minister of Environment, Waters and Forests no. 296/21 February 2020* on the approval of the Management Plan and the Regulation of the Piatra Craiului National Park and of the Natura 2000 site ROSCI0194 Piatra Craiului
- *Order of the Minister of Public Health no. 1808 of October 17, 2007*on the establishment of regional antitoxic centers for children
- *Order of the Minister of Health, of the Minister of Environment and Forests and of the President of the National Sanitary Veterinary and Food Safety Authority no. 10/368/11/2010,* on the approval of the procedure for the approval of biocidal products which are made available on the market in Romania, with subsequent amendments and completions
- *Order of the Deputy Prime Minister, Minister of Environment no. 307/2019* on the approval of the Management Plan and the Regulation of the Rodna Mountains National Park, of the ROSCI0125 Rodna Mountains, of the ROSPA0085 Rodna Mountains and of the other protected natural areas of national interest included
- *Order of Deputy Prime Minister, Minister of Environment, and Minister of Public Finance no. 1214/3729/2018 of November 15, 2018* on the modalities for controlling the export and import of chemicals that present a risk, as well as the modalities of collaboration between the authorities, according to the Government Decision no. 770/2016 on some measures for the application of Regulation (EU) no. Regulation (EC) No 649/2012 of the European Parliament and of the Council of 4 July 2012 on the export and import of hazardous chemicals
- *Order of the Minister of Environment and Forests no. 1978/2010* on the approval of the Regulation on the organization and functioning of the National Network for Environmental Radioactivity Surveillance
- *Government Emergency Ordinance no. 19/2006 of 22 February 2006* on the use and control of the Black Sea beach*activities carried out on the beach, with subsequent amendments and completions*
- *Government Emergency Ordinance no. 195/2005 of December 22, 2005* on environmental protection, as subsequently amended and supplemented
- *Government Emergency Ordinance no. 196/2005 of 22 December 2005* on the Environment Fund, as subsequently amended and supplemented
- *Government Emergency Ordinance no. 202 of December 18, 2002* on integrated coastal zone management, as subsequently amended and supplemented
- *Government Emergency Ordinance no. 34/2000 of 17 April 2000 on* organic agri-food products, as subsequently amended and supplemented
- *Government Emergency Ordinance no. 5/2015 of April 2, 2015* on waste electrical and electronic equipment, as subsequently amended and supplemented
- *Government Emergency Ordinance no. 52/2017 of 4 August 2017* on the refund of sums representing the special tax on cars and motor vehicles, the pollution tax on motor vehicles, the tax on polluting emissions from motor vehicles and the environmental stamp on motor vehicles, as subsequently amended and supplemented
- *Government Emergency Ordinance no. 57/2007 of June 20, 2007* on the regime of protected natural areas, conservation of natural habitats, of wild flora and fauna, as subsequently amended and supplemented
- *Government Emergency Ordinance no. 71/2010 of 30 June 2010* on the establishment of the Marine Strategy, as subsequently amended and supplemented
- *Government Emergency Ordinance no. 92/2021 of 19 August 2021* on the waste regime
- *Government Ordinance no. 18/2016 of 24 August 2016* on the arrangement of the maritime space
- *Regulation (EC) no. 1005/2009 of the European Parliament and of the Council of 16 September 2009* on substances that deplete the ozone layer
- *Regulation (EC) no. Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November 2009* on cosmetics

- *Regulation (EC) no. 1272/2008 of the European Parliament and of the Council of 16 December 2008* on the classification, labeling and packaging of substances and mixtures, amending and repealing Directives 67/548 / EEC and 1999/45 / EC and amending Regulation (EC) No 1234/2007 1907/2006
- *Regulation (EC) no. 166/2006* of the European Parliament and of the Council on the establishment of the European Register of Emitted and Transferred Pollutants
- *Regulation (EC) no. Commission Regulation (EC) No 1881/2006 of 19 December 2006* setting maximum levels for certain contaminants in foodstuffs
- *Regulation (EC) no. Regulation (EC) No 1882/2003 of the European Parliament and of the Council of 29 September 2003* adapting to Council Decision 1999/468 / EC the provisions relating to committees assisting the Commission in the exercise of implementing powers provided for in acts subject to the procedure referred to in Article 251 of the EC Treaty
- *Regulation (EC) no. 1907/2006 (REACH)* on the registration, evaluation, authorization and restriction of chemicals (REACH), establishing the European Chemicals Agency, amending Directive 1999/45 / EC and repealing Council Regulation (EEC) No 793/93 and Regulation (EC) No 1448/94 of the Commission, as well as Council Directive 76/769 / EEC and Commission Directives 91/155 / EEC, 93/67 / EEC, 93/105 / EC and 2000/21 / EC
- *Regulation (EC) no. Council Regulation (EC) No 338/97 of 9 December 1996* on the protection of species of wild fauna and flora by controlling trade therein
- *Regulation (EC) no. Council Regulation (EC) No 834/2007 of 28 June 2007* on organic production and labeling of organic products, and repealing Regulation (EEC) No 2454/93 2092/91.
- *Regulation (EC) no. Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004* laying down specific rules for the organization of official controls on products of animal origin intended for human consumption
- *Regulation (EEC) no. Council Regulation (EEC) No 3528/86 of 17 November 1986* on the protection of the forests of the Community against air pollution
- *Regulation (EU) no. 10/2011* for plastics and articles intended to come into contact with food, from the point of view of the supply chain
- *Regulation (EU) 2019/1010* of the European Parliament and of the Council of 5 June 2019 on the alignment of reporting obligations in the field of environmental legislation and amending Regulations (EC) no. 166/2006 and (EU) no. 995/2010 of the European Parliament and of the Council, Directives 2002/49 / EC, 2004/35 / EC, 2007/2 / EC, 2009/147 / EC and 2010/63 / EU of the European Parliament and of the Council, Regulations (EC) no. 338/97 and (EC) no. Council Regulation (EC) No 2173/2005 and Council Directive 86/278 / EEC
- *Council Regulation (EU) 2019/2236 of 16 December 2019 establishing for 2020,* of fishing opportunities for certain fish stocks and groups of fish stocks applicable in the Mediterranean Sea and the Black Sea
- *Regulation (EU) 2020/741 of the European Parliament and of the Council of 25 May 2020* on minimum requirements for water reuse
- *Regulation (EU) no. 528/2012 of the European Parliament and of the Council of 22 May 2012* on the making available on the market and use of biocidal products
- *Regulation 850/2004 / EC of the European Parliament and of the Council of 29 April 2004 on Persistent Organic Pollutants and amending Directive 79/117 / EEC*
- *EC Regulation no. 1143/2014* on the prevention and management of the introduction and spread of invasive alien species
- *Commission Implementing Regulation (EU) 2019/627 of 15 March 2019* laying down uniform practical arrangements for carrying out official controls on products of animal origin intended for human consumption in accordance with Regulation (EU) 2017/625 of the European Parliament and of the Council and amending Regulation (EC) No 1782/2003 Commission Regulation (EC) No 2074/2005 as regards official controls
- *European Union Regulation no. 525/2013* on a mechanism for monitoring and reporting greenhouse gas emissions, as well as for reporting, at national and Union level, other information relevant to climate change and repealing Decision no. 280/2004 / CE
- *Regulation (EC) no. 66/2010 of the European Parliament and of the Council of 25 November 2009* on the EU Ecolabel
- *Regulation (EU) no. 517/2014 of the European Parliament and of the Council of 16 April 2014* on fluorinated greenhouse gases and repealing Regulation (EC) No. 842/2006

- *Regulation (EU) no. 649/2012 of the European Parliament and of the Council of 4 July 2012* on the export and import of hazardous chemicals
- *National Health Strategy 2014-2020, Decision no. 1082/2013 / EU of the European Parliament and of the Council of 22 October 2013 on serious cross-border threats to health and repealing Decision no. 2119/98 / EC*

GLOSSARY OF TERMS

AEM/EEA- European Environment Agency;
APM/EPA- Environmental Protection Agency;
NEPA- National Environmental Protection Agency;
polluting activity -any activity that causes negative changes regarding the natural characteristics of the quality of the geological environment;
Ambient air -tropospheric air, excluding workplace air;
Ecological accident- event produced as a result of large and unforeseen discharges / emissions of dangerous / polluting substances or preparations, in the form of vapors or energy resulting from uncontrolled / sudden anthropogenic activities, which damage or destroy natural and anthropogenic ecosystems;
Regulatory acts- environmental advice, Natura 2000 opinion, environmental agreement, import / export agreement for non-CITES plants and / or wildlife, CITES permit, import agreement for genetically modified organisms, integrated environmental authorization / authorization, authorization for activities with genetically modified organisms;
Environmental agreement- technical-legal act by which the conditions for carrying out the project are established, from the point of view of environmental protection; the environmental agreement represents the decision of the competent authority for environmental protection, which entitles the project owner to carry out the project from the point of view of environmental protection;
Adaptation- the ability of natural and anthropogenic systems to respond to the effects of climate change, including climate variability and extreme weather events, in order to reduce potential damage, seize opportunities or cope with the consequences of climate change;
Agglomeration- area representing a conurbation with a population of over 250,000 inhabitants or, where the population is less than or equal to 250,000 inhabitants, having a population density per km2 greater than 3,000 inhabitants;
Location of urban fund- the places in urban areas where the levels are representative for the exposure, in general, of the urban population;
Coastal waters: surface waters located within a line whose points are located entirely at a distance of 1 nautical mile on the seaward side, from the nearest point of the baseline, from which the extent of territorial waters is measured, with the extension of the limit , where applicable, up to the outer limit of the waters
transients.
Surface water: inland waters with the exception of groundwater; transitional waters and coastal waters, except in the case of the chemical status for which the waters are to be included
territorial.
Inland waters: all standing and running surface water and groundwater inside the baseline, from which the extent of territorial waters is measured.
Groundwater: waters below the surface of the soil in the saturated zone and in direct contact with the ground or subsoil.
Transient waters: surface water bodies in the vicinity of river mouths, which are partly saline as a result of the proximity of coastal waters, but which are strongly influenced by freshwater streams.
Residual water -wastewater, resulting from industrial / technological processes or household activities, which contains various impurities or harmful toxic substances, pathogenic microorganisms, etc.
Area / site- geographically defined area exactly delimited;
Protected natural area- terrestrial, aquatic and / or underground area, with a legally established perimeter and having a special protection and conservation regime, in which there are species of wild plants and animals, biogeographical, landscape, geological, paleontological, speleological or other elements and formations , with special ecological, scientific or cultural value;
Arsenic, cadmium, nickel and benzo (a) pyreneof PM10 - the total amount of these elements and their compounds contained in the PM10 fraction;

Environment authorization- technical-legal act issued by the competent authorities for environmental protection, which establishes the conditions and / or parameters for the operation of an existing activity or a new activity with a possible significant impact on the environment, necessary for its commissioning;
Integrated environmental permit- technical-legal act issued by the competent authorities, according to the legal provisions in force regarding the integrated prevention and control of pollution;
Competent authority for environmental protection- the central public authority for environmental protection, the National Agency for Environmental Protection or, as the case may be, the territorial public authorities for environmental protection, respectively the regional agencies for environmental protection, the county agencies for environmental protection, the "Danube Delta" Biosphere Reserve Administration and the National Guard Environment and its subordinate structures;
Environment approval- the administrative act issued by the competent authority for environmental protection, which confirms the integration of the environmental protection aspects in the plan or program subject to adoption;
Bio= biological elements;
G= (ecological status) good;
R B= river basin;
Environmental balance- work prepared by natural or legal persons certified according to law, in order to obtain the approval for establishing environmental obligations or environmental authorization, and containing the elements of technical analysis to obtain information on the causes and consequences of cumulative negative effects, previous, present and anticipated activity, in order to quantify the actual environmental impact of a site; if a significant impact is identified, the balance shall be supplemented by a risk assessment study;
biodiversity- the variability of organisms within terrestrial, marine, continental aquatic ecosystems and ecological complexes; this includes intraspecific, interspecific diversity and ecosystem diversity;
Biosafety-all measures taken to reduce or eliminate potential risks that may arise as a consequence of the use of genetically modified organisms, which could have adverse effects on human health and on the conservation and sustainable use of biological diversity;
Biotechnology -technological application in which biological systems, living organisms, their components or derivatives are used, for the realization or modification of products or processes with specific use;
WB= Water body;
AWB= artificial water body;
HMWB= heavily modified body of water;
MPC= Maximum Permissible Concentration.
The best techniques available- the most advanced and efficient stage of development in the development of an activity and the modes of operation, which demonstrates the practical possibility of being the reference for setting emission limit values for the purpose of prevention, and if this is not possible, for to reduce overall emissions and environmental impact as a whole:

-the techniques refer both to the technology used and the way in which the installation is designed, built, maintained, operated, as well as to its decommissioning and remediation of the site, according to the legislation in force;

-available refers to those requirements that have registered a stage of development that allows their application in the respective industrial sector, in viable economic and technical conditions, taking into account the costs and benefits, whether or not these techniques are used or performed at provided that these techniques are accessible to the operator;

-the best - refers to the most effective techniques for achieving an overall high level of environmental protection as a whole;

Greenhouse gas emission certificate -the title conferring the right to emit one tonne of carbon dioxide equivalent in a defined period, valid only for the purpose of GD no. 780/2006 and which is transferable under the conditions provided by the aforementioned Decision;
CITES- Convention on International Trade in Species of Wild Fauna and Flora - International Agreement between Governments aimed at ensuring that international trade in wildlife specimens does not threaten their survival.
Co-incineration / combustion -the use of waste oils as fuel, with adequate recovery of the heat generated;

Contributions from natural sources- emissions of pollutants that do not result directly or indirectly from human activities, including natural events such as volcanic eruptions, seismic activities, geothermal activities, wildfires, storms, marine aerosols, resuspension or transport of naturally occurring particles into the atmosphere from dry regions;

VOC volatile organic compounds- organic compounds from anthropogenic and biogenic sources, other than methane, which can produce photochemical oxidants by reaction with nitrogen oxides in the presence of sunlight;

DC underscored= Water Framework Directive (2000/60 / EC);

refuse- any substance, preparation or any object of the categories established by the specific legislation on the waste regime, which the holder discards, intends or is obliged to discard;

WEEE (waste electrical and electronic equipment) -the electrical and electronic equipment that constitutes waste according to the provisions of the Government Emergency Ordinance no. 78/2000 regarding the waste regime, approved with modifications and completions by Law no. 426/2001, including all components, subassemblies and consumables, an integral part of the equipment when it becomes waste;

Total or accumulated deposits- the total amount of pollutants that is transferred from the atmosphere to surfaces such as soil, vegetation, water, buildings, etc., with a certain area, in a certain time interval;

Recyclable waste- waste which may be a raw material in a production process for obtaining the initial product or for other purposes;

Dangerous wastewaste generically classified, according to the specific legislation on the waste regime, in these types or categories of waste and which have at least one constituent or a property that makes them hazardous;

Environmental damage- alteration of the physico-chemical and structural characteristics of the natural and anthropogenic components of the environment, reduction of diversity or biological productivity of natural and man-made ecosystems, damage to the natural environment with effects on quality of life, mainly caused by water, atmosphere and soil pollution, overexploitation resources, their deficient management and capitalization, as well as through the inadequate arrangement of the territory;

Sustainable Development- the development that corresponds to the needs of the present, without compromising the possibility of future generations to satisfy their own needs;

River basin district: land or sea area constituted by one or more neighboring river basins together with the associated coastal waters, which is identified as a main river basin management unit.

EQS= (eng,) Environmental Quality Standard;

Ecological balance- the set of states and interrelations between the component elements of an ecological system, which ensures the maintenance of the structure, its functioning and ideal dynamics;

Ecosystem- dynamic complex of plant, animal and microorganism communities and the abiotic environment, which interact in a functional unit;

ecotourism- a form of tourism in which the main objective is the observation and awareness of the value of nature and local traditions and which must meet the following conditions:

-to contribute to the conservation and protection of nature;
-use local human resources;
-to have an educational character, respect for nature - awareness of tourists and local communities;
-to have an insignificant negative impact on the natural and socio-cultural environment;

FACILITIES- any form of spillage into the environment, punctual or diffuse emission, including by run - off, jet, injection, inoculation, storage, emptying or vaporization;

broadcasting- direct or indirect discharge of substances, vibrations, electromagnetic and ionizing radiation, heat or noise in air, water or soil, which may have an impact on the environment and is measured at the place of departure from the source;

Fugitive emissions- undirected emissions, released into the ambient air through windows, doors and other orifices, ventilation or opening systems, which do not normally fall into the category of directed sources of pollution;

Emissions from fixed sources- emissions released into the ambient air of equipment, installations, including ventilation, from construction activities, from other fixed works that produce or through which pollutants are discharged;

Emissions from mobile pollution sources- emissions into the air by road, rail, sea and air, non-road mobile equipment equipped with internal combustion engines
Emissions from diffuse sources of pollution- emissions to ambient air from non-directed sources of emissions of air pollutants, such as fugitive emission sources, natural emission sources and other sources not specifically defined
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Eco-label- a graphic symbol and / or a short descriptive text applied to the packaging, in a brochure or other information document, which accompanies the product and which provides information on at least one and at most three types of environmental impact;
Eurostat ETE: Population connected to urban wastewater treatment plants
FB / Fb= phytobenthos;
VG= (ecological condition) very good;
GFC= general physico-chemical elements;
Extreme meteorological phenomena- weather events significantly different from the average or usual meteorological patterns, due to which natural disasters occur (eg floods, heat waves, tornadoes);
FP= phytoplankton;
Anthropogenic factor:factor represented by human action on the environment.
Biotic factor: factor represented by the action of an organism on the environment or on other organisms.
Abiotic factors:non-living components of the environment. They are grouped into climatic, edaphic factors (structure, texture, humus content, etc.), orographic (relief), etc.
Water uses: water services together with any activity identified as having a significant impact on water status
Greenhouse gases -the gases provided in annex no. 2 to GD no. 780/2006, amended and supplemented by GD no. 133/2006: carbon dioxide (CO_2), methane (CH_4), nitrogen oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6);
Waste management -the collection, transport, recovery and disposal of waste, including the supervision of such operations and the subsequent maintenance of disposal sites, including the actions taken by a trader or broker;
HG= Government Decision;
Natural habitat- terrestrial, aquatic or underground area, in natural or semi-natural state, which is differentiated by geographical, abiotic and biotic characteristics;
Natural habitat of community interest- that type of habitat which:

-it is in danger of extinction in its natural area; or

-it has a small natural area either as a result of its restriction or due to the fact that its surface is naturally small; or

-presents representative samples with typical characteristics for one or more of the five biogeographical regions: alpine, continental, Pannonian, steppe and Pontic;

Priority natural habitats -endangered natural habitat types, for the conservation of which the European Community has a special responsibility, due to the small proportion of their area on the territory of the European Union;
Habitat of a species- the natural or semi-natural environment defined by abiotic and biotic factors in which a species lives at any stage of its biological cycle;
Environmental impact- any change to the environment, beneficial or harmful, resulting in part or in whole from the activities, products or services of an organization;
DDNRDI= Danube Delta National Research and Development Institute
Environmental information- any written, visual, audio, electronic or any other material information about;

a)the state of the environmental elements, such as air and atmosphere, water, soil, land surface, landscape and natural areas, including wetlands, marine and coastal areas, biological diversity and its components, including genetically modified organisms, and the interaction between these elements;

b)factors, such as substances, energy, noise, radiation or waste, including radioactive waste, emissions, discharges and other discharges into the environment, which affect or may affect the environmental elements referred to in letter a);

c)measures, including administrative measures, such as policies, legislation, plans, programs, conventions concluded between public authorities and natural and / or legal persons regarding environmental objectives, activities that affect or may affect the elements and factors provided in letter. a) and b), as well as the measures or activities intended to protect the elements provided in letter a);

d)reports on the implementation of environmental protection legislation;

e) **cost-benefit analyzes or other economic analyzes and forecasts** used within the measures and activities provided in let. c);

f)the state of human health and safety, including contamination, whenever relevant, of the food chain, human living conditions, cultural areas and buildings, in so far as they are or may be affected by the state of the environmental elements referred to in letter a) or, through these elements, the factors, measures and activities provided in let. b) and c);

plant- any stationary or mobile technical unit as well as any other activity directly related, from a technical point of view, to the activities of the stationary / mobile units located on the same location, which may produce emissions and effects on the environment;

Global warming- increase of the temperature at the level of the terrestrial surface

ME -Ministry of the Environment

MEWF -Ministry of Environment, Waters and Forests

MEF -Ministry of Environment and Forests

MECC- Ministry of Environment and Climate Change

environment- the set of conditions and natural elements of the Earth: air, water, soil, subsoil, characteristic aspects of the landscape, all atmospheric layers, all organic and inorganic matter, as well as living beings, interacting natural systems, including the elements listed above, including some material and spiritual values, quality of life and conditions that can influence human well-being and health;

Fixed measurements- measurements performed at fixed points, either continuously or by random sampling, to determine the levels, in accordance with the relevant data quality objectives;

Indicative measurements- measurements that meet less stringent data quality objectives than those required for fixed point measurements;

Margin of tolerance -percentage of the limit value by which it can be exceeded, under the conditions specified by the legislation in force;

M= (ecological status) moderate;

ME= annual average (arithmetic);

MZB= macrozoobenthos (benthic macronevertebrates);

Micro-organismany microbiological entity, cellular or non - cellular, capable of replication or transfer of genetic material, including viruses, viroids and plant and animal cells in cultures;

Environmental monitoring- monitoring, forecasting, warning and intervention in order to systematically evaluate the dynamics of the qualitative characteristics of the environmental elements, in order to know the quality status and their ecological significance, the evolution and social implications of the changes produced, followed by the necessary measures;

Monument of nature- rare or endangered plant and animal species, isolated trees, formations and geological structures of scientific or landscape interest;

Natura 2000- the European network of protected natural areas created in 1992 out of the need to protect nature and maintain the long-term natural resources necessary for socio-economic development;

NFR- Nomenclature for Reporting as defined in the reporting guidelines to the LRTAP Convention (Convention on Long-range Transboundary Air Pollution);

N= nutrients;

Genetically modified organism- any organism, except human beings, in which the genetic material has been modified in a way that does not occur naturally by mating and / or natural recombination;

Exposure concentration obligation- the level established on the basis of the average exposure indicator in order to reduce the harmful effects on human health, which must be achieved within a given period;

Nitrogen oxides- the sum of the volume concentrations (ppbv) of nitrogen monoxide (nitric oxide) and nitrogen dioxide, expressed in units of mass concentration of nitrogen dioxide (micrograms / cubic meter);

Long-term goalthe level to be reached, in the long term, unless this is not possible through proportionate measures, in order to ensure effective protection of human health and the environment;
OD= dissolved oxygen;
Natural park- area of land where the aim is to maintain the existing natural landscape and current land uses, with the possibility of restricting these uses in the future;
National park- large area of land, guarded and cared for, in which forestry, mining, hunting, etc. they are stopped to keep nature unchanged;
National emission ceiling- the maximum quantity of a substance that can be emitted at national level during a calendar year;
P= poor ecological status;
ON B= good ecological potential;
PEM / MaxEP= maximum ecological potential;
PEM / MoEP= moderate ecological potential;
PS= specific pollutants;
PM10- suspended particles passing through a size selection orifice, as defined by the reference method for sampling and measuring PM10, SR EN 12341, with a separation efficiency of 50% for an aerodynamic diameter of 10 micrometers;
PM2.5- suspended particles passing through a size selection orifice, as defined by the reference method for sampling and measuring PM2,5; SR EN 14907, with a separation efficiency of 50% for an aerodynamic diameter of 2.5 micrometers;
Lower evaluation threshold- the level below which the use of modeling or objective estimation techniques is sufficient to assess ambient air quality;
Plans and programs -plans and programs, including those co-financed by the European Community, as well as any amendments thereto, which are drawn up and / or adopted by an authority at national, regional or local level or which are prepared by an authority for legislative procedure, by the Parliament or the Government and are required by legislative, regulatory or administrative provisions;
Action plan- plan of measures comprising the steps to be completed in time intervals specified by the provisions of the integrated environmental permit by the holder of the activity under the control of the competent authority for environmental protection in order to comply with legal provisions on integrated pollution prevention and control; the action plan is an integral part of the integral environmental permit;
Natural heritage -all the components and physico-geographical, floristic, faunal and biocenotic structures and structures of the natural environment, whose ecological, economic, scientific, biogenic, sanogenic, landscape and recreational importance and value have a relevant significance in terms of conserving the floristic and faunal biological diversity, ecosystems, conservation of genetic, plant and animal heritage, as well as to meet the requirements of life, well-being, culture and civilization of present and future generations;
pollutant- any substance, prepared in solid, liquid, gaseous or vapor or electromagnetic, ionizing, thermal, acoustic or vibrating radiation which, when introduced into the environment, alters the balance of its constituents and of living organisms and causes damage to property;
Pollution- the direct or indirect introduction of a pollutant that may harm human health and / or the quality of the environment, damage to property or cause damage or impediment to the use of the environment for recreational or other legitimate purposes;
damage- a quantifiable adverse change of a natural resource or a quantifiable deterioration of the functions performed by a natural resource for the benefit of another natural resource or the public, which may occur directly or indirectly;
Project- documentation regarding the execution of construction works or other installations or arrangements, other interventions on the natural environment and the landscape, including those that involve the extraction of mineral resources;
Compliance program -plan of measures comprising the steps to be completed in time intervals specified by the provisions of the environmental permit or approval for establishing environmental obligations by the business owner, under the control of the competent authority for environmental protection, in order to comply with legal provisions on environmental protection; the compliance program is an integral part of the environmental permit or environmental permit;

Sectoral Operational Programme- document approved by the European Commission for the implementation of those sectoral priorities from the National Development Plan which are approved for financing through the community support framework;

Public- one or more natural or legal persons and, in accordance with national law or practice, their associations, organizations or groups;

Average exposure indicator- the average level determined on the basis of some measurements carried out in the urban background locations on the entire territory of the country and which provide indications regarding the exposure of the population. It is used to calculate the national exposure reduction target and the exposure concentration obligation;

Environmental report -part of the documentation of the plans or programs, which identifies, describes and evaluates the possible significant effects on the environment, their application and its rational alternatives, taking into account the objectives and the related geographical area, according to the legislation in force;

Security report- documentation prepared by natural or legal persons certified according to the law, necessary for objectives in which dangerous substances are present according to the provisions of the legislation on the control of activities that present major accident hazards in which dangerous substances are involved;

Bad: body of inland water flowing mostly on the surface of the land, but which can also flow underground in a certain part of its course

Ecological reconstruction- all the works performed in order to bring
a site, after its remediation, as close as possible to the natural state

Water resources: surface waters composed of watercourses with their deltas, lakes, ponds, inland maritime waters and territorial sea, as well as groundwater on the territory of the country, in their entirety.

Natural Resources- all the natural elements of the environment that can be used in human activity: Non-renewable resources - minerals and fossil fuels, renewable - water, air, soil, flora, wildlife, including inexhaustible - solar, wind, geothermal and wave energy;

Non-renewable resources- natural heritage resources whose use is limited in time due to the impossibility to reproduce (eg mineral resources);

Renewable resources- natural heritage resources that have the capacity to reproduce or renew (water, air, soil, flora, wildlife, including inexhaustible ones - solar, wind, geothermal and wave energy);

National Register of Greenhouse Gases -unique, standardized and secure electronic database, which records and tracks all operations with greenhouse gas emission certificates, in application of GD no. 780/2006, and with greenhouse gas emission units provided for in the Kyoto Protocol;

Natural reserve- an area in which the entire natural environment or certain floristic, faunal or geological specimens are protected by law;

"**Natura 2000**" **ecological network** -the European ecological network of protected natural areas comprising special avifauna protection areas established in accordance with the provisions of Directive 79/409 / EEC on the conservation of wild birds and special conservation areas designated by the European Commission and Directive 92/43 / EEC on the conservation natural habitats, wild fauna and flora;

S =(ecological status) poor;

River basin management and planning scheme (SDABH): river basin water planning tool, consisting of two parts: River Basin Management Plan (PABH) and River Basin Management Plan (PMABH).

Climatic changes- complex process of long-term change of climatic elements (temperature, precipitation, increase in frequency and intensity of extreme weather events, etc.), due primarily to greenhouse gas emissions from anthropogenic activities, which have caused imbalances in the atmosphere and favored the onset of the greenhouse effect;

it= ecological status;

Contaminated site -geographically defined area, delimited in surface and depth, polluted with biological or chemical substances;

Site of community interest- area / site which, in the region or biogeographical regions in which it exists, contributes significantly to maintaining or restoring the favorable conservation status of natural habitats or species of Community interest and which may thus contribute significantly to the coherence of the NATURA 2000 network and / or significant in maintaining biological diversity in the region or regions concerned. For species of animals occupying large areas of distribution, the areas of Community interest correspond to the areas in the territories where these species are naturally present and where the abiotic and biological factors essential for their existence and reproduction are present;

Species of community interest- species which in the territory of the European Union are:

-endangered, except those whose natural area is located at the limit of distribution in the area and which are neither endangered nor vulnerable in the western Palearctic region; or

-vulnerable, species whose endangerment is likely in the near future if the action of the disturbing factors persists; or

-rare, species whose populations are reduced in terms of distribution and / or numbers and which, even if they are not currently endangered or vulnerable, are at risk of becoming extinct. These species are located in small geographical areas or are rarely scattered over large areas; or

-endemic and requiring special attention due to the specific characteristics of their habitat and / or the potential impact that their exploitation has on the state of conservation;

SPA(special avifauna protection area) - protected natural area whose purposes are the conservation, maintenance and, where appropriate, the restoration to a favorable conservation status of bird species and specific habitats designated for the protection of wild migratory bird species ;

SCI(site of Community importance) - the site / area which, in the region or in the biogeographical regions in which it exists, contributes significantly to the maintenance or restoration to a favorable state of conservation of the natural habitats provided in Annex no. 2 or of the species of community interest provided in annex no. 3 of GEO no. 57/2007 and which contributes significantly to the coherence of the "Natura 2000" network and / or contributes significantly to the maintenance of biological diversity in the respective biogeographical region or regions. For species of animals with a wide range, the sites of Community importance must correspond to the areas of the area where abiotic and biotic factors essential for the existence and reproduction of these species are present;

Priority species -species for the conservation of which the European Community has a special responsibility due to the small proportion of their area in the territory of the European Union;

Protected species -endangered, vulnerable, rare or endemic species that benefit from a legal protection status;

Surface water status: is the general expression of the state of a body of surface water, determined by the minimum indicators that characterize its ecological state and its chemical state.

Groundwater status: is the general expression of the state of a groundwater body, determined by the minimum indicators that characterize its quantitative state and its chemical state.

State of conservation of a natural habitat- the totality of the factors that act on a natural habitat and of its characteristic species and that can influence in the long run both its natural distribution, its structure and functions, as well as the survival of the characteristic species;

Conservation status of a species- the totality of the factors that act on a species and that can influence in the long run the distribution and the abundance of the populations of the respective species;

Substance- chemical element and its compounds, within the meaning of the legal regulations in force, except for radioactive substances and genetically modified organisms;

Dangerous substance- any substance classified as dangerous by the specific legislation in force in the field of chemicals;

Priority substances- substances that represent a significant risk of pollution on the aquatic environment and through it on humans and water uses, according to specific legislation in the field of water;

Priority hazardous substances- substances or groups of substances which are toxic, persistent and which tend to bioaccumulate other substances or groups of substances which create a similar level of risk, in accordance with specific water legislation;

Source of ionizing radiation- physical entity, natural, realized or used as an element of an activity that can generate exposures to radiation, by emitting ionizing radiation or releasing radioactive substances;

Ozone precursors- substances that contribute to the formation of ground-level ozone;

Ton of carbon dioxide equivalent -one metric tonne of carbon dioxide or a quantity of any other greenhouse gas with a global warming potential equivalent to one metric tonne of carbon dioxide;

National exposure reduction target- the percentage reduction in the average exposure of the population, set for the reference year in order to reduce the harmful effects on human health, which must be achieved, where possible, within a given period;

Activity holder- any natural or legal person who operates, controls or is delegated with decisive economic power over an activity with a potential impact on ambient air quality;

EQR= ecological quality ratio

Limit value -level set on the basis of scientific knowledge, in order to avoid, prevent or reduce harmful effects on human health or the environment, which is reached within a given period and which must not be exceeded after it has been reached;

Value Target- the level set, in order to avoid and prevent the occurrence of harmful events and to reduce their effects on human health and the environment as a whole, which must be achieved as far as possible within a given period

ELV -end-of-life vehicle, a vehicle that has become waste;

Area- part of the territory of the country delimited for the purpose of assessing and managing the ambient air quality;

Flood zone:the land area in the major bed of a watercourse, delimited by a level of the water mirror, corresponding to certain flows in situations of high water.

Protection zone- the land area around the point where fixed measurements are carried out, delimited so that any activity carried out inside it, after the installation of the measuring equipment, does not affect the representativeness of the ambient air quality data for which it was located;

Wetland- extent of ponds, swamps, peat bogs, natural or artificial waters, permanent or temporary, where the water is stagnant or flowing, fresh, brackish or salty, including the extent of seawater whose depth at reflux does not exceed 6 m.

Translated by, Elena Emilia Neacșu-
Authorization no: 25580
Translation date: 08/09/2022

ACCEPTANCE FOR THE PUBLICATION OF THE REPORT

MINISTERUL MEDIULUI,
APELOR ȘI PĂDURILOR

Nesecret

AGENȚIA NAȚIONALĂ PENTRU PROTECȚIA MEDIULUI
INTRARE / IEȘIRE Nr. 18 479
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NEACȘU Elena-Emilia Aut.Nr. 25580

Translated by, Elena Emilia Neacșu- Authorization no:25580
Translation date: 08/09/2022

MINSTRY OF ENVIRONMENT WATERS AND FORESTS

OFFICE OF SECRETARY OF STATE
NO: DCEIP/129726/05.11.2021

TO: NATIONAL ENVIRONMENTAL PROTECTION AGENCY
ATTN: Mr. Eugen Ioan COZMA, Vice-president
REFERRING TO: National report on the state of environment in Romania for 2020

Dear Mr. Vice President,

As a response to your address No.1/7588/EIC/29.09.2021, registered with the Ministry of the Environment of Waters and Forests under No.R./28085/04.10.2021, we inform you about the acceptance of the Ministry of the Environment of Waters and Forests regarding the publication on the National Environmental Protection Agency's website of the Annual report on the state of the environment in Romania, for the year 2020, modified according to the observations sent to the e-mail address: melania.corleciuc@anpm.ro.

Sincerely,

Secretar de Stat
Robert-Eugen SZÉP