MINISTRY OF ENVIRONMENT, WATERS AND FORESTS
NATIONAL ENVIRONMENTAL PROTECTION AGENCY

REPORT
OF INDICATORS
YEAR 2019

Bucharest- 2020

EXECUTIVE SUMMARY

The Report of indicators for 2019 (RO/EN) is a selection of indicators found in the Report on the state of the environment in Romania for 2019 (published on the ANPM website: http://www-old.anpm.ro/upload/150386_ANPM-PC_RSM%202019.pdf), prepared with data of public interest provided by the institutions found in the report or taken from the websites of relevant European or international bodies in the field of environmental protection. Report offers assessments on the situation of the environment, scenarios on its evolution, information on the actions that are being taken and what should be done or can be done for its improvement, in the light of the 37 core set indicators (CSI) established by the European Environment Agency (EEA / EEA) taken over and supplemented with 34 other specific indicators, through OMMAP no. 618 / 30.03.2015, for the most correct characterization of the thematic areas of the report. Thus, the current report aims to describe, as close to the European model, the way in which the environmental policies are developed and evolved, the trends in this field and the impact forecast at the level of Romania.

Thank you all !
The development team, Bucharest 2020

CONTENTS

SELECTIVE LIST OF ABBREVIATIONS AND ACRONYMS

AGA	Annual Growth Analysis
AA	Annual average (arithmetic)
ACOP	Administrative Capacity Operational Program
AOT40	Accumulated Ozone exposure over a Threshold of 40 ppb (=80 µg/m³)
APSCP/SIP	Action plan on sustainable consumption and production and sustainable industrial policy
APSFR	Areas with Potential Significant Flood Risk
AR	Arranged regime
AT	Alert threshold
AWB	Artificial water body

BAT	The best available techniques
BCR	Balance of credit recovery
Bio	Biological elements
BOC	Biochemical oxygen content at 5 days
CAD	Chemical Agents Directive
CAD	Chemical Agents Directive
CAD-MARD	County Agricultural Directorates - Ministry of Agriculture and Rural Development
CAFE	Clean Air For Europe
CANE	Classification of Activities in the National Economy
CASHF	County Association of Sports Hunters and Fishermen
CB	Control body
CBC	Cross Border Cooperation
CBS	Commission for Biological Security
CCST	Competence Centre for Space Technologies in Constanta
Cctc	Cool continental temperate climate
CDC	Center for Disease Control
CDM	Clean Development Mechanism
CDSLU	Creation of the Database of Soil-Land Units
CE	Council of Europe
CF	Cohesion Fund
CFC	Chlorofluorocarbons
CFEU	Catch per fishing effort unit
CGAEC	Code for Good Agricultural and Environmental Conditions
CGAP	Code of Good Agricultural Practices
CIL	Cold Intermediate Layer
CIS WFD	Common Implementation Strategy for the Watwer Framework Directive
CITSWLF	Convention on International Trade in Species with Wild Life and Fauna
CLP	Classification, Labelling and Packaging
CMD	Carcinogens and Mutagens Directive
CMIP	Climate Model Intercomparison Project
COC-Cr	Chemical oxygen content – potassium bichromate method
COPAS	County Office of Pedological and Agrochemical Studies
CPR	Common Provisions Regulation
CREAS	Chemical Registration, Evaluation and Authorisation System
CSMTR	Carcinogenic Substances Mutagens and Toxics for Reproduction
CSR	Country Specific Recommendations
Ctc	Continental temperate climate
CWP	Coverage of wastewater purification
DARD	Directorates for Agriculture and Rural Development
D-BSC	Danube-Black Sea Canal

DCM	Directive carcinogens and mutagens
DDBR	Danube Delta Biosphere Reserve
DDT	1,1,1 – Triclor – 2,2 – bis (4 chlorphenyl) ethane
DG IMIE	Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
DL WBA	Dobrogea-Litoral Water Basin Administration
DLWD	Dobrogea Litoral Water Directorate
DMC	Domestic Material Consumption
DME	Direct Material Entries
DO	Dissolved oxygen
DPH	Directorate of Public Health
DPSIR	Driver-Pressure-State-Impact-Response
E.r	Equivalent residents
EAFRD	European Agricultural Fund for Rural Development
EASHW	European Agency for Safety and Health at Work
EBRD	European Bank for Reconstruction and Development
ECHA	European Chemicals Agency
EDL	Emission Derivative Limits
EEA	European Environment Agency
EEC	European Economic Community
EEE	Electrical and electronic equipment
EFA	Environmental Fund Administration
EFSA	European Food Safety Authority
ELV	Emission Limit Values
ELV	End-of-life vehicles
EMAS	Eco-Management and Audit Scheme
ENSO	El Niño-Southern Oscillation
EPA	Environmental Protection Agency
EPARD	European Programme for Agriculture and Rural Development
EPER	European Pollutant Emissions Register
EQR	Ecological quality report
EQS	Environmental Quality Standard
ERDF	European Regional Development Fund
E-REPT	European Register of Emissions and Pollutant Transfers
ERSS	Environmental Radioactivity Surveillance Strategy
ES	European standard
ES	Ecological status
ESC	Economic and Social Cohesion
ETPP	Electro-thermal power plant
EU	European Union
EU TEPI WP-5	Purified water – Collected water

EUNIS	European Nature Information System
EUROSTAT	European Union StaticStic Commission
Eurostat ETE	Population connected to urban wastewater treatment plants
EWIS	European Water Information System
F	Fish
FB/Fb	Fitobenthos
FP	Fitoplankton
G	(Ecological condition) good
GARTR	General Association of Refrigeration Technicians in Romania
GCFM	General Commission of Fisheries in the Mediterranean
GD	Government decision
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEF	Global Environmental Finance
GEO	Government Emergency Ordinance
GEP	Good ecological potential
GES	Greenhouse gases
GFC	General physico-chemical elements
GHG	Greenhouse Gas
GIS	Geographic Information System
GMSP	Genetically modified superior plants
H	Mountain climate
HBDP	Hydrographic Basin Development Plan
HCB	Hexachlorobenzene
HCFC	Hydrochlorofluorocarbons
HCH	Hexachlorcyclohexan
HFC	Hydrofluoarocarbons
HMWB	Heavily modified water body
I	Industrial
ICMS	International Chemical Management Strategy
ICP	International Co-operative Programme
ICPDR	International Commission for the Protection of the Danube River
ICZM	Integrated Coastal Zone Management
ID	Insufficient data
IED	The Industrial Emissions Directive (Directiva Emisii Industriale)
IET	International Emissions Trading
IFI	International Financial Institution
IMP	Integrated Maritime Policy
IOS	International Organization for Standardization
IPCC	Intergovernmental Panel on Climate Change
IPCETD	Industrial Policy, Competitiveness and Energy Transport Directorate
IPE	Individual Protection Equipment
IPPC	Integrated Pollution Prevention and Control
IPPU	Industrial Processes and Product Use

IT	Information threshold
IUCN	International Union for Conservation of Nature
IUCNR	International Union for the Conservation of Nature and its Resources
JI	Joint implementation
KT	Kilo tone
LBP	Large Burning Plants
LCP	Large Combustion Plant
LEAP	Local Environmental Action Plan
LLC	Limited liability company
LRTAP	Air pollutant emissions data viewer (LRTAP Convention)
LSA	Large supply area
LULUCF	Land use, land use change and forests
LV	Limit value
M	Moderate ecological status
MA LIOP	Managing Authority for the Large Infrastructure Operational Program
MA OPAC	Managing Authority of the Operational Program Administrative Capacity
MAC	Maximum Allowable Concentration
MARD	Ministry of Agriculture and Rural Development
MARSPLAN-BS	Cross-border maritime spatial planning in the Black Sea – Romania and Bulgaria
MaxEP	Maximum ecological potential
ME	Ministry of Environment
MEF	Ministry of European Funds
MEP	Moderate ecological potential
MESFD	Marine Environment Strategy Framework Directive
MH	Ministry of Health
MLW	Marine Litter Watch App
MONERIS	Modelling Nutrient Emissions in River Systems
MRDPA	Ministry of Regional Development and Public Administration
MRI	Market Research Institute S.R.L.
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
MWF	Ministry of Waters and Forests
MZB	Macrozoobenthos (macronevertebrate bentice)
N	Nutrients
NACP	National Authority for Consumer Protection
NACREA	National Agency for Cadastre and Real Estate Advertising
NADCSP	National Agency for Dangerous Chemical Substances and Preparations
NAFA	National Agency for Fisheries and Aquaculture

NALI	National Agency for Land Improvements
NAO	North Atlantic oscillation
NAP	National Allocation Plans
NAPEP	National Action Plan for Environmental Protection
NAQMN	National Air Quality Monitoring Network
NARW	National Administration "Romanian Waters"
NAUI	National Association of Underwater Instructors
NCA	Navigable Canals Administration
NCAPPP	National Commission for the Approval of Plant Protection Products
NCBP	National Commission for Biocidal Products
NCCNA	National Commission for the Control of Nuclear Activities
NCCZ	National Committee of the Coastal Zone
NCRMCE	National Centre for Risk Monitoring in the Community Environment
NDP	National Development Plan
NEG	National Environmental Guard
NEPA	National Environmental Protection Agency
NGO	Non-governmental organization
NIGGE	National Inventory of Greenhouse Gas Emissions
NIHWM	National Institute of Hydrology and Water Management
NIRD	National Institute of Research and Development
NIRDEP	National Institute of Research Development for Environmental Protection Bucharest
NIS	National Institute of Statistics
NMA	National Meteorological Administration
NMP	National Management Plan
NMRDI	Grigore Antipa National Marine Research and Development Institute
NNERS	National Network for Environmental Radioactivity Surveillance
NOEDC	National Oceanographic and Environmental Data Center
NPRMII	National Programme for rehabilitation of the Main Irrigation Infrastructure in Romania
NPS	National Petroleum Society
NR	Natural Regime
NRACUS	National Regulatory Authority for Community Utilities Services
NRDIDD	National Research And Development Institute " Danube Delta”
NRDIMGG-GEOECOMAR	National Research-Development Institute for Marine Geology and Geoecology - GEOECOMAR Bucharest
NR-DIPAEP	National Research-Development Institute for Pedology, Agrochemistry and Environmental Protection
NRDP	National Rural Development Programme
NRLER	National Reference Laboratory for Environmental Radioactivity
NRP	National Reform Programme

NSELAGGE	National System for Estimating the Level of Anthropogenic Greenhouse Gas Emissions
NSFA	National Strategy for Fisheries and Aquaculture
NSIAQAM	National System for Integrated Air Quality Assessment and Management
NSSD	National Strategy for Sustainable Development
NSVFSA	National Sanitary Veterinary and Food Safety Authority
NT	Total nitrogen
NVA	Nitrate-vulnerable areas
NVOC	Nemethane Volatile Organic Compounds
NWASER	National warning/alarm system for environmental radioactivity
NWMP	National Waste Management Plan
NWMS	National Waste Management Strategy
NWRM	Natural Water Retention Measures
ODS	Ozone-destroying substances
OECD CEI	Population connected to wastewater treatment plants
OECD KEI	Degrees of connection to wastewater treatment plants
OM	Order of the Minister
OPAS	Office of Pedological and Agrochemical Studies
OPLI	Operational Program Large Infrastructure
OSH	Occupational Safety and Health
P	Poor ecological status
P	Poor ecological status
PADI	Professional Association of Diving Instructors
PA-MNC	Poarta Albă-Midia Năvodari canal
PCB	Polychlorinated biphenyls
PCWTS	Population connected to wastewater treatment systems
PET	Polyethylenereftalate
PFC	Perflourocarbons
PFPPM	Plans for flood prevention, protection and mitigation
PH	Polyaromatic hydrocarbons
PLLVWW	Pollutant load limit values of waste water
PMB	Program "Man and Biosphere”
POPs	Persistent Organic Pollutants
PSDN	Programme on the Sustainable Development Network
PTS	Permanent Technical Secretariat
Q	Flow m^3/s
QTL	Quasiomogen top layer
r.b.	River basin
RAU	Register of Aquaculture Units
RBLM	Risk-Based Land Management
RBMP	River basin management plan

RD BAT	Reference documents on the best available techniques
RF	Rural fund
RIPA	Research Institute for Pedology and Agrochemistry
RS	Romanian Standard
RWA	Romanian Water Association
RWMP	Regional Waste Management Plan
SAC	Special Areas of Conservation
SAPA	Special Avifaunistic Protection Areas
SCI	Sites of Community Importance
SDG	Sustainable Development Goals
SEVESO	Control of major accidents involving dangerous substances
SF6	Sulf hexafluoride
SIPA	Structural Instrument of Pre-Accession
SIVTR	State Institute for Variety Testing and Registration
SME	Small and Medium Enterprises
SOP	Sectoral Operational Program
SP	Specific pollutants
STP	Short-term pollution
SUBF	Suburban fund
SWOT	Strengths Weaknesses Opportunities Threats
SYR	Statistical Yearbook of Romania
T	Transport
TAOP	Technical Assistance Operational Program
TE	Threatened with extinction
THI	Temperature-humidity index
TP	Total phosphorus
TSM	Total suspension matter
UE	Unevaluated
UF	Urban fund
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	Convention - United Nations Framework on Climate Change
UNO	United Nations Organization
UV	Ultraviolet rays
V	Total volume m^3
VG	(ecological status) very good
VOC	Volatile Organic Compounds
VU	Vulnerable
WAQ	Water Quality / Model for forecasting water quality
WB	Water body
WBA	Water Basin Administration
WCtc	Warm continental temperate climate
WEEE	Waste Electrical and Electronic Equipment
WEI	Water Exploitation Index

WFD	Water Framework Directive (Directive 2000/60/EC)
WFEA	World Forum for Ecological Acoustics
WP	Wastewater purification
WUOI	Water users' organisations for irrigation
WWF	World Wide Fund for Nature

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. nr. 618/30.03.2015*

Note: The indicators that are not included in the report could not be processed due to lack of data

AIR POLLUTION

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

BIODIVERSITY

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

CLIMATIC CHANGES

- RO 06 Indicator CSI 06 – Production and consumption of substances that lead to the destruction of the ozone layer
- RO 10 Indicator CSI 10 – Trend of greenhouse gas emissions
- RO 11 Indicator CSI 11 – Greenhouse gas emissions projections
- RO 12 Indicator CSI 12 – Temperature at global, European and national level
- RO 13 Indicator CSI 13 – Atmospheric concentrations of greenhouse gases

LAND AND SOIL

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

WASTE

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

WATER

- RO 18 Indicator CSI 18 – Use of fresh water resources

- RO 19 Indicator CSI 19 – Oxygen-consuming substances in rivers
- RO 20 Indicator CSI 20 – Nutrients in water
- RO 21 Indicator CSI 21 – Nutrients in transient, coastal and marine waters
- RO 22 Indicator CSI 22 – The quality of the bathing water
- RO 23 Indicator CSI 23 – Chlorophyll *a* from transient, coastal and marine waters
- RO 24 Indicator CSI 24 – Treatment of urban waste water

AGRICULTURE

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

ENERGY

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

FISHING

- RO 32 Indicator CSI 32 – State of marine fish stocks
- RO 33 Indicator CSI 33 – Aquaculture production
- RO 34 Indicator CSI 34 – Capacity of the fishing fleet

TRANSPORT

- RO 35 Indicator CSI 35 – Demand for passenger transport
- RO 36 Indicator CSI 36 – Demand for freight
- RO 37 Indicator CSI 37 – Use of alternative fuels and cleaner

AIR POLLUTION

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

LIST OF SPECIFIC INDICTORS FOR ROMANIA

BIODIVERSITY

- RO 40 Indicator SEBI 05 – Habitats of European interest in Romania
- RO 41 Indicator SEBI 07 – Natural protected areas at national level
- RO 42 Indicator SEBI 08 – Protected areas of Community interest designated in accordance with the Habitats and Birds Directive
- RO 43 Indicator SEBI 10 – Invasive allogeneic species
- RO 44 Indicator SEBI 13 – Fragmentation of natural and semi-natural areas
- RO 45 Indicator SEBI 17 – Forest: forest fund, raising and harvesting wood
- RO 46 Indicator SEBI 18 – Forest: dead wood (dry)

CLIMATIC CHANGES

- RO 47 Indicator CLIM 02 – Precipitation average
- RO 48 Indicator CLIM 04 – Extreme precipitation
- RO 49 Indicator CLIM 08 – The degree of snow cover
- RO 50 Indicator CLIM 12 – Increasing sea level at global, European and national level
- RO 51 Indicator CLIM 13 – Increasing sea water temperature
- RO 52 Indicator CLIM 16 – Flows of watercourses
- RO 53 Indicator CLIM 17 – Floods
- RO 54 Indicator CLIM 18 – Hydrological drought
- RO 55 Indicator CLIM 27 – Organic carbon from the soil
- RO 56 Indicator CLIM 30 – The growing season of agricultural crops
- RO 57 Indicator CLIM 32 – The productivity of agricultural crops determined by the lack of water resources
- RO 58 Indicator CLIM 34 – Surfaces occupied by forests
- RO 59 Indicator CLIM 35 – The risk of forest fires
- RO 60 Indicator CLIM 36 – Extreme temperatures and health
- RO 61 Indicator CLIM 46 – Floods and health
- RO 62 Indicator CLIM 47 – The number of degrees-days for heating

LIST OF SPECIFIC INDICTORS FOR ROMANIA

WASTE

- RO 63 Indicator Waste 003 – Waste electrical and electronic equipment

WATER

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

TRANSPORT

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

SUSTAINABLE CONSUMPTION AND PRODUCTION

- RO 70 Indicator SCP 033 – Number of EMAS and ISO 14001 certified organizations
- RO 71 Indicator SCP - Number of products and services labeled with the European eco-label

ENVIRONMENTAL AIR QUALITY

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

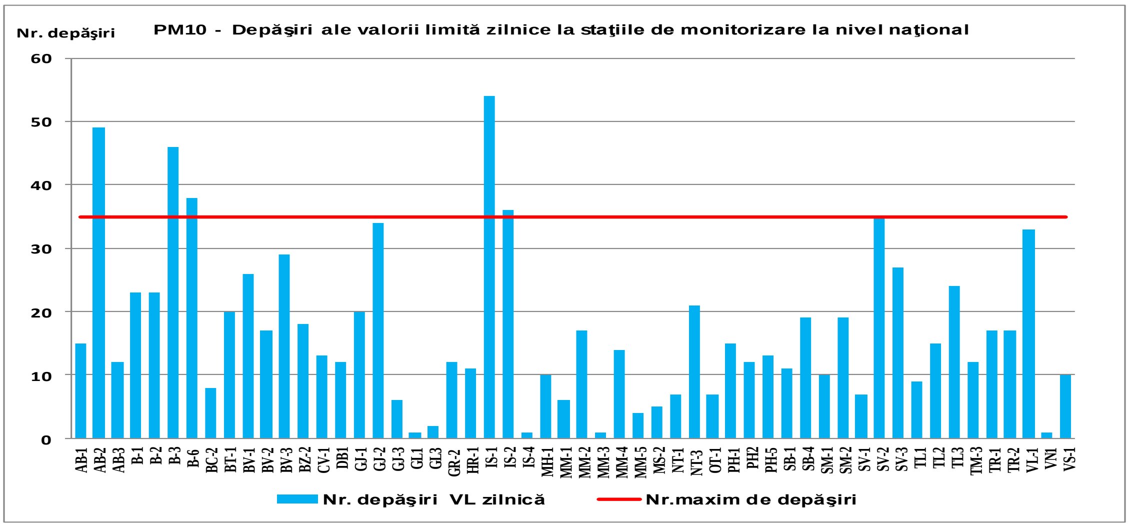
- data available from air quality monitoring stations;
- results of studies, inventories, forecasts;
- available data and results reported or obtained from studies at European level;
- scenarios, strategies, programs, objectives, national and European targets for air quality and pollution.

Exceedances of limit values and target values for ambient air quality in urban areas

RO 04
Indicator code Romania: RO 04 EEA indicator code: CSI 04
TITLE: EXCEEDING THE LIMIT VALUES CONCERNING AIR QUALITY IN URBAN AREAS
DEFINITION: Percentage of urban population potentially exposed to ambient air pollutant concentrations that exceed the limit value for the protection of human health.

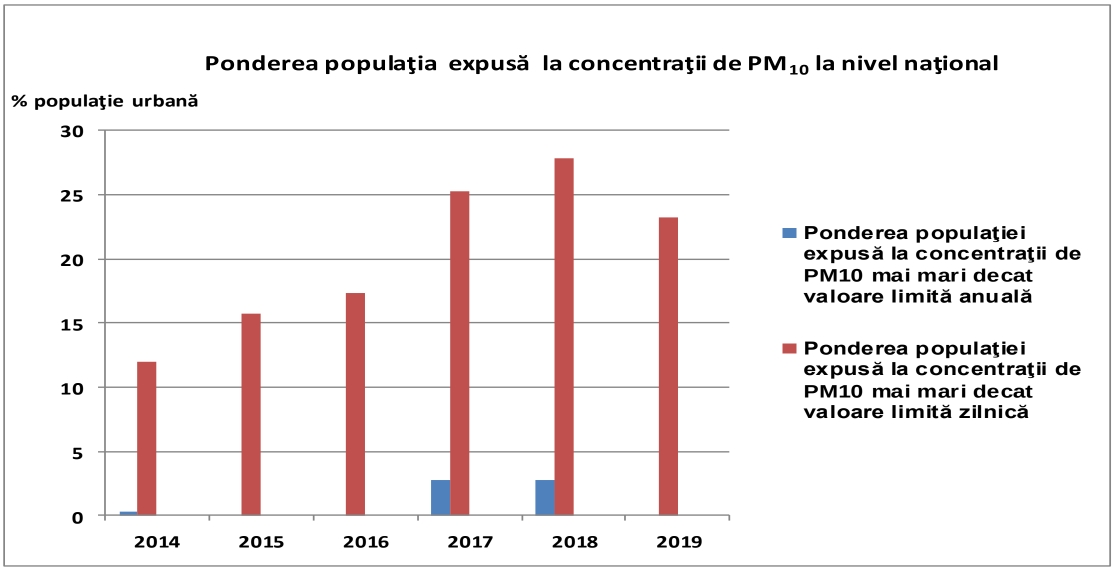
Life quality is strictly correlated and dependent on air quality. The pace of economic, demographic and institutional development requires that well-thought-out and documented measures are taken, in order to control the dangerous air pollution phenomena, to direct the socio-economic-financial development mechanisms for the benefit of man and humanity. Loading the body of the population exposed to certain pollutants, known to have storage qualities in certain organs, is another important aspect of the influence of environmental pollution on health, which can be analyzed considering the percentage of the urban population potentially exposed to pollutant concentrations in the ambient air which exceed the limit value for the protection of human health.

Figure I.1 Number of exceedances of daily limit value for particles in suspensions PM10 at national monitoring stations in 2019



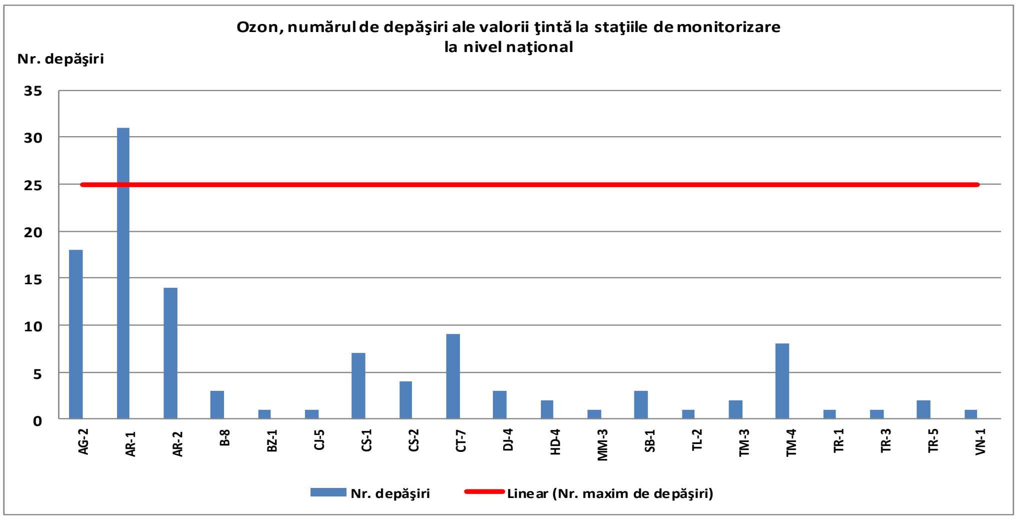
Source:NEPA

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



Source: NEPA

Figure I.3 The number of exceedances of the target value for ozone at the monitoring stations at national level in 2019



Source: NEPA

Health effects of ambient air pollution

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

The effects of ambient air pollution on ecosystems

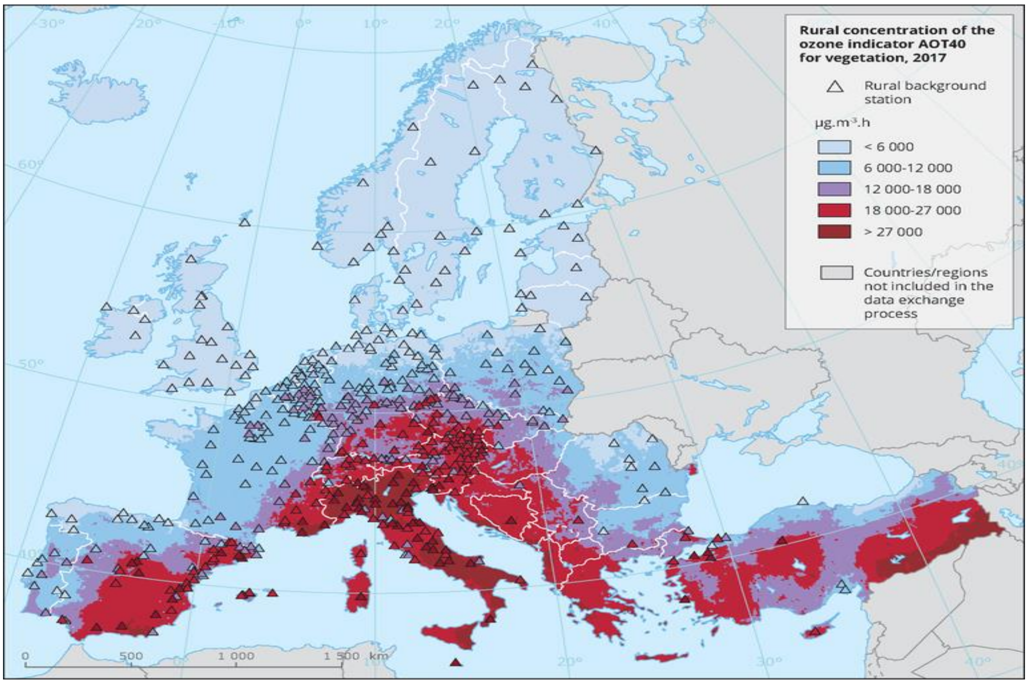
Environmental pollution affects ecosystems by negatively influencing the development of fauna and flora, which are sometimes much more sensitive than the human body to the action of various pollutants. The effects of air pollutants are diverse, depending on their nature:

- acid gases (carbon monoxide, sulfur dioxide, nitrogen oxides) in combination with water from precipitation produce acid rain affecting vegetation;
- nitrogen and sulfur compounds contribute to the formation of smog, which impedes the normal photosynthesis and respiration of animals;
- halogen derivatives cause burns in plants and a disease called fluorosis in animals (bone deformity and tooth loss);
- particles reduce atmospheric transparency affecting photosynthesis and affect animals by causing respiratory disease similar to humans.

RO 05
Indicator code Romania: RO 05 EEA indicator code: CSI 05
TITLE: EXPOSURE OF ECOSYSTEMS TO ACIDIFICATION, EUTROFIZATION AND OZON
DEFINITION: The indicator shows the ecosystems or cultivated areas that are subject to atmospheric deposition or concentrations of pollutants that exceed the so-called "critical thresholds" or the concentration for a particular ecosystem or cultivated area. At the same time, this indicator shows the state of change of 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 estimation of the exposure to pollutants under which no harmful and significant long-term effects appear, taking into account the present knowledge.

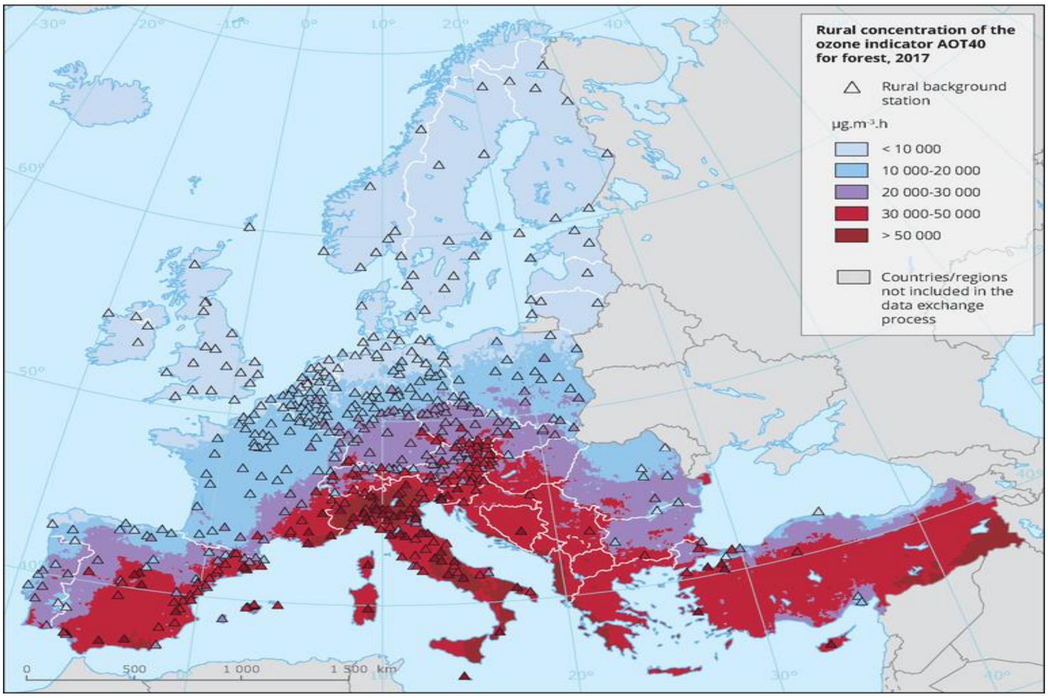
Figure I.4 Exposure of vegetation areas and forests to AOT40 ozone concentrations in some European countries

Vegetation



Source: *https://www.eea.europa.eu/data-and-maps/figures/rural-concentration-map-of-the-ozone-indicator-aot40-for-crops-year-13/rural-concentration-of-the-ozone-1/image_large*

Forests



Source: https://www.eea.europa.eu/data-and-maps/figures/rural-concentration-of-the-ozone-5/rural-concentration-of-the-ozone-1/image_large

The effects of ambient air pollution on soil and vegetation

Pollutants emitted into the atmosphere are subjected 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, so they have a lower capacity to dilute in air with respect to gases, instead settling more easily. The main effects of ambient air pollution on soil and vegetation are eutrophication (generated by nitrogen compounds from the atmosphere by sedimentation and deposition by precipitation) and acidification (generated by acid rain, which have as a source acid gases: CO_2, SO_2, NO_x).

AIR POLLUTION EMISSIONS AND MAIN SOURCES OF EMISSIONS

The level of emissions of pollutants 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 conventional fuels with alternative fuels (biodiesel, ethanol);
- ❖ the use of high energy efficient installations and equipment (low consumption, high efficiency);
- ❖ implementation of a program of afforestation and creation of green spaces (CO_2 absorption, retention of fine powders, 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 the efficiency of the elimination of mitigation measures and the degree / extent to which these measures are applied.

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

- ❖ *Autonomous measures* that represent changes arising from human activities (for example, lifestyle changes), stimulated by control and control approaches (for example, legal restrictions on movement) or by economic incentives (for example, pollution taxes, pollution control systems, emissions trading, etc.).
- ❖ *Structural measures* that supply the same level of (energy) services to the consumer, but with less polluting activities. This group includes replacing fuels (for example, switching from coal to natural

gas) and improving energy efficiency / energy conservation.

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

Final energy consumption by type of sector

RO 27
Indicator code Romania: RO 27 EEA indicator code: CSI 27
TITLE: FINAL ENERGY CONSUMPTION BY TYPE OF SECTOR
DEFINITION: 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 in all sectors of activity. They are structured to include industry, transport, households, services and agriculture.

The assessment of the degree of energy dependence at the sector level is performed by summing the amounts of energy used on activity branches according to the energy balance. The quantities used for the production of other fuels, the consumption of the energy sector and the losses of transport and distribution are not included.

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

	2017		2018	differences	
	thousand toes		thousand toes	(±)thousand toes	%
ENERGY RESOURCES - TOTAL	43357		43238	-119	99,7
- Primary energy production (including recovered energy)		25417	24979	-438	98,3
• **from primary energy resources:**					
- coal (excluding coke)		5323	4868	-455	91,5
- crude oil[2)]		12216	12485	+269	102,2
- usable natural gas[3)]		11034	11087	+53	100,5
- imported coke		479	454	-25	94,8
- imported petroleum products		3279	3290	+11	100,3
- hydroelectric, wind, solar, photovoltaic energy and nuclear heat		4897	5044	+147	103,0

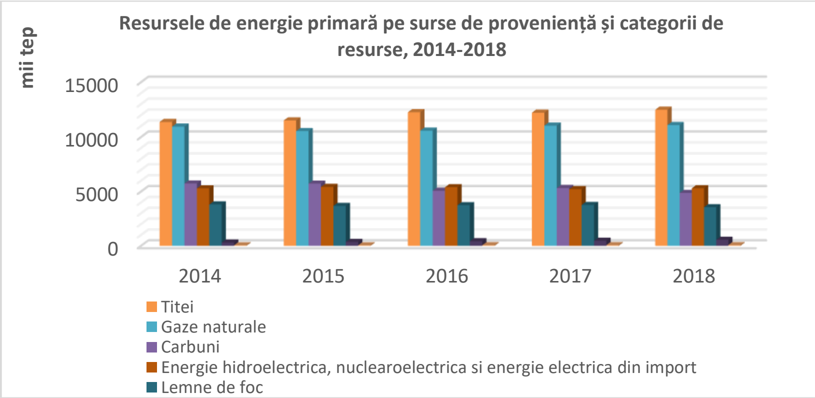
[1)] Conventional fuel with a calorific value of 10000 kcal / kg; 2) including gasoline and ethane from extraction scaffolding; 3) exclusive gasoline and ethane from extraction scaffolding (cf. INSE, Energy Balance 2018)

Resources and primary energy consumption by type of fuel

RO 29
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 the gross domestic energy consumption of solid fuels, crude oil, natural gas, firewood, nuclear and renewable sources and a smaller component of "other" sources (industrial waste and net imports of electricity) of a country.

Primary energy resources in 2018 were 43,238 thousand tons of oil equivalent, down 1178 thousand toe (-2.79%) 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 unconventional sources. The majority share of primary energy production from crude oil and natural gas is observed.

Figure I.5 Primary energy resources by source and resource categories, 2014-2018, (thousand toe)



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

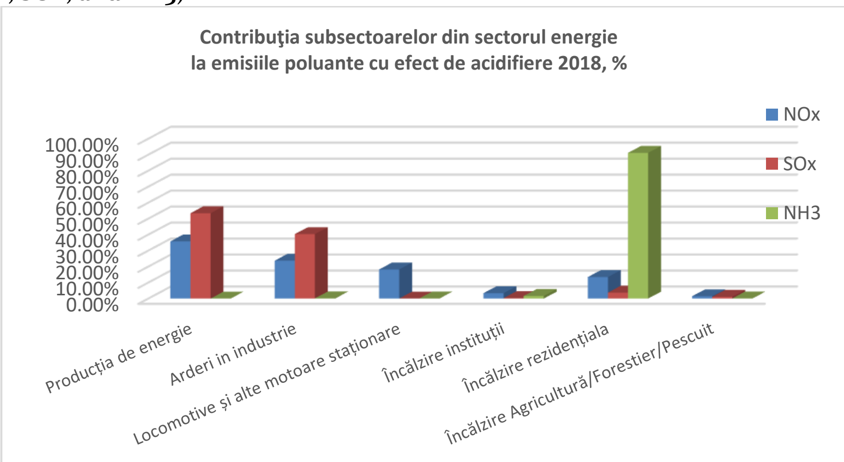
Primary energy production in 2018, of 24979 thousand toe, decreased by 438 thousand toe compared to 2017, due to the decrease in the production of usable coal, oil and natural gas, but continued to maintain its significant share in total energy resources, representing 57.8% of them.
The production of electricity from renewable resources (hydro, wind and solar photovoltaic) registered an increase of 8.6% (+178 thousand toe) compared to the previous year. *Source: National Institute of Statistics*
The total domestic consumption of primary energy was 33510 thousand toe in 2018, increasing by 0.4% compared to 2017 (33391 thousand toe).
Gross domestic consumption (including losses) increased in 2018, compared to 2017, by 119 thousand toe, representing + 0.4%. By types of energy carriers, the gross domestic consumption of usable natural gas (+225 thousand toe), electricity (+208 thousand toe) and crude oil and petroleum products (+108 thousand toe) increased, while the consumption of coal (including coke) decreased by -295 thousand toe.
Given the current challenge of ensuring energy resources and the need to reduce CO2 emissions, as well as the protection of the environment, investments in energy efficiency and renewable energy, recovery of secondary energy resources and combating energy poverty is a strategic priority for Romania.

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 in anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH3) and sulfur oxides (SOx, SO2), taking into account its acidifying potential for each of them. The indicator also provides information on changes in emissions from major source sectors: generation and distribution of energy; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sectors; use of solvents and products; agriculture; waste; others.

Acidification is the process of modifying the natural chemical nature of an environmental component due to the presence of some chemical compounds in the atmosphere, which causes a series of chemical reactions in the atmosphere, leading to changes in air, precipitation and even soil pH, 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 anthropogenic activities: burning fossil fuels (coal, oil, natural gas), metallurgy, agriculture, road traffic. Manure management and enteric fermentation from livestock breeding are significant sources of ammonia, and the use of nitrogen fertilizers in agriculture is an important source of ammonia.

Figure I.6 Contributions of the activity subsectors of the energy sector, in 2018, to the emissions of polluting substances with acidifying effect (%, NOx, SOx, and HN3)



Source : Romania's Informative Inventory Report 2020

Ozone precursor emissions

RO 02
Indicator code Romania: RO 02 EEA indicator code: CSI 02
TITLE: OZONE PRECURSOR EMISSIONS
DEFINITION: The indicator follows trends in the anthropogenic emissions of ozone precursor pollutants: nitrogen oxides (NOx), carbon monoxide (CO), methane (CH_4) and non-methane volatile organic compounds (NMVOCs) from the sectors: energy production and distribution; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sectors; 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 the suspended particles, the main components of smog and nitrogen oxides, in the presence of light, contributes to the formation of tropospheric ozone. Tropospheric ozone is a very oxidizing, highly reactive, smelling, gas-inducing gas that causes respiratory problems, focuses on the stratosphere and provides protection against life-threatening UV radiation.

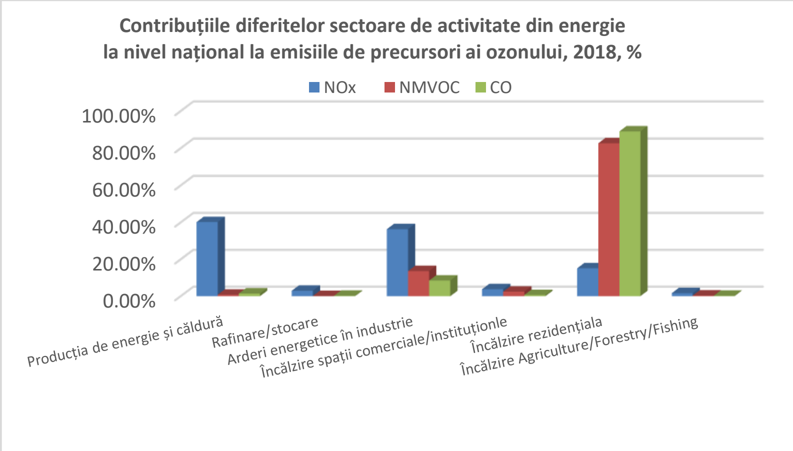
Ozone present at ground level acts as a component of "photochemical smog". It is formed by a reaction involving in particular volatile organic compounds and nitrogen oxides.

It is responsible for damage to vegetation by atrophy of some tree species in urban areas. During spring and summer, when the daylight range is high, atmospheric photochemical reactions are accelerated, resulting in increased ozone concentrations, especially during very hot days (temperatures above 30 ° C). In addition, increased concentrations of tropospheric ozone can have an impact on crops and buildings.

Volatile organic compounds are one of the main precursors to ozone, which is a natural constituent of the atmosphere. In the context where other pollutants exist, such as nitrogen oxides, sulfur oxides, ozone becomes a generating source of smog and produces a number 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 urban, precursor pollutants being generated in particular by industrial activities and road traffic. VOC pollution is widespread in many industrial plants 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 generation. Nitrous oxides are responsible for smog formation, acid rain, deterioration of water quality, greenhouse effect, and reduced visibility in urban areas.

Figure I.7 Contributions of the subsectors of activity from the energy sector, in 2018, to the emissions of polluting substances discharged into the atmosphere and considered as precursor substances of ozone



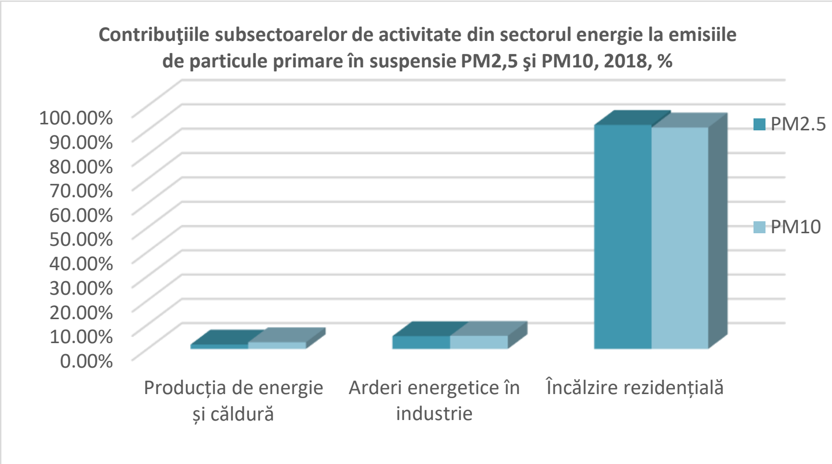
Source : Romania's Informative Inventory Report 2020

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 PRECURSORS OF PARTICLES
DEFINITION: This indicator shows the primary particle emission (PM2,5) and 10 µm (PM10) and secondary particle precursors (NOx, ammonia (NH_3) and Sulfur dioxide (SO_2), derived from anthropogenic sources, by source sectors: energy production and distribution, energy use in industry, industrial processes, road transport, non-commercial transport, institutional and residential transport, use of solvents and other products, waste, other sources.

The trend of the emission of primary particles with a diameter of less than 2.5 µm (PM2.5) and 10µm (PM10), derived from anthropogenic sources, by types of activity sectors is presented graphically.

Figure I.8 Contributions of the subsectors of activity from the energy sector, in 2018, to the emissions of primary particles in suspension PM2.5 and PM10



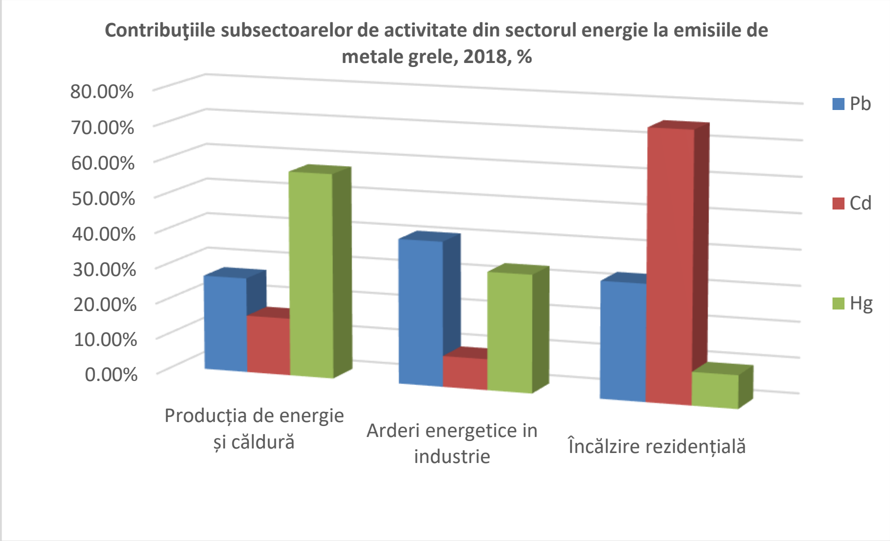
Source : Romania's Informative Inventory Report 2020

Heavy metal emissions

RO 38
Indicator code Romania: RO 38 EEA indicator code: APE 05
TITLE: HEAVY METAL EMISSIONS
DEFINITION: Trends of heavy metal anthropic emissions by industry: 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 can not be degraded naturally, have a long retention time in the environment and are dangerous in the long run because they can accumulate in the food chain. Heavy metals can come from stationary and mobile sources: combustion and waste combustion processes, technological processes in heavy metal non-ferrous metallurgy and road traffic. Heavy metals can cause affections such as muscular, nerve, digestive disorders, general apathy; can affect the process of plant growth, preventing the normal development of photosynthesis, breathing or sweating. From statistical data, heavy metal emissions show a decrease compared to those recorded in recent years. From the distribution of emissions by sectors of activity, it is noticed that the highest share of mercury emissions, in excess of 60%, comes from combustion in the production of energy and heat. These include sectors such as: production processes, waste treatment and disposal and, in a very small proportion, other activities, namely non-industrial combustion plants and road transport.

Figure I.9 The contributions of the subsectors of activity in the energy sector, in 2018, to heavy metal emissions

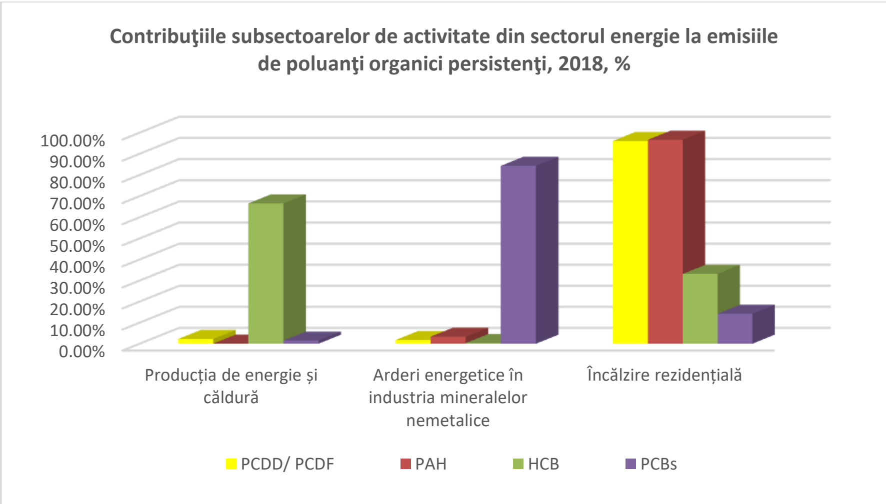


Source : Romania's Informative Inventory Report 2020

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, polycyclic aromatic hydrocarbons (PAHs), by sectors of activity: production and distribution of energy; 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 Contributions of the subsectors of activity in the energy sector, in 2018, to the emissions of persistent organic pollutants



Source : Romania's Informative Inventory Report 2020

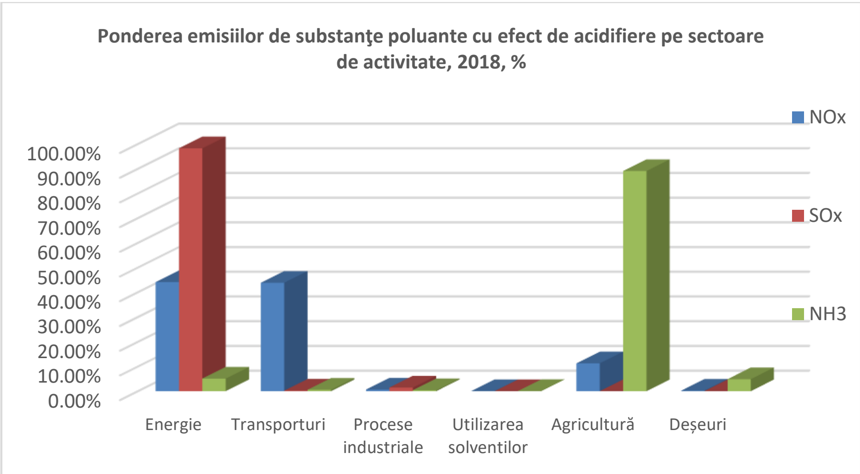
From the analysis of the data presented regarding the contribution of the energy sector to the emissions of persistent organic pollutants, it is observed that the largest share is the residential heating activity subsector, where over 90% percentages are observed for PCDD / PCDF dibenzofurans and PAH flavored 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 in anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH_3) and sulfur oxides (SOx, SO_2), for each of these taking into account its acidifying potential. The indicator also provides information on changes in emissions from major source sectors: generation and distribution of energy; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sectors; use of solvents and products; agriculture; waste; others.

Figure I.11 Share of emissions of polluting substances with acidification effect at national level by activity sectors in 2018



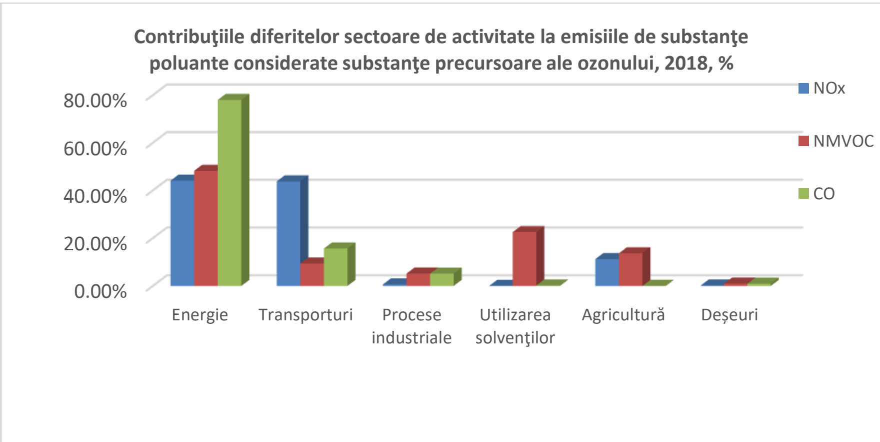
Source: Romania's Informative Inventory Report 2020

Ozone precursor emissions

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

Ozone is the allotropic form of oxygen. In the atmosphere, it can form naturally as a result of electrical discharges and under the action of solar rays, and artificially, as a result of the reactions of harmful substances from sources of ground pollution.
Ozone formed at the bottom of the troposphere is the main pollutant in industrialized cities. Tropospheric ozone is formed from nitrogen oxides (especially nitrogen dioxide), volatile organic compounds (VOC), carbon monoxide in the presence of solar radiation as the source of chemical reaction energy.
Toxic fog 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 and hydrocarbon oxides increases rapidly due to intense traffic. At the same time, the amount of nitrogen dioxide in the atmosphere decreases due to the fact that solar light leads to its decomposition into nitrogen oxide and oxygen atoms. Oxygen atoms combined with molecular oxygen form ozone. Hydrocarbons are oxidized and reacted with nitrogen oxide to produce nitrogen dioxide.

Figure I.12 Contributions of the activity sectors at national level, in 2018 to the emissions of pollutants discharged into the atmosphere and considered as precursor substances of ozone, %

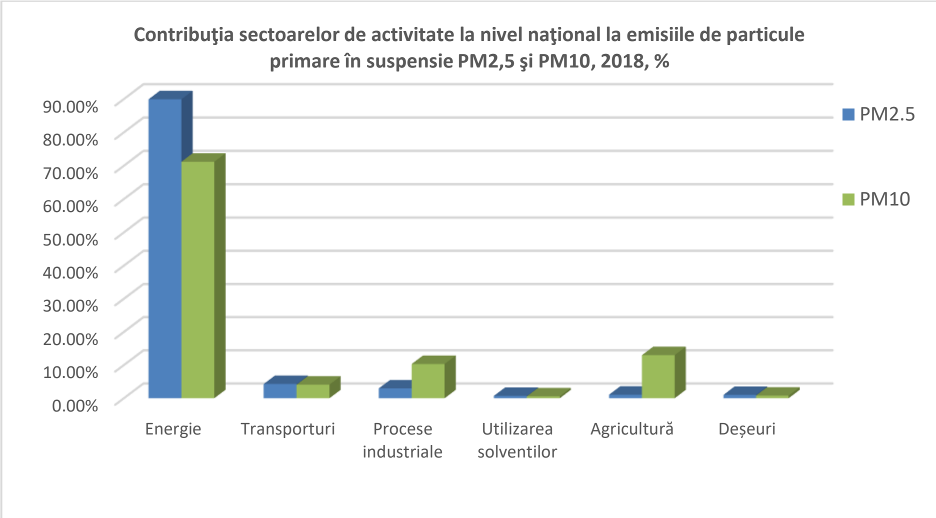


Source: Romania's Informative Inventory Report 2020

Primary particle emissions and secondary particle precursors

RO 03
Indicator code Romania: RO 03 EEA indicator code: CSI 03
TITLE: EMISSIONS OF PRIMARY PARTICLES AND SECONDARY PRECURSORS OF PARTICLES
DEFINITION: This indicator shows trends in the primary particle emission (PM2,5) and 10 µm (PM10) and secondary precursors of particle (NOx, ammonia (NH3) and Sulfur dioxide (SO2), derived from anthropogenic sources, by source sectors: energy production and distribution, energy use in industry, industrial processes, road transport, non-commercial transport, institutional and residential transport, use of solvents and other products, waste, other sources.

Figure I.13 Contribution of the activity sectors at national level in 2018, to the emissions of primary particles in suspension PM2.5 and PM10



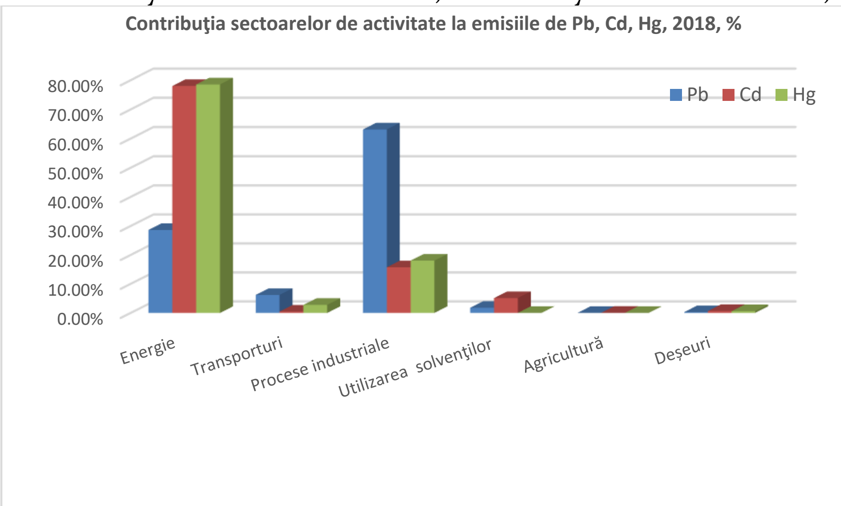
Source : LRTAP-RO- 2020

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 suspended primary particles (90% PM2.5, respectively 71% PM10), the majority in this sector being dust emissions, generated in the activity of residential heating. With much lower shares, the agriculture and industrial processes sectors stand out in PM10 emissions (13%, respectively 10%).

Heavy metal emissions

RO 38
Indicator code Romania: RO 38 EEA indicator code: APE 05
TITLE: HEAVY METAL EMISSIONS
DEFINITION: Trends of heavy metal anthropic emissions by industry: 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 Contribution of the activity sectors at national level, to the heavy metals emissions Pb, Cd, Hg, 2018

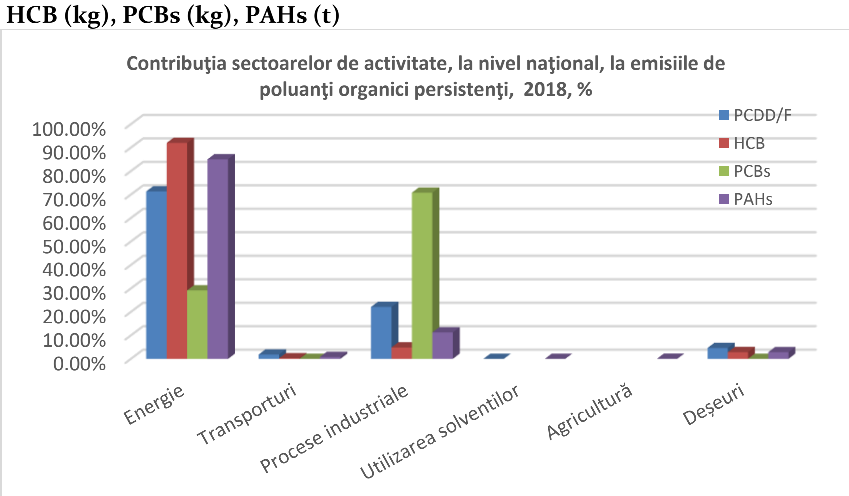


Source : LRTAP-RO- 2020

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, polycyclic aromatic hydrocarbons (PAHs), by sectors of activity: production and distribution of energy; 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 Contribution of the sectors of activity at national level in 2018, to the emissions of persistent organic pollutants PCDD / PCDF (g I-TEQ), HCB (kg), PCBs (kg), PAHs (t)



Source : LRTAP-RO- 2020

Industrial emissions

Industry

Industrial activities play an important role in the economic well-being of a country, while contributing to sustainable development. However, industrial activities can also have a significant impact on the environment. The industrial strategy of sustainable development aims to stimulate competitiveness, following the stable economic growth, and the protection of the environment. The air emissions generated by the largest industrial plants represent a considerable part of the total emissions of atmospheric pollutants. Also, these industrial activities also have an important impact on the environmental factors of water, soil, in addition to the generation of waste. The possibility of controlling the activity of industrial installations so that the emissions, the resulting waste and the energy consumption are as small as possible, has been subject to 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 (integrated pollution prevention and control) (recast) aims to prevent and control integrated pollution resulting from industrial activities, by establishing the conditions for prevention, and if not possible, for reducing emissions to air, water and soil, as well as preventing waste generation, 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 minimize their consequences. For the prevention, reduction, elimination of 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 best overlap with the concept of sustainable development were 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 the measures directly at the source and taking into account when necessary the economic situation, the local environmental conditions or the geographical location and the 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 authorization.
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 on the establishment of the European Register of Emitted and Transferred Pollutants and amending Council Directives 91/689 / EEC and 96/61 / EC (EPRTR Regulation). The EPRTR Regulation establishes a register of pollutant emissions and transfers 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 UN-ECE Protocol regarding the 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 on 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 in the titanium dioxide industry;
- Directive 82/883 / EC on the surveillance and control modalities of the areas where there are emissions from the titanium dioxide industry;
- Directive 92/112 / EC on the procedures for the harmonization of programs to reduce the pollution caused by waste from the titanium dioxide industry.

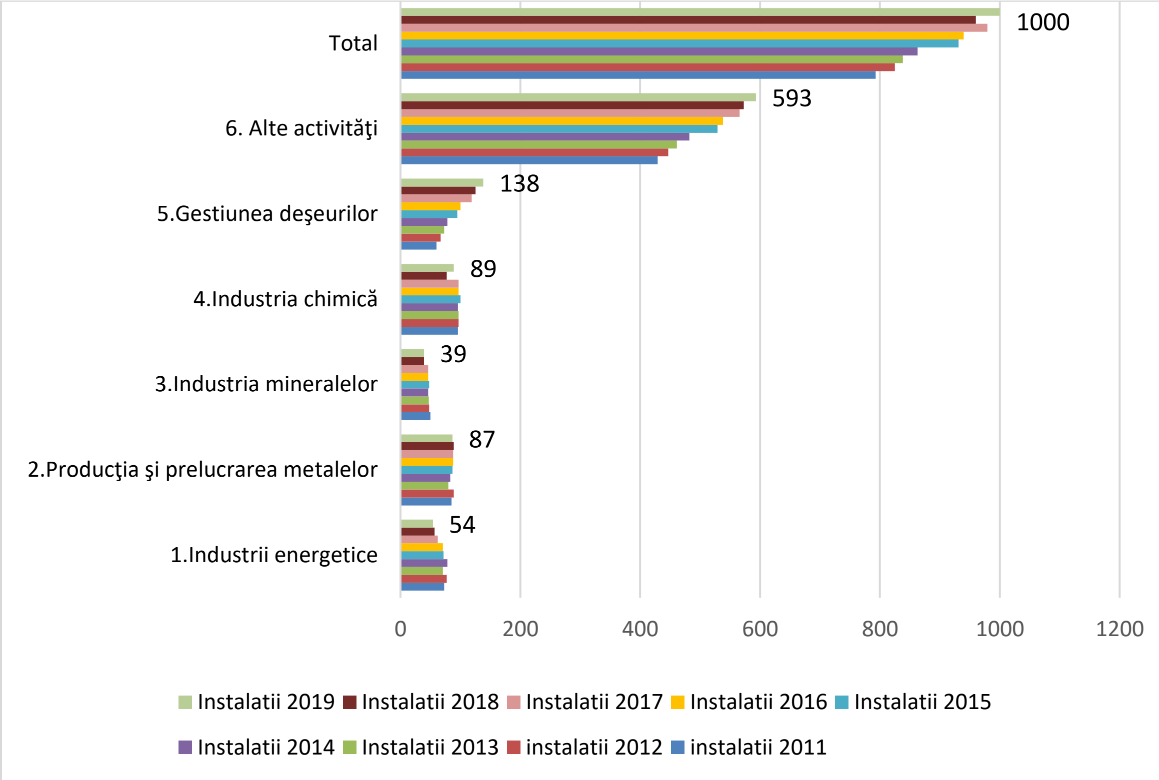
Romania transposed the provisions of the IED Directive by Law no. 278/2013 regarding industrial emissions, which entered into force on 01.12.2013. Chapter II of the new directive contains provisions applicable to the activities set out in Annex 1 and which, where appropriate, reach the capacity thresholds set out in that Annex.As regards the activities listed in Annex 1, the provisions of Directive 2010/75 / EU on industrial emissions are based on several principles, namely:

- an integrated approach that takes into account the environmental performance of the entire installation, including emissions to air, water and soil, waste generation, raw materials use, energy efficiency, noise, accident prevention, as well as restoring a satisfactory state of the site in time of closing, in order to ensure a high level of environmental protection considered as a whole;

- the application in the operation of the industrial facilities of the Best Available Techniques (BAT), as well as the establishment of the authorization conditions and the emission limit values (VLE) 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 setting the conditions for authorization by the competent authorities for environmental protection;
- verifying the conformity of industrial installations by implementing an environmental inspection system and inspection plans including site verification at least once every 1 or 3 years;
- public participation in the decision-making process for issuing integrated environmental permits and informing them about the environmental performance of industrial installations.

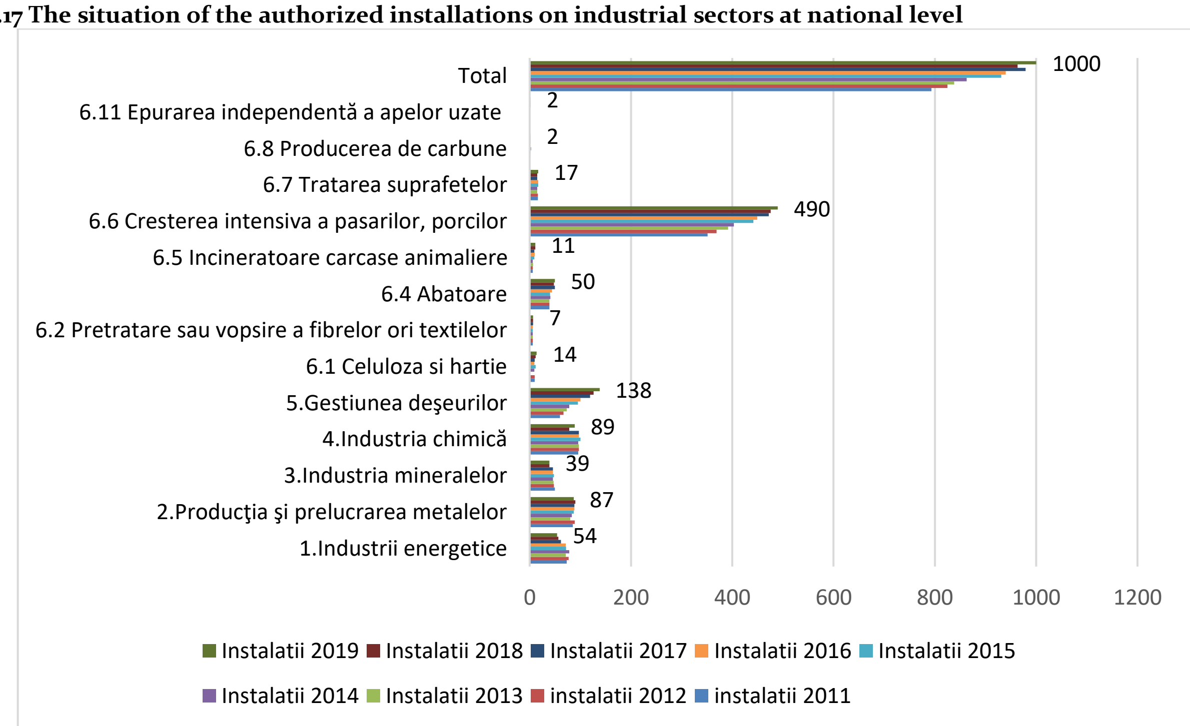
The most important categories of industrial activities provided by Annex 1 of the Directive 2010/75 / EU represented in Romania are the following: Thermo-energy industry, Cement industry, Oil and natural gas refining industry, Chemical and petrochemical industry, Metallurgical industry. The main possible environmental factor 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 the auxiliary products. Also, the non-ferrous metallurgy industry has a possible significant impact on the environment through the emission of pollutants into the atmosphere (combustion gases and powders), by the disposal of technological waste water, the storage of waste, etc. The construction materials industry is represented by important units for the production of cement, lime, refractory bricks, etc., activities that determine the generation of large quantities of powders, as well as gas emissions (especially CO_2, SO_2, etc.). The chemical industry is represented by installations for the production of basic organic and inorganic chemicals, chemical fertilizers, plant protection products, basic pharmaceuticals and explosives. These activities are associated with the generation of emissions from the storage of chemicals used as raw materials and products, with potential significant impact on air, soil and groundwater. The food industry holds an important place in the economy of many regions, being represented by installations for the production of food, beverages and milk from raw materials of animal and vegetable 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, by the discharge of technological wastewater with high organic load, the production of solid waste specific to these types of activity. That is why the operators have paid greater attention to the elimination of these problems by the creation of wastewater treatment plants, the purchase of ecological incinerators for animal waste, 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 and other gases that cause olfactory discomfort), soil and water (generally from manure storage and their spread on agricultural land as organic fertilizer). The machine building industry with possible significant impact on the environment through the metallic waste resulting from the series production and the specific pollutants resulting from the organic solvent treatment of the metal surfaces, objects or products manufactured within this industrial branch. The light industry is represented by pre-treatment factories (operations such as washing, bleaching, textile treatment) or dyeing of fibers or textiles, activities that generate waste and waste water.

Figure I.16 Industrial activities that comply with the provisions of Chapter II of Directive 2010/75 / EU on industrial emissions



Source: NEPA

Figure I.17 The situation of the authorized installations on industrial sectors 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, as subsequently amended and supplemented, contains special provisions applicable from 1 January 2016, for combustion plants whose total rated thermal input is 50 MW or more, regardless of the type of fuel used (solid, liquid or gaseous).
According to the provisions of art. 30 par. (3) integrated environmental permits issued for installations that have in their composition combustion plants authorized before the date of entry into force of the law (01.12.2013) or whose operators have submitted a complete application for authorization before this date, provided that such installations be put into operation by 7 January 2014 at the latest, include conditions to ensure that the emissions to air from these installations do not exceed the emission limit values set out in Part 1 of Annex no. 5 of the law.
The integrated environmental authorizations issued for combustion installations that do not fall under the provisions of par. (3), respectively those put into operation after January 7, 2014, provide conditions to ensure that the emissions to air from these installations do not exceed the emission limit values set out 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 set out in Part 1.
Until 1 January 2016, for combustion plants with a rated thermal input exceeding 50 MW, the provisions of Directive 2001/80 / EC (LCP) relating to the limitation of air emissions of certain pollutants, mainly SO_2, NOx and powders, were applied. Directive 2001/80 / EC (LCP) on the limitation of emissions into the atmosphere of certain pollutants from large combustion plants has been transposed into Romanian law by Government Decision no. 541/2003 on 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 completions. In accordance with Art. 10 of the law, the provisions of Chapter II apply to the categories of activities mentioned in annex no. 1, and one of the categories is the one mentioned in point 1.1
– Combustion of fuels in installations with a total rated thermal input of 50 MW or more.
At national level, out of the total of 82 functional combustion installations - 32 combustion installations benefited until June 30, 2020, according to art. 32 of the law, derogating from the observance of the emission limit values provided in art. 30 par. (3) and the desulphurization rates provided in art. 31, on the condition that the measures provided in the National Transition Plan (NTP) are implemented and that the emission limit values for sulfur dioxide, nitrogen oxides and dust applicable on 31.12.2015 are complied with, as well as the contributions to the national emission ceilings established in the NTP. Also, 22 combustion installations benefit in the period 01.01.2016 - 31.12.2023, according to art. 33 of the law, the derogation from the observance of the emission limit values provided in art. 30 par. (3) and the desulphurization rates provided in art. 31, having the right to operate within the limit of 17500 hours, and 8 combustion installations benefit in the period 01.01.2016 - 31.12.2022, according to art. 35, the derogation from the observance of the emission limit values provided in art. 30 par. (3) and (4) and of the desulphurization rates provided for in Article 31, on the condition that at least 50% of the useful production of thermal energy, 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, in particular emissions of sulfur dioxide and nitrogen oxides which 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: rehabilitation and modernization of large combustion plants, change of fuel used. The reduction of SOx emissions in the energy sector is achieved mainly by giving up 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, but energy production and consumption nevertheless put considerable pressure on the environment, such as contributing to climate change, environmental degradation and adverse effects on human health.
In 2018, 72 combustion installations operated at national level. The main fuels used in these installations are: natural gas, fuel oil, lignite and coal, but in a small number of installations biomass, coke oil and refinery gas are also used. The values of the annual emissions (tons / year) of specific pollutants coming from the

combustion installations, registered in 2018 are the following:

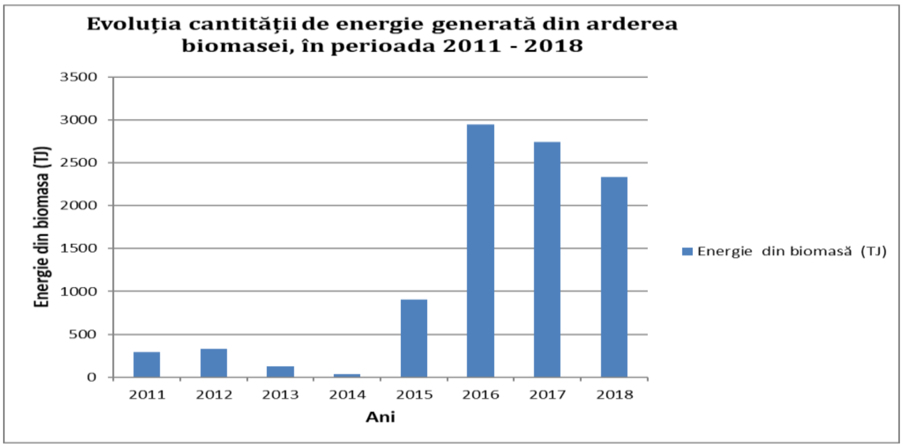
- 36276,379 t Sulphur dioxide;
- 30321,618 t Nitrogen oxides;
- 2625,052 t Powder.

Table I.2 Evolution of the amount of energy generated from the burning of biomass expressed in TJ, during the period 2011 – 2018

Years	2011	2012	2013	2014	2015	2016	2017	2018
Energy from biomass (TJ)	294,94	330,91	128,00	38,91	907,396	2944,463	2744,66	2334,859

Source: NEPA

Figure I.18 Evolution of the amount of energy generated from the burning of biomass expressed in TJ, during the period 2011 –2018



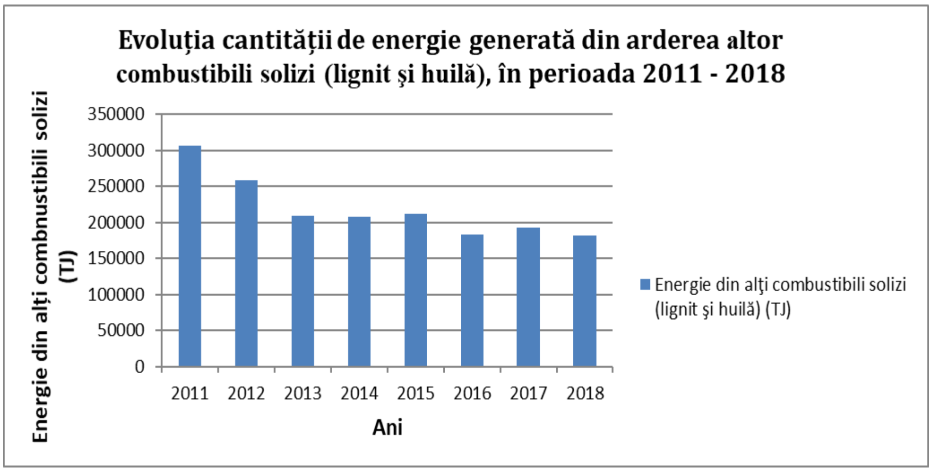
Source: NEPA

Table I.3 2 Evolution of the amount of energy generated from the combustion of other solid fuels (lignite and oil), between 2011 and 2018

Years	2011	2012	2013	2014	2015	2016	2017	2018
Energy from other solid fuels (lignite and oil) (TJ)	306876,56	258902,12	208891,93	207672,78	211619,41	183880,38	192209,76	181596,29

Source: NEPA

Figure I.19 Evolution of the amount of energy generated from the combustion of other solid fuels (lignite and oil), between 2011 and 2018



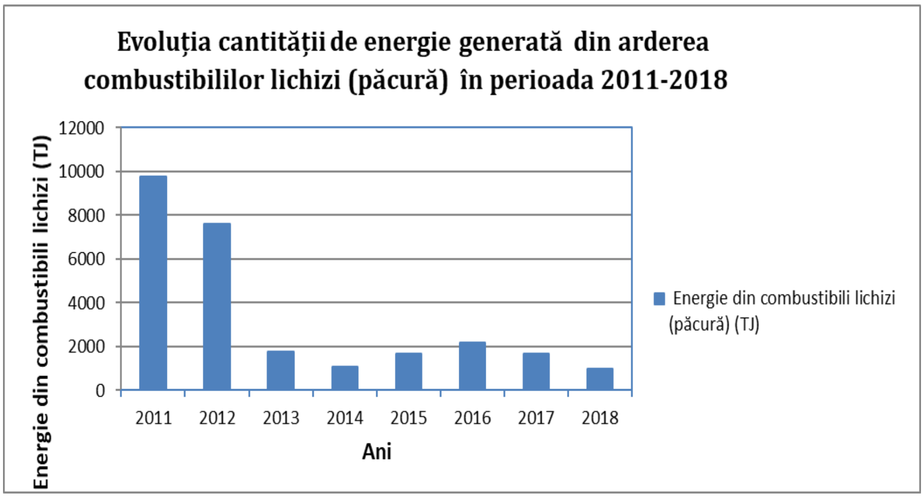
Source:NEPA

Table I. Evolution of the amount of energy generated from the burning of liquid fuels (fuel oil), during the period 2011–2018

Years	2011	2012	2013	2014	2015	2016	2017	2018
Energy from liquid fuels (fuel oil) (TJ)	9744,24	7605,84	1752,87	1077,57	1655,253	2187,866	1690,78	1005,134

Source:NEPA

Figure I.20 Evolution of the amount of energy generated from the burning of liquid fuels (fuel oil), during the period 2011–2018



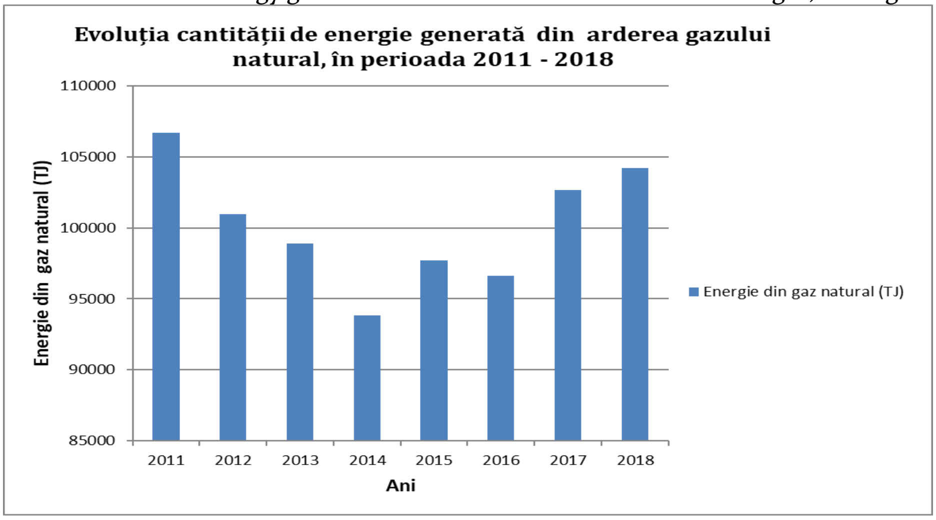
Source:NEPA

Table I.5 Evolution of the amount of energy generated from the combustion of natural gas, during the period 2011 – 2018

Years	2011	2012	2013	2014	2015	2016	2017	2018
Energy natural gas (TJ)	106708.87	100984.9	98877.58	93823.39	97736.824	96652.262	102684	104210,492

Source:NEPA

Figure I.21 Evolution of the amount of energy generated from the combustion of natural gas, during the period 2011 – 2018



Source:NEPA

Table I. Evolution of the amount of energy generated from the combustion of other combustible gases (furnace gas and refinery gas), during the period 2011 – 2018

Years	2011	2012	2013	2014	2015	2016	2017	2018
Energy other gases (TJ)	2873,65	2560,37	1868,90	1622,468	1389,004	1999,226	1290,66	1300,279

Source:NEPA

Chapter IV of Directive 2010/75 / EU on industrial emissions (IED) presents special provisions on waste incineration plants and waste co-incineration plants

Incineration of hazardous and non-hazardous waste can cause emissions of substances that pollute the air, water and soil and have adverse effects on human health. To limit these risks, Directive 2000/76 / EC on waste incineration imposed strict operating conditions and technical requirements for waste incineration and co-incineration plants, which were taken over in Chapter IV of Law no. 278/2013 regarding industrial emissions – *Special provisions regarding waste incineration and waste incineration plants.*

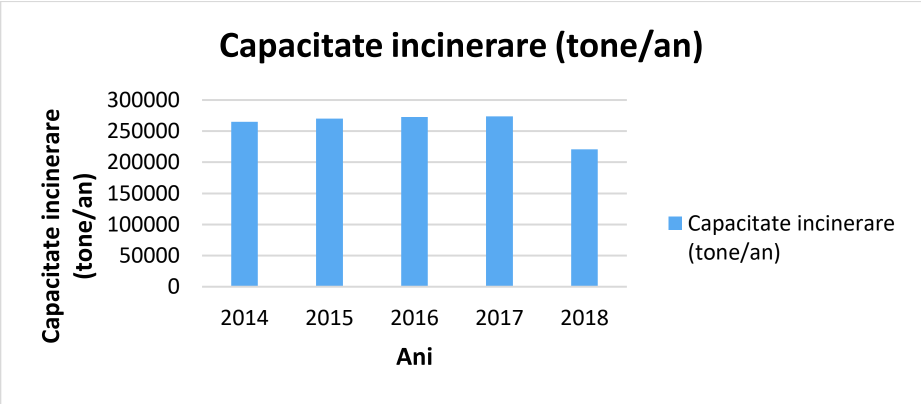
This chapter refers to the technical advances in the control of emissions from incineration / co-incineration activities in terms of reducing pollution, especially those related to setting limit values for atmospheric emissions for dioxins, mercury and powders to which there are added limits on water discharges from waste gas purification plants. According to Law no. 278/2013 on industrial emissions, this chapter applies to the activities in Annex I *(activities 5.2 și 5.3).*

In 2018, 33 incineration plants and co-incineration plants were inventoried.

In order to guarantee the complete combustion of the waste, it is stipulated that all installations must maintain the gases resulting from incineration and co-incineration at a minimum temperature of 850 ° C for at least two seconds. In the case of hazardous waste containing more than 1% halogenated organic matter, expressed in chlorine, the temperature should be brought to 1 100 ° C

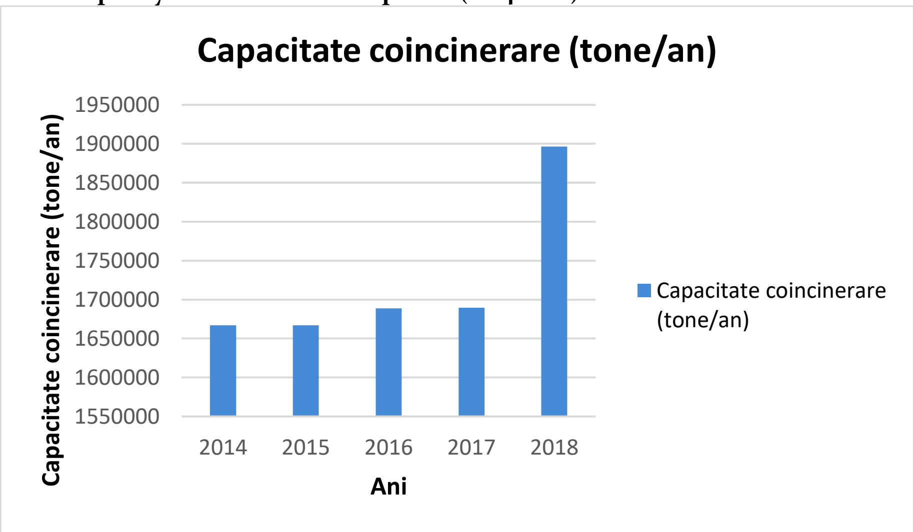
for at least two seconds. The heat produced by incineration or co-incineration should be used as much as possible.
The limit values of atmospheric emissions for incineration plants are indicated in annex no. VI part 3 of the respective law.
These relate to heavy metals, dioxins and furans, carbon monoxide (CO), powders, total organic carbon (COT), hydrochloric acid (HCl), hydrofluoric acid (HF), sulfur dioxide (SO_2) and nitrogen oxides (NO and NO_2).
The determination of the limit values of the atmospheric emissions for the co-incineration plants is provided in annex no. VI part 4 of the respective law. There are also special provisions regarding cement kilns and combustion plants for waste co-incineration.
The incineration or co-incineration plants must have an opinion stipulating the conditions for the discharge of the waste water from the waste gas treatment. This opinion must guarantee compliance with the emission limit values indicated in annex no. VI part 5 of the respective law.
The waste generated by incineration or co-incineration should be minimized and recycled as far as possible. When transporting dry residues, precautions must be taken to avoid dispersing them in the environment. Tests must be carried out to determine the physical and chemical characteristics of the residues, as well as their harmful potential.
The evolution of the capacities of the incineration and co-incineration plants for the period 2014 - 2018 is presented in the graphs below.

Figure I.22 The evolution of the capacity of incineration plants (2014 – 2018)



Source:NEPA

Figure I.23 Evolution of the capacity of co-incineration plants (2014-2018)



Source:NEPA

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

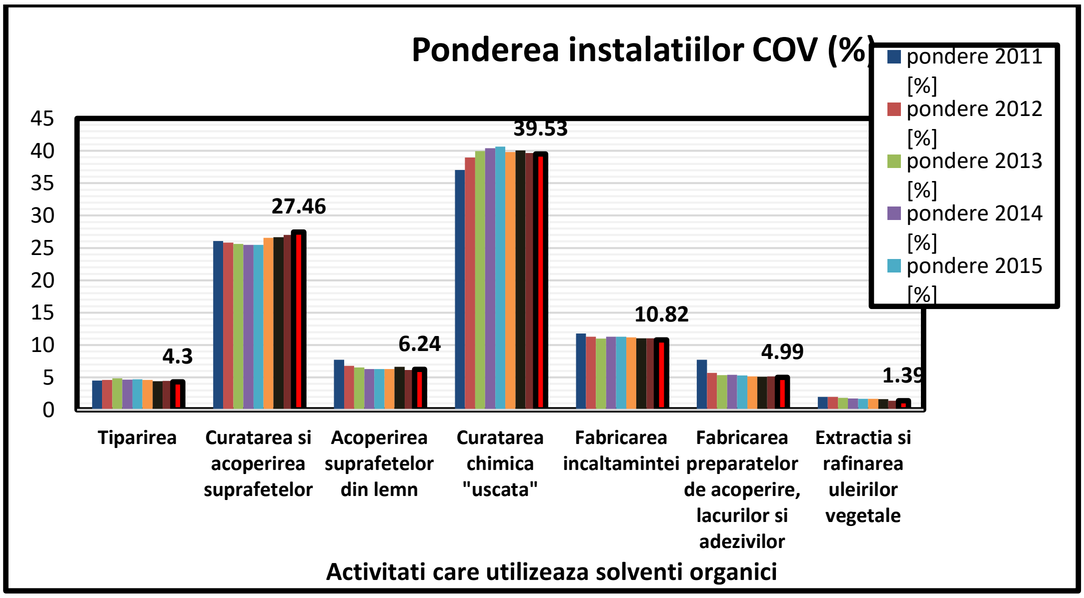
With the advent of the European Parliament's Directive 2010/75 / EU on industrial emissions, Directive 1999/13 / EC on the establishment of measures to reduce emissions of volatile organic compounds (VOCs) due to the use of organic solvents in certain activities and installations has become an integral part of it.
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, where appropriate, the consumption thresholds set out in Part 2 of that Annex.
These provisions aim to prevent or reduce the effects, direct or indirect, due to the emissions of volatile organic compounds (VOCs) in the environment, mainly from the air and the potential risks to human health, through measures and procedures to be implemented, in certain industrial activities whose solvent consumption is higher than the thresholds established for each type of activity.
The economic agents that operate the installations that are covered by Chapter V have the obligation to apply the measures and the techniques associated with the best available techniques to ensure the compliance of the operating conditions with one of the following requirements:

- compliance with VOC emission limit values by using VOC emission capture and treatment equipment;
- applying a VOC Reduction Scheme by reducing solvent consumption by appropriate techniques, or replacing VOC-based solvents with water-based solvents, or with lower VOC content, to provide the possibility to reduce source emissions, reducing 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 721 (58 installations also fall under Chapter II - special provisions applicable to the installations and activities listed in Annex I - IPPC), from which the following activities have an important weight:

- printing, with a weight of 4,3 %;
- cleaning and coating surfaces, with a weight of 27,46 %;
- covering of wooden surfaces, with a weight of 6,24%;
- "dry" chemical cleaning, with a weight of 39,53 %;
- footwear manufacture, with a weight of 10,82 %;
- manufacture of paints, varnishes, inks and adhesives, with a weight of 4,99 %;
- extraction and refining of vegetable oils and animal fats, with a weight of 1.39% of the total inventory activities.

Figure I.24 Share of VOC installations



Source:NEPA

European register of pollutants emitted and transferred (Register E-PRTR)

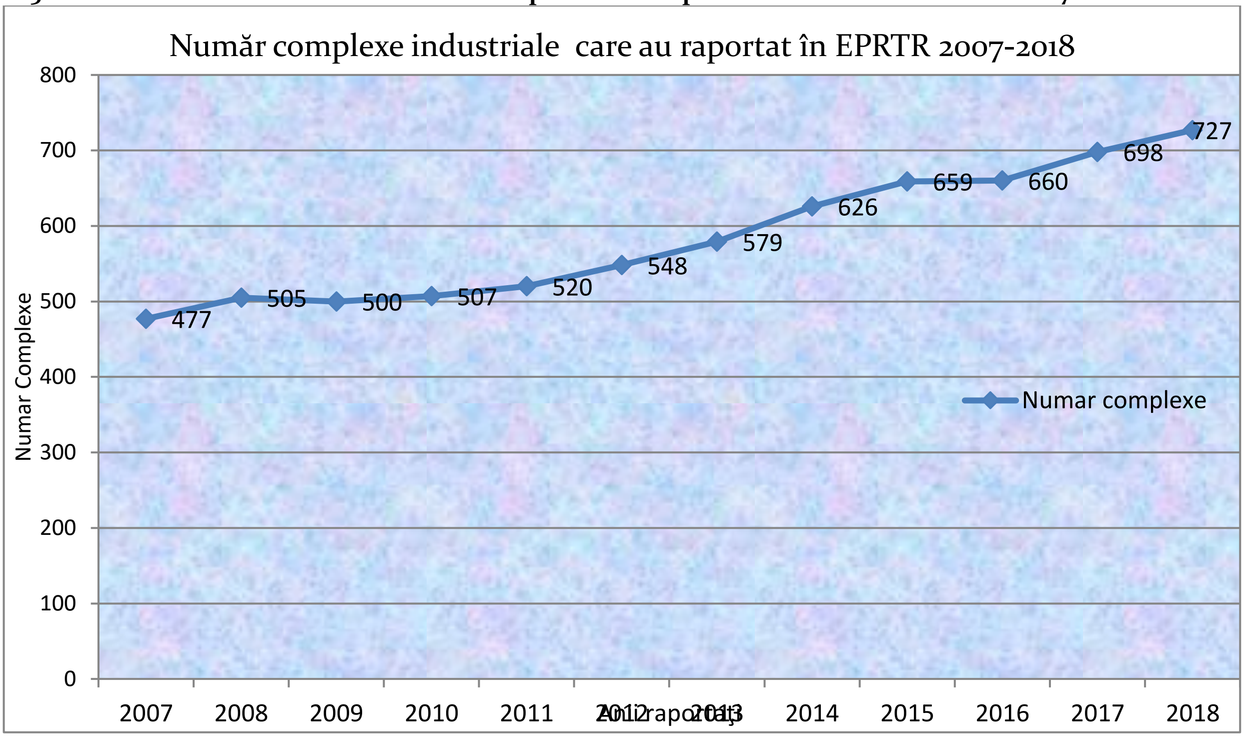
The European Register of Emitted and Transferred Pollutants (E-PRTR Register) succeeds the European Pollutant Emissions Register (EPER Register). The register is designed as an electronic database that can be accessed by the public at the following address http://prtr.ec.europa.eu/ . At European level, on 18 January 2006, 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 / EC ("E-PRTR Regulation"). The register contains specific data and information on emissions of pollutants into air, water, soil, on transfers of pollutants from wastewater, hazardous and non-hazardous wastes, outside the locations of industrial complexes, from all EU Member States. Reporting is required if the capacity threshold and emission or transfer thresholds outside the site of pollutants in wastewater or waste are exceeded. Romania has implemented at national level the provisions of the EPRTR Regulation through H.G. 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 Pollutants Emitted and Transferred and the modification of Council Directives 91/689 / EEC and 96/61 / EC, which establishes the institutional framework necessary for the direct application of the EPRTR Regulation.

According to the requirements of the EPRTR Regulation, the National Agency for Environmental Protection has created the national website of the Register of Transmitted and Transferred Pollutants (PRTR) that allows the public access, both in the country and abroad, to the environmental information regarding the industrial complexes in Romania, by accessing the address http://prtr.anpm.ro . The link according to the request of the European Commission was sent at European level to be integrated in the European register in the section "Links - National Registers".

Both the European EPRTR and the national PRTR Registry contain information for the period (2007-2018), the data collections for the latter year being reported by the Member States to the European Commission by March 30, 2020. The EPRTR Regulation has set new requirements, in addition to those established by the EPER Decision, extending the reporting for the industrial sectors covered by the IPPC Directive to a number of non-IPPC activities, thus totaling 66 activities grouped into 9 industrial sectors, including underground mining and exploration / exploitation activity of oil and gas fields.

The collection for the year 2018, at national level, comprises a number of 727 industrial complexes respectively sites that registered exceedances of the threshold values established by Annex II of the EPRTR Regulation, with 250 industrial complexes more than in 2007 (477), with 222 industrial complexes more than 2008 (505), with 227 industrial complexes more than 2009 (500), with 220 industrial complexes more than 2010 (507), with 207 industrial complexes more than 2011 (520), with 179 industrial complexes more than in 2012 (548), with 148 industrial complexes more than in 2013 (579), with 101 industrial complexes more than in 2014 (626), with 70 industrial complexes more than in 2016 (657), with 67 more industrial complexes compared to 2016 (660), and with 29 more industrial complexes than in 2017 (698).

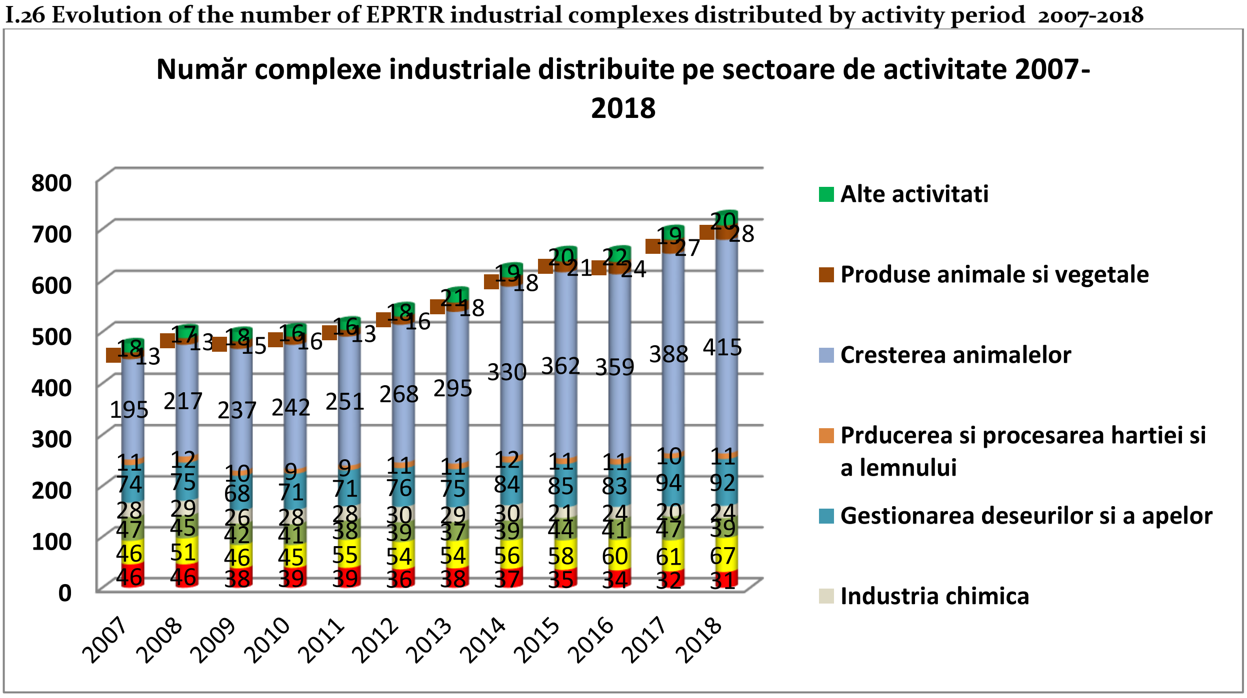
Figure I.25 Evolution of the number of industrial complexes that reported in EPRTR *Source:NEPA* **2007-2018**



Source:NEPA

Compared to 2017, in 2018 there is an increase of 4,15% in the number of complexes registered in the National PRTR Register and compared to 2007 an increase of 52,4%. In the 2018 collection, a number of 51 industrial complexes were registered for the first time in the national PRTR Register.

Figure I.26 Evolution of the number of EPRTR industrial complexes distributed by activity period 2007-2018



Source:NEPA

The share of the total number of reported installations in the energy sector, metal production and processing, mineral industry, chemical industry, paper and wood production and processing, plant animal products sector, and other activities remains more or less the same over the series of time and the number of reported industrial complexes carrying out animal husbandry activity was continuously increasing until 2015, after which for 2016 there is a small decrease followed by a new increase in 2017 and 2018, so the growth recorded in 2018 is higher by 6.5% compared to 2017.

Their distribution on development regions is as follows:

- Region 1 North - East 94 industrial complexes,
- Region 2 South - East 99 industrial complexes,
- Region 3 South – Muntenia 157 industrial complexes,
- Region 4 South West – Oltenia 42 industrial complexes,
- Region 5 West 105 industrial complexes,
- Region 6 North - west 92 industrial complexes,
- Region 7 Center 110 industrial complexes,
- Region 8 Bucharest – Ilfov 28 industrial complexes.

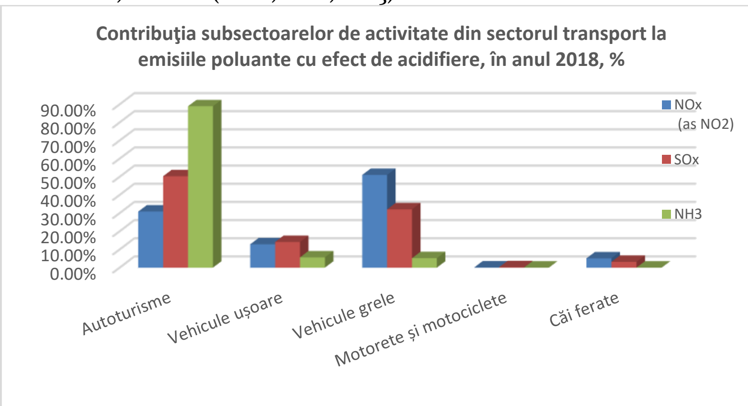
Although the energy sector continues to improve its environmental performance, it contributes to air pollution with significant amounts of sulfur dioxide, carbon monoxide, carbon dioxide, nitrogen oxides and dust. Analyzing at national level the evolution of these main pollutants emitted in the air, a general tendency 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 plants, by making desulphurization, deoxidation and dust removal facilities. At the same time, the reduction of SOx emissions in the energy sector was 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). However, we must admit that the decrease in annual emissions of pollutants (kg / year) from large combustion plants has also occurred due to the closure of some plants. But overall, in 2018 compared to 2007 most of the emissions in the energy sector were reduced as follows: SOx by about 91.83%, NOx by about 65.60%, PM10 by about 90.38%, and CO_2 by about 44, 34%.

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

Figure I.27 Contribution of the subsectors of activity from the transport sector to the emissions of pollutants with acidification and eutrophication effect, in 2018 (NOx, SOx, NH_3)



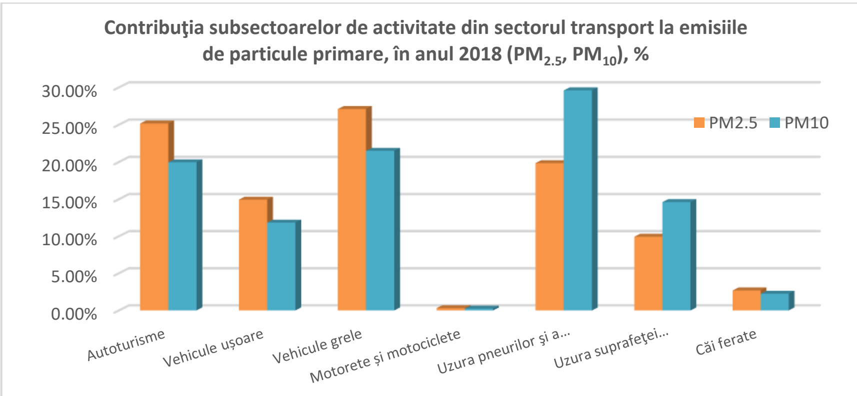
Source: Romania's Informative Inventory Report 2020

The analysis of data on the contribution of transport sub-sectors in transport in 2018 to emissions of ozone precursors in the transport sector shows that the most important source of pollution is car transport, to CO and NMVOC pollutants, closely followed by gasoline evaporation for NMVOC pollutant and heavy vehicle category has the highest share of nitrogen oxide pollutants.

Primary particle emissions and secondary particle precursors

RO 03
Indicator code Romania: RO 03 EEA indicator code: CSI 03
TITLE: PRIMARY PARTICLES EMISSIONS AND SECONDARY PARTICLE PRECURSORS
DEFINITION: This indicator shows the primary particle emission (PM2,5) and 10 µm (PM10) and secondary particle precursors (NOx, ammonia (NH3) and Sulfur dioxide (SO2), derived from anthropogenic sources, by source sectors: energy production and distribution, energy use in industry, industrial processes, road transport, non-commercial transport, institutional and residential transport, use of solvents and other products, waste, other sources.

Figure I.28 Contribution of the subsectors of activity in the transport sector to the emissions of primary particles, in 2018 ($PM_{2.5}$, PM_{10})



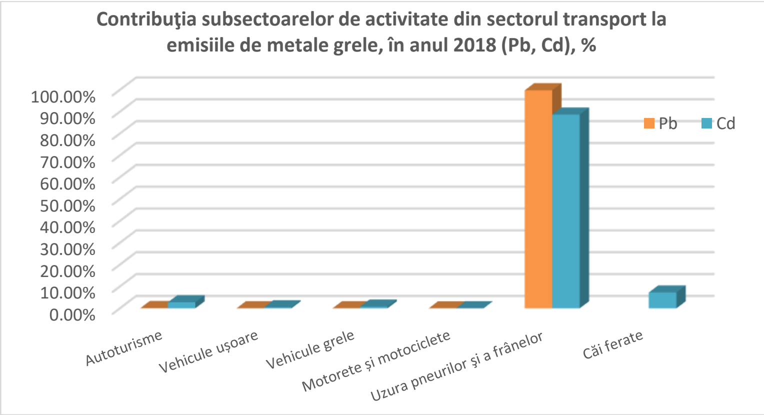
Sursa: LRTAP-RO-2020

From the analysis of the data on the contribution of the transport activity subsectors, in 2018, to the emissions of primary particles and precursors of secondary particles, it is found that the activities with the highest share are the categories of heavy vehicles, cars and tire and brake wear.

Heavy metal emissions

RO 38
Indicator code Romania: RO 38 EEA indicator code: APE 05
TITLE: HEAVY METAL EMISSIONS
DEFINITION: Trends of heavy metal anthropic emissions by industry: 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 the subsectors of activity from the transport sector to the emissions of heavy metals, in 2018 (Pb, Cd)



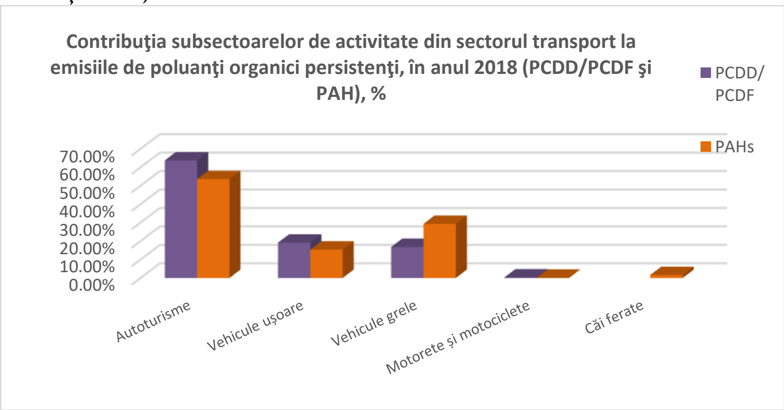
Source: LRTAP-RO- 2020

From the analysis of data on the contribution of the transport sector at national level, in 2018, to heavy metal emissions, it is found that the largest share belongs to the process of wear of tires and brake pads.

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, polycyclic aromatic hydrocarbons (PAHs), by sectors of activity: production and distribution of energy; 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 subsectors of activity in the transport sector to the emissions of persistent organic pollutants, in 2018 (PCDD/PCDF şi PAH)



Source: LRTAP-RO-2020

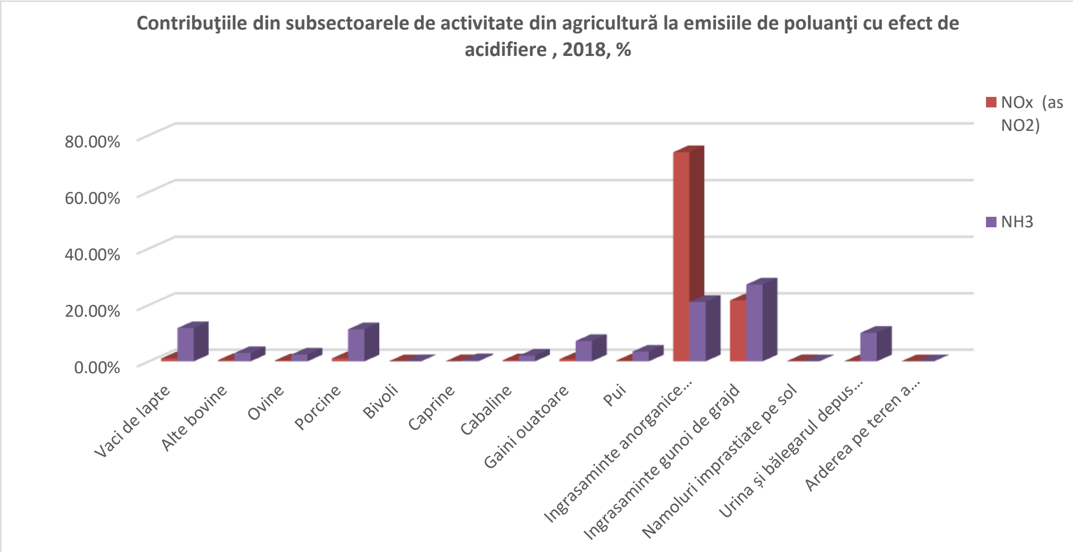
From the analysis of the data on the contribution from the transport sector, on persistent organic pollutants it is shown that the largest share is in the category of passenger cars, followed by the categories of heavy vehicles and light vehicles.

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 in anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH3) and sulfur oxides (SOx, SO2), taking into account its acidifying potential for each of them. The indicator also provides information on changes in emissions from major source sectors: generation and distribution of energy; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sectors; use of solvents and products; agriculture; waste; others.

Figure I.31 Contributions of the subsectors of activity in the agriculture sector to the emissions of acidifying pollutants (NOx și NH_3), in 2018



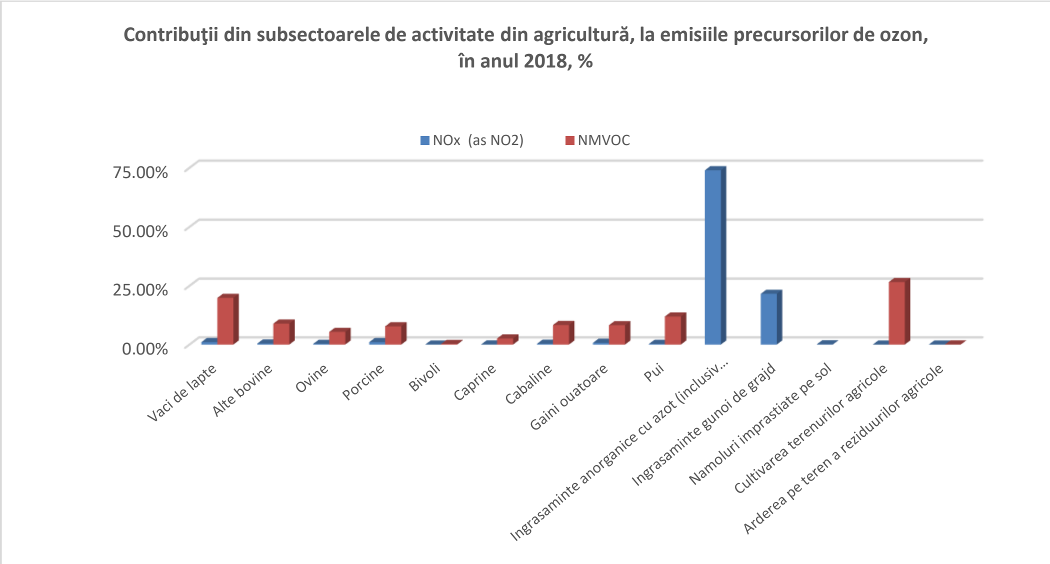
Source: Romania's Informative Inventory Report 2020

The analysis of the data presented on the contribution of the activity of the agricultural subsectors to the emissions of pollutants with acidifying effect, shows that the activities with impact in this type of emissions are the application of synthetic and natural fertilizers in agricultural crops, followed by animal husbandry (dairy cows, pigs , laying hens). The subsector of activity consisting in the application of organic and inorganic nitrogen fertilizers (including urea) on the soil is the main contributor to NOx emissions from agriculture.

Ozone precursor emissions

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

Figure I.32 Contributions of the subsectors of activity from the agriculture sector to the emissions of ozone precursors (NMVOC și NOx), in 2018



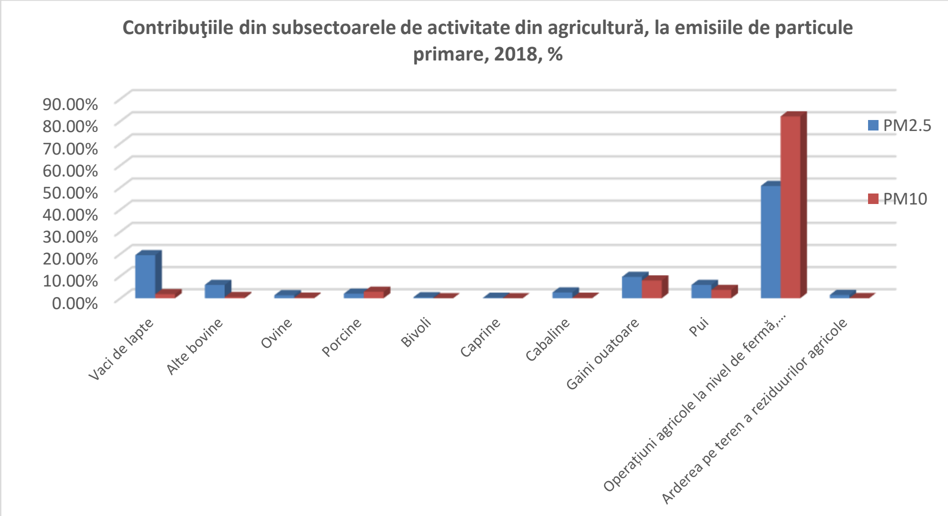
Source: Romania's Informative Inventory Report 2020

The analysis of the data presented on the contribution of the activity of the agricultural sectors to the emissions of ozone precursors at national level, shows that the activities on agricultural land cultivation, along with those of animal husbandry (dairy cows, chickens, other cattle), have the largest share for NMVOC pollutant; for NOx emissions, the main emitter is the application of inorganic nitrogen fertilizers (including urea).

Primary particle emissions and secondary particle precursors

RO 03
Indicator code Romania: RO 03 EEA indicator code: CSI 03
TITLE: PRIMARY PARTICLES EMISSIONS AND SECONDARY PARTICLE PRECURSORS
DEFINITION: This indicator shows the primary particle emission (PM2,5) and 10 µm (PM10) and secondary particle precursors (NOx, ammonia (NH_3) and Sulfur dioxide (SO_2), derived from anthropogenic sources, by source sectors: energy production and distribution, energy use in industry, industrial processes, road transport, non-commercial transport, institutional and residential transport, use of solvents and other products, waste, other sources.

Figure I.33 Contributions of the subsectors of activity from the agriculture sector to the emissions of primary particles PM2.5 and PM10, year 2018



Source: LRTAP-RO-2020

From the analysis of the data regarding the contribution of sub-sectors of agriculture, to the PM2,5 and PM10 primary particle emissions, it is found that a significant share is held by the activity of agricultural operations in farms, transport and storage, followed by the activity of breeding milk 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, polycyclic aromatic hydrocarbons (PAHs), by sectors of activity: production and distribution of energy; 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 agricultural activity sector had in 2018 at national level an insignificant contribution (0.06%) to the emissions of polycyclic aromatic hydrocarbons, resulting from the activity of field burning of agricultural residues.

TRENDS AND FORECASTS ON ENVIRONMENTAL AIR POLLUTION

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

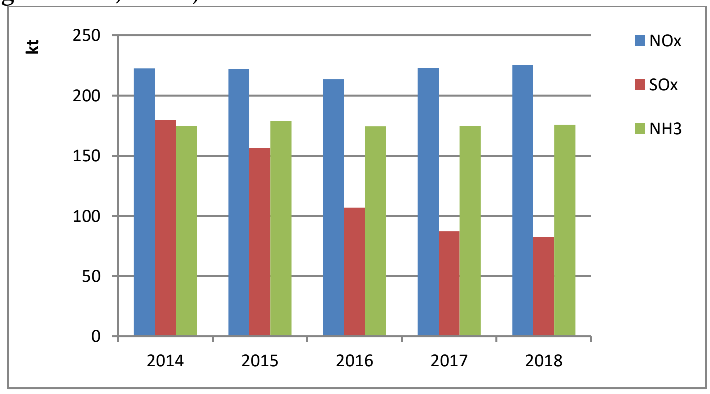
- the level of production achieved from various sectors of activity at national level;
- refurbishment of installations (cleaner technologies, with emissions of minimal pollutants);
- the replacement of old installations, which are not economically and financially justified to be refurbished, with new,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

Air pollution is a complex problem because it is a widespread phenomenon, generated by many activities, such as increasing industrial and energy production, burning fossil fuels, increasing traffic, heating, 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 in anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH3) and sulfur oxides (SOx, SO2), taking into account its acidifying potential for each of them. The indicator also provides information on changes in emissions from major source sectors: generation and distribution of energy; energy use in industry; industrial processes; road transport; non-road transport; the commercial, industrial and household sectors; use of solvents and products; agriculture; waste; others.

Figure I.34 The trend of emissions of air pollutants with acidifying and eutrophication effect at national level 2014-2018 (energy, industry, transport, agriculture, waste)



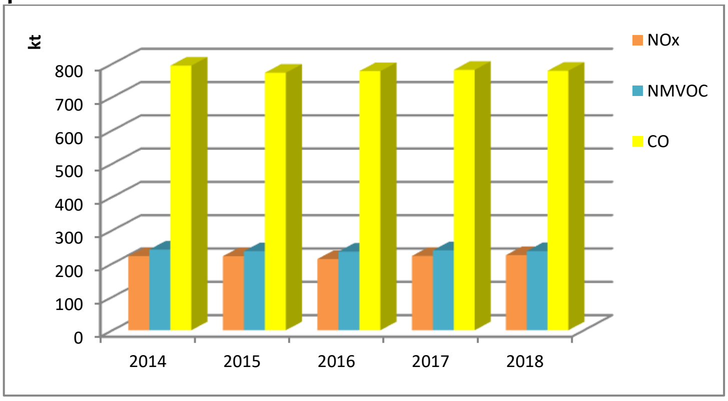
Source: LRTAP-RO 2020

From the data analysis, a slight tendency to decrease the emissions of pollutants with acidifying effect at national level can be observed during the analyzed period. By sectors, the decrease is mainly in the energy and industry sectors, with the agriculture and transport sectors showing increases or decreases, from year to year.

Ozone precursor emissions

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

Figure I.35 The trend of emissions of ozone precursor air pollutants at national level (energy, industry, transport, agriculture, waste) during 2014-2018



Source: LRTAP-RO-2020

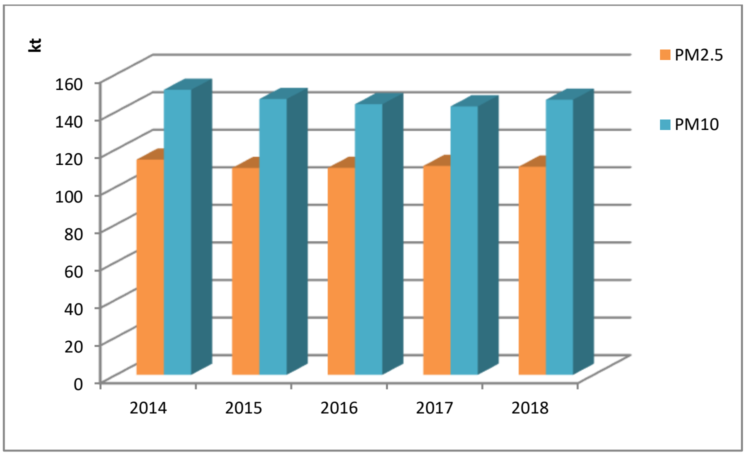
The analysis of the data sets presented on the trend of emissions of ozone precursor pollutants at national level also shows a slight decrease over the analyzed period.
Emissions of pollutants released into the atmosphere have a downward trend due to the implementation of the principles of sustainable development and the adoption of environmental policies, such as:

❖ electricity production by partial replacement of fossil fuels with alternative sources: nuclear energy (commissioning of reactors 3 and 4 of Cernavoda NPP), wind energy, energy produced in the fields of photovoltaic panels, etc.;
❖ reducing the sulfur content of fuels and partially replacing diesel fuel with biodiesel;
❖ replacing rural heating (traditional wood stoves) with modernized stoves that use pellets as fuel and have high combustion efficiencies and low pollutant emissions;
❖ the introduction into operation of vehicles equipped with hybrid and electric motors;
❖ 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 installations for the containment, capture, storage of pollutants (eg capture and storage of carbon dioxide in large combustion plants-IMA, electrostatic filters, burners with low NOx emissions, scrubbing, etc.).

Primary particle emissions and secondary particle precursors

RO 03
Indicator code Romania: RO 03 EEA indicator code: CSI 03
TITLE: PRIMARY PARTICLES EMISSIONS AND SECONDARY PARTICLES PRECURSORS
DEFINITION: This indicator shows the primary particle emission (PM2,5) and 10 µm (PM10) and secondary precursors of particles (NOx, ammonia (NH3) and Sulfur dioxide (SO2), derived from anthropogenic sources, by source sectors: energy production and distribution, energy use in industry, industrial processes, road transport, non-commercial transport, institutional and residential transport, use of solvents and other products, waste, other sources.

Figure I.36 Trends of primary particle emissions at national level (total energy, industry, transport, agriculture, waste) 2014-2018



Source: LRTAP-RO-2020

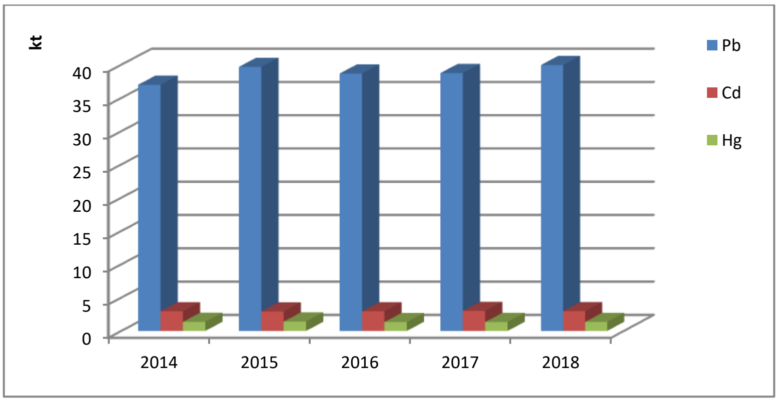
From the analysis of the data sets on the trend of PM2,5 and PM10 primary particle emissions at national level, we can observe the main sectors with major contributions in primary particle emissions: the energy sector and the agriculture sector.

The overall trend at the national level of primary particle emissions in the period 2014-2018 is decreasing in the industry and energy sectors and slightly increasing in transport and agriculture.

Heavy metals emissions

RO 38
Indicator code Romania: RO 38 EEA indicator code: APE 05
TITLE: HEAVY METAL EMISSIONS
DEFINITION: Trends of heavy metal anthropic emissions by industry: 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 Trend of heavy metal emissions (Cd, Hg and Pb) at national level (total energy, industry, transport, agriculture, waste) 2014-2018



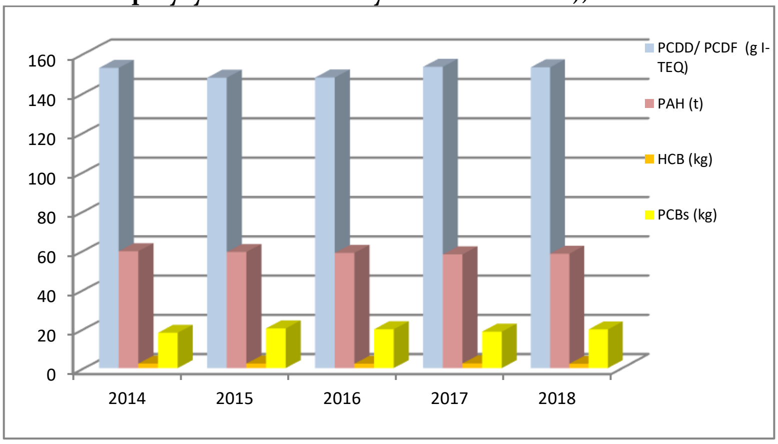
Source: LRTAP-RO-2020

At national level, the analysis of the data presented on the trend of heavy metal emissions shows the increase in 2014-2018, the activities increasing due to economic growth. The transport sector shows an annual growth trend due mainly to the growth of 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, polycyclic aromatic hydrocarbons (PAHs), by sectors of activity: production and distribution of energy; 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.

Figura I.38 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 during 2014-2018



Source: LRTAP-RO-2020

In the industry and transport sectors there are trends of increasing emissions of persistent organic pollutants mainly due to the intensification of economic activities, namely the sharp increase in the fleet of all categories of cars, both cars and light and heavy vehicles.
There have been highlighted as tools for controlling and preventing emissions of air pollutants the socio-economic, financial and political measures that create the legislative framework, as well as the objectives of some environmental plans, projects and programs at national and European level according to the requirements of the directives on quality of life and the environment.

FORECASTS ON THE EMISSIONS OF THE MAIN ATMOSPHERIC POLLUTANTS

Emissions of pollutants released into the atmosphere have a downward trend due to the implementation of the principles of sustainable development and the adoption of environmental policies such as:

- production of electricity by partially replacing fossil fuels with alternative sources: nuclear power (commissioning of Cernavoda CNE reactors 3 and 4), wind energy, energy produced in the fields of photovoltaic panels, etc;
- reduction of sulfur content in fuels and gases and partial replacement of diesel fuel with biodiesel;
- wood-burning stoves) with modernized stoves that use as pellet fuel and have high combustion yields and low pollutant emissions;
- introduction into operation of vehicles equipped with electrically powered engines;

- the provision of economic-financial mechanisms that allow the replacement of installations with significant pollutant effect on the environment with less polluting ones;
- provision of facilities for retention, capture, storage of polluting substances (eg carbon capture and storage at large combustion plants - IMA, electrostatic filters, low NOx burners, scrubbing, etc.).

POLICIES, ACTIONS AND MEASURES FOR IMPROVING ENVIRONMENTAL 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 ambient air. Law no. 104/2011 regarding the surrounding air quality provides for the establishment of agglomerations and air quality management areas in which the environmental concentrations of pollutants do not meet the air quality objectives (limit values or target values). For these areas it is necessary to manage the air quality by developing and implementing air quality plans / programs, which should include in addition to the measures to reduce emissions and measures to protect sensitive groups of the population.

WATER RESOURCES: QUANTITY AND FLOWS

Natural water resources in 2019

RO 18

Indicator code Romania: RO 18
EEA indicator: CSI 18

TITLE: USE OF WATER RESOURCES

DEFINITION: The Water Exploitation Index (WEI) is the total annual average freshwater abstraction reported to total annual average of renewable water resources at national level, expressed as a percentage and calculated according to the following formula.

WEI = CT/RTx100

where: WEI is the water exploitation index, expressed in%;

CT - average annual total freshwater abstraction, expressed in billions of m³ /year

RT - the total annual average national renewable water resources, expressed in million m³ / year

Potential and technically usable water resources (theoretical and usable)

Table II.1 Potential and technically usable water resources (theoretical and usable) in thousands m³

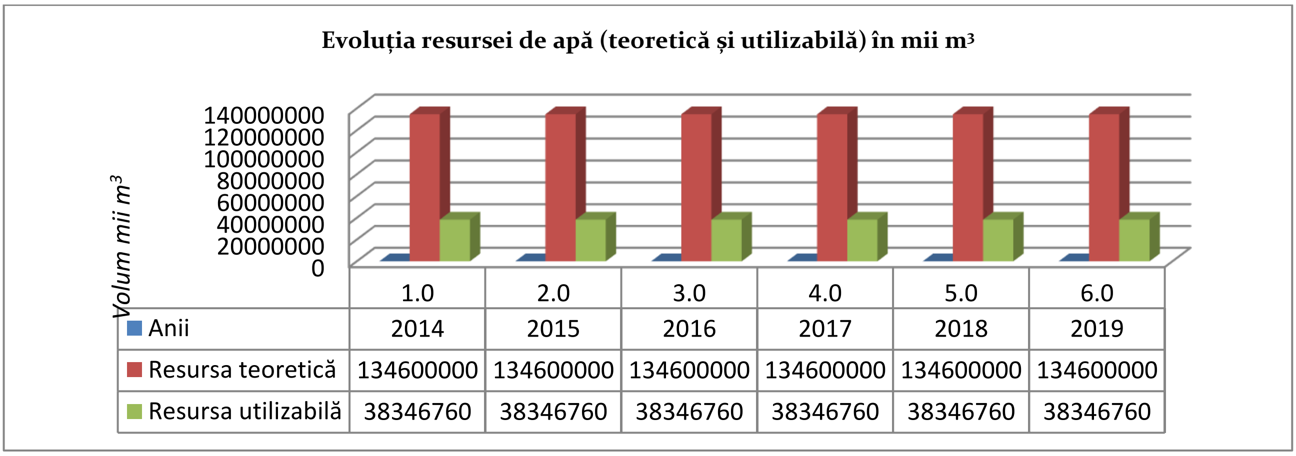
Source: ANAR

Year	Theoretical resource (thousands m3)	Usable resource *
2014	134600000	38346760
2015	134600000	38346760
2016	134600000	38346760
2017	134600000	38346760
2018	134600000	38346760
2019	134600000	38346760

**The usable resource, according to the degree of planning of the river basins, also includes the resource related to the coastal lakes, as well as the resource provided by indirect external re-use along the river.*

Figure II.1 Theoretical and usable water resource in thousands of m³

Source: ANAR



SURFACE WATER RESOURCES

The surface water resources of Romania come from 2 categories of sources, respectively:

- inland rivers (including natural lakes);
- Danube river.

Compared to the last 5 years (2014 - 2018), the volume elapsed in 2019 is lower by about 1.0% compared to the multiannual average of the annual stock (37681.6 * 106m3) elapsed in the mentioned interval (table II.2). The proximity to the multiannual average of the last 5 years is explained by the fact that in the last 5 years in this interval there were dry years (2015 and 2017) which decreased the average value of water resources (figure II.2).

Extending the analysis of the comparative evolution of the resource related to 2019 at the level of the main basins, it is found that mainly in the western and eastern part of the country, the volume spent in 2019 was in excess of the multiannual average of the last 5 years. The mentioned situation is observed in the river basins of the rivers Tisa, Someș, Crișuri, Bega - Timiș - Cerna, Argeș, Siret and Prut (see table II.2). The highest increase is found in the Prut river basin where the annual stock in 2019 represented 136% of the average multiannual stock (2014-2018) followed by the river basins of the rivers Bega - Timiș - Cerna (126% of the average average stock over the last 5 years).

In conclusion, 2019 was a normal year in terms of the amount of total water resources from inland rivers, the average annual stock being approximately equal to the multiannual average value calculated over the long term (40000 * 106m³)

The Danube River presents a situation similar to the one registered on the inland rivers, the volume spilled at the entrance to the country (st. H. Baziaș) and the one registered at the exit from the country (st. H. Isaccea) being below the average level calculated on the last 5 years (table II.3).

Extending the analysis, the specific resource on each analyzed river basin 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 Population and Housing Census of 2011 (http: //www.recensamantromania .ro /). The data obtained are presented in the table II.4.

Table II.2 Water resources of 2019, compared to the previous period (2014-2018)

Source: ANAR

River basin	Parameter	F (km²)	Q annual average (m³/s)							Q_{2019}/Q_{med} (%)
			2014	2015	2016	2017	2018	Average 2014-2018	2019	
TISA	Q	4540	40.9	50.1	62.2	74.57	70.7	59.7	65.87	110
	V		1288	1579	1980	2352	2230	1886	2077	
SOMEȘ	Q	17840	68.7	92.6	129.8	95.21	93.21	95.9	109.38	114
	V		2166	2919	4105	3003	2939	3026	3450	
CRIȘURI	Q	14860	51.9	55	90.4	64.92	81.48	68.7	79.88	116
	V		1637	1734	2859	2047	2569	2169	2519	
MUREȘ	Q	29390	127	124	176.4	116.1	159.4	141	139.2	99.0
	V		4005	3910	5578	3661	5027	4436	4391	
BEGA – TIMIȘ - CARAȘ	Q	13060	73.1	57.132	78.85	46.61	66.3	64.4	80.86	126
	V		2305	1802	2487	1470	2091	2031	2550	
NERA - CERNA	Q	2740	54.2	41.75	35.8	19.38	33.01	36.8	32.4	88.0
	V		1710	1317	1132	611	1041	1162	1022	
JIU	Q	10080	168	129	154	70.8	111	127	92.7	73.2
	V		5298	4068	4870	2233	3500	3994	2923	

OLT	Q	24050	226	168	162	134	205	179	156	87.2
	V		7127	5298	5123	4226	6465	5648	4920	
VEDEA	Q	5430	37.7	17.6	15.9	7.15	25.1	20.7	10.28	49.7
	V		1188	555	503	225	791	652	324	
ARGEŞ	Q	12550	95.4	83.8	75	57.68	74.85	77.3	89.27	115
	V		3008	2642	2372	1819	2361	2440	2815	
IALOMITA	Q	10350	61.9	42.5	45.1	40.2	45	46.94	33	70.3
	V		1952	1340	1426	1268	1419	1481	1041	
DUNĂREA	Q	34141	41.7	36.9	33.1	23.55	35.17	34.1	32.09	94.1
	V		1316	1164	1047	743	1109	1076	1012	
SIRET	Q	42890	288	206	217	160.3	272.57	229	241.45	106
	V		9084	6481	6862	5055	8596	7216	7614	
PRUT	Q	10990	13.1	6.92	7.39	13.72	15.16	11.3	15.363	136
	V		412	218	234	433	478	355	484	
DOBROGEA	Q	5480	2.51	3.92	4.88	2.63	3.34	3.46	1.67	48.3
	V		79	124	154	82.8	105	109	53	
Total Romania without the Danube river	Q	238391	1350	1115	1288	926.83	1291.29	1194	1179.45	98.8
	V		42575	35151	40732	29228	40722	37682	37195	

Notă: Q - Flow Q (m^3/s)
V - total volume ($10^6 m^3$)

Figure II.2 Water resources (volume 106 m³) of 2019, compared to the previous period (2014-2018)

Source: ANAR

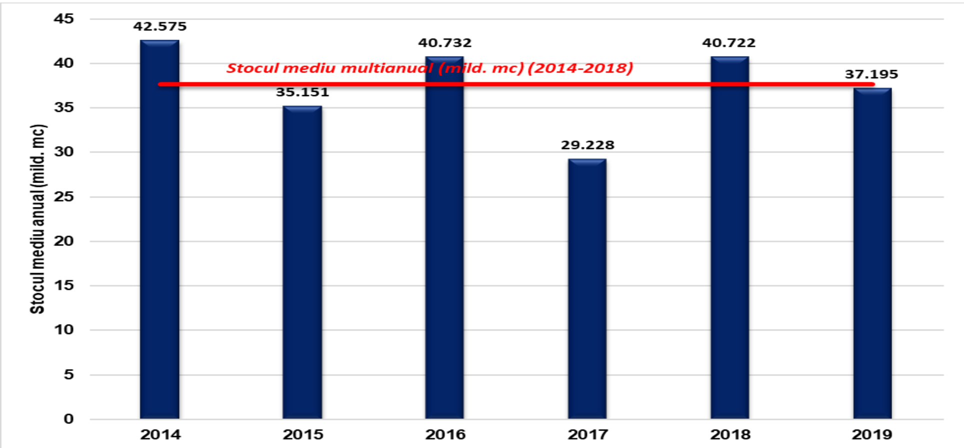


Table II.3 Water resources of the Danube River in 2019, compared to the previous period (2014-2018)

Sursa: ANAR

Hydrometric control stations on the Danube river	Parameter 1	Q annual average (m^3/s)							Q_{2019}/Q_{med} (%)
		2014	2015	2016	2017	2018	Average 2014-2018	2019	
Baziaş	Q	6016	4920	5410	4530	5072	5190	4813	92,7
	V	189721	155157	170610	142858	159950	163659	151783	

	V 1/2	94861	77579	85305	71429	79975,3	82294	75891.5	
Isaccea	Q	7439	6170	6470	5210	6499	6359	5593	88
	V	234596	194577	204038	164303	204952	200493	176381	

Notă: Q - Debit Q (m^3/s), V - volum total ($10^6 m^3$), V 1/2 - 50% of the volumes flown on the Danube at the entrance to the country, related to Romania, the other half returning to the Republic of Serbia

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

Source: ANAR

The river basin	F (km^2)	Annual avrg volume (mil. m^3)	No.inhabitants (2011)	Theoretical specific resource (m^3/inhab./year)
TISA	4540	2077	300747	6906
SOMEȘ	17840	3450	1505499	2292
CRIȘURI	14860	2519	853134	2953
MUREȘ	29390	4391	1902949	2307
BEGA – TIMIȘ - CARAȘ	13060	2550	874429	2916
NERA - CERNA	2740	1022	52651	19411
JIU	10080	2923	929184	3146
OLT	24050	4920	1892452	2600
VEDEA	5430	324	360155	900
ARGEȘ	12550	2815	3379628	833
IALOMIȚA	10350	1041	1279917	813
DUNĂREA	34141	1012	1537039	658
SIRET	42890	7614	3563802	2136
PRUT	10990	484	1072436	451
DOBROGEA	5480	53	617565	86
Total Romania without the Danube river	238391	37195	20121587	1849

Note: The values of the water volumes from 2019 were reported to the data resulting from the Population and Housing Census from 2011

Underground water resources

In Romania, a number of 143 groundwater bodies were identified, delimited and characterized. Of these, 115 are groundwater bodies and 28 are deep groundwater bodies. As a result of the risk analysis performed within the Management Plan, it turned out that all 143 groundwater bodies in Romania are in good quantitative condition.

Characterization of the shallow groundwater flow regime in 2019 compared to 2018

The characterization of the groundwater flow regime of shallow water in Romania was developed based on the monthly and annual average values of piezometric levels measured in the boreholes in the Data Transmission Program and based on comparisons of monthly reported values during 2019 with values recorded in previously and with multiannual monthly values. The interpretation of the results was spatially integrated within the major geomorphological units of Romania.

At the level of the entire country, the calculation of the average values of the piezometric depths at the level of 2018 and 2019 showed a decrease in approximately 68% of the number of monitoring points. The differences calculated between the average values of 2019, the average values of 2018 and the multiannual values, grouped by geographical areas, are summarized in table no. II.5.

Table II.5 Differences between the annual averages 2019 compared to 2018 and the multiannual averages of the piezometric depths

Source: ANAR

Area / Depth exceedances NP (cm)	No. of drillings	The differences of the annual averages 2019 and 2018 (cm)		Increases compared to the year 2018 (%)	Differences in 2019 and multiannual averages (cm)	
		Max	Min		Max	Min
A.Câmpia Română, Piemontul Getic și	116	161	-74	15	319	-250

Subcarpații Getici						
B.Câmpia de Vest, Dealurile Crișanei și Banatului	65	105	-56	7	225	-301
C.Depresiunea Transilvaniei și depresiunile din Carpații Orientali	42	81	-197	5	310	-136
D.Podișul Moldovei, Subcarpații Orientali și de Curbură	39	66	-137	7	195	-92
E.Podișul Dobrogei	9	90	-2	3	461	-128

NP – Piezometric level

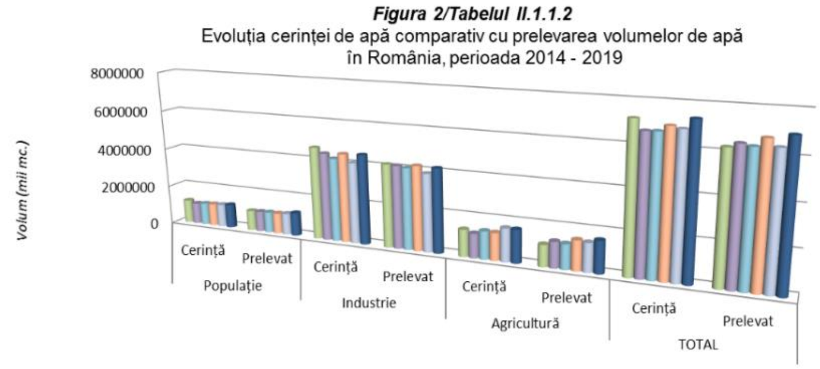
Use of water resources

Table II.6 The evolution of the water requirement compared to the sampling of water volumes (thousand m3)

Source	Population		Industry		Agriculture		TOTAL	
	Requirement	Collected	Requirement	Collected	Requirement	Collected	Requirement	Collected
Surface	669012	542360	2010819	1341359	850863	816313	3530694	2700032
	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
Underground	435448	397883	179770	129393	31460	27903	646678	555179
	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
Danube	84774	76607	2474334	2685627	472783	234995	3031891	2997229
	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
Black Sea	63	63	8804	13198	36	33	8903	13294
	61	49	11803	7011	0	0	11864	7060
	60	65	9503	9533			9563	9598
	58	52	10287	10253	0	0	10345	10305
	65	46	10179	9238			10244	9284
	74	47	10339	6405	0	0	10413	6452
TOTAL 2014	1189297	1016913	4673727	4169577	1355142	1079244	7218166	6265734
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

Source: ANAR

Figure II.3 The evolution of the water requirement compared to the sampling of water volumes in Romania, period 2014-2019



	Populație		Industrie		Agricultură		TOTAL	
	Cerință	Prelevat	Cerință	Prelevat	Cerință	Prelevat	Cerință	Prelevat
TOTAL 2014	1189297	1016913	4673727	4169577	1355142	1079244	7218166	6265734
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

Source: ANAR

Table II.7 The evolution of water demand 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	2014	669012	542360	81.1%	2010819	1341359	66.7%	850863	816313	95.9%	3530694	2700032	76.5%
	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%
Subteran	2014	435448	397883	91.4%	179770	129393	72.0%	31460	27903	88.7%	646678	555179	85.9%
	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%
Dunăre	2014	84774	76607	90.4%	2474334	2685627	108.5%	472783	234995	49.7%	3031891	2997229	98.9%
	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%
Marea Neagră	2014	63	63	100.0%	8804	13198	149.9%	36	33	91.7%	8903	13294	149.3%
	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%
TOTAL	2014	*1189297*	*1016913*	*85.5%*	*4673727*	*4169577*	*89.2%*	*1355142*	*1079244*	*79.6%*	*7218166*	*6265734*	*86.8%*
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%*

Source: ANAR

Extreme events caused by water flows

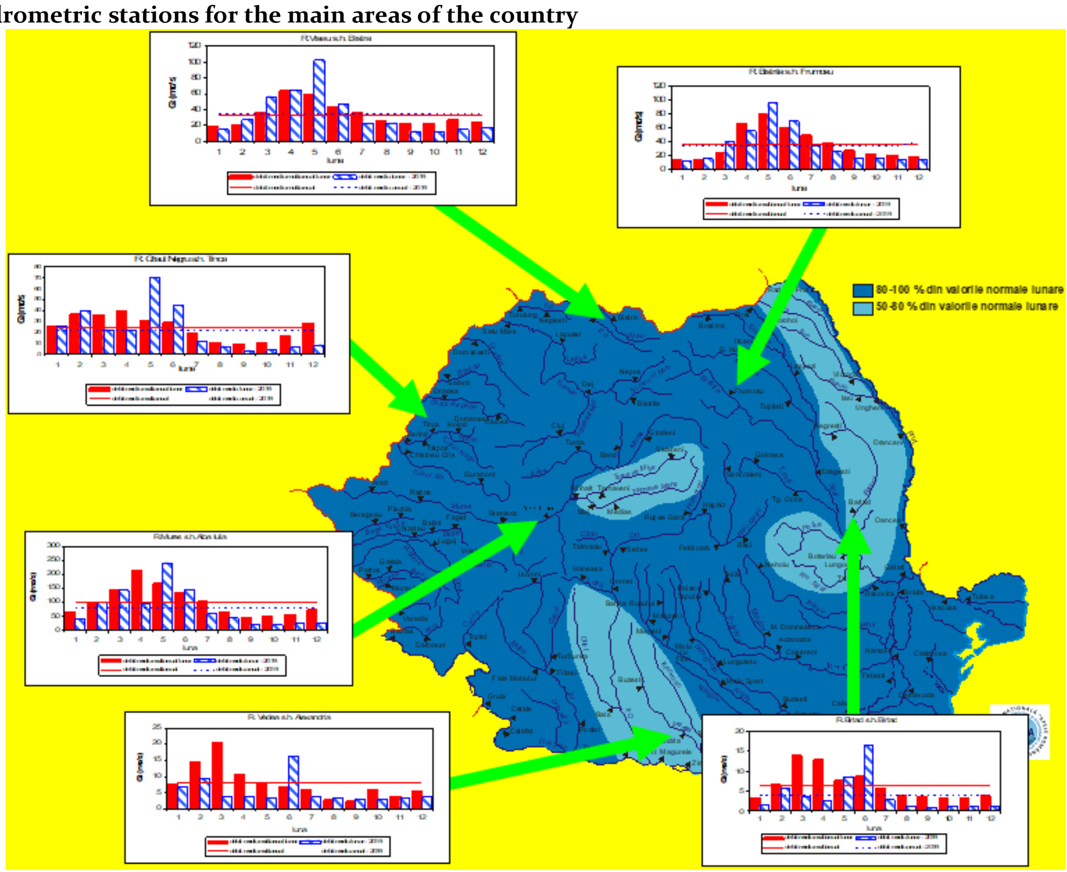
RO 52
Indicator code Romania: RO 52 EEA indicator code: CLIM 16
TITLE: WATER COURSE FLOWS
DEFINITION: The indicator defines the estimated changes in daily, monthly, seasonal and annual average flows of watercourses.

Hydrological characterization of the year 2019

I) Inland rivers

In 2019 the hydrological regime was at values between 80 - 100% of the multiannual averages, lower (50-80% of the multiannual averages) on the rivers from the hydrographic basins: Târnave, Olt inferior, Vedea, Putna, Rm. Sărat, Bârlad and on the tributaries of the Prut (figure II.4). During 2019, the most important dangerous meteorological and hydrological events were registered in May and June 2019. The most affected river basins were in May Tur, Someş, Crasna, Barcău, Crişuri, Mureş superior, Bega Veche, Bega , Timiş, Bârzava, Moraviţa, Caraş, Nera, Olt superior and Bârlad, and in June the rivers from the river basins Crasna, Barcău, Tur, Crişul Negru, Crişul Alb, Bega Veche, Bega, Timiş, Bârzava, Neajlov, Teleajen, Bârlad, the tributaries of the Olt, the tributaries of the Buzau, the tributaries of the Prut and the rivers of Dobrogea.

Figura II.4 Distribution of the coefficients of annual modules (the ratio between the annual average flow and the multiannual average flow) for 2019, the hydrograph of the monthly average flows ( ) compared to the normal monthly values ( ), annual average throughput 2019 ( ), multiannual average throughput ( ) at some representative hydrometric stations for the main areas of the country



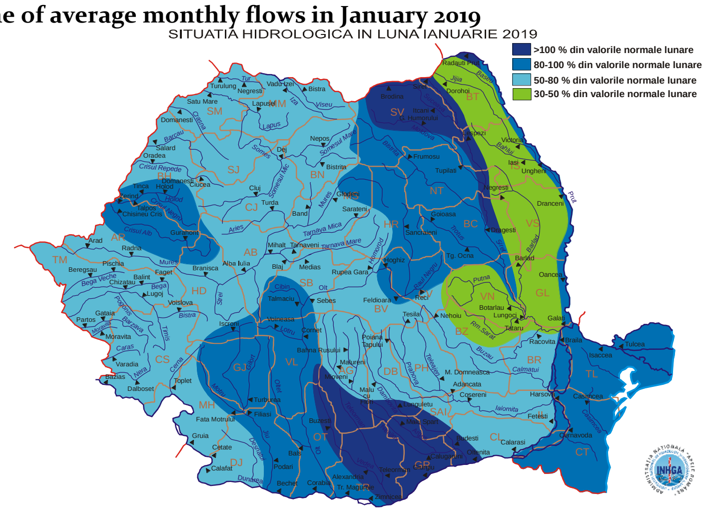
Source: ANAR

Characterization of the winter months 2019

In January 2019, the hydrological regime of the river basins in Romania (figure II.5) was at the following values:

- over the multiannual monthly averages on the rivers from the hydrographic basins: Vedea, Argeş inferior, Suceava, on the upper courses of Moldova and the Prut and on the upper and middle course of Siret;
- between 80-100% of the monthly norms on the rivers from the hydrographic basins: Crişul Negru, Crişul Alb, Jiu, Olt inferior, Trotuş, Bistriţa, on the upper courses of Mureş and Olt, on the lower course of Siretului, on the middle and lower course of the Prut and on the rivers of Dobrogea;
- between 50-80% of the monthly multiannual averages in the river basins: Vişeu, Iza, Tur, Someş, Crasna, Barcău, Crişul Repede, Mureş, Bega Veche, Bega, Timiş, Bârzava, Moraviţa, Caraş, Nera, Cerna, Desnăţui, Upper and middle Argeş, Ialomiţa, Buzău and on the middle course of the Olt.
- between 30-50% of the monthly norms on the rivers from the hydrographic basins: Putna, Râmnicu Sărat, Bârlad and on the tributaries of the Prut.

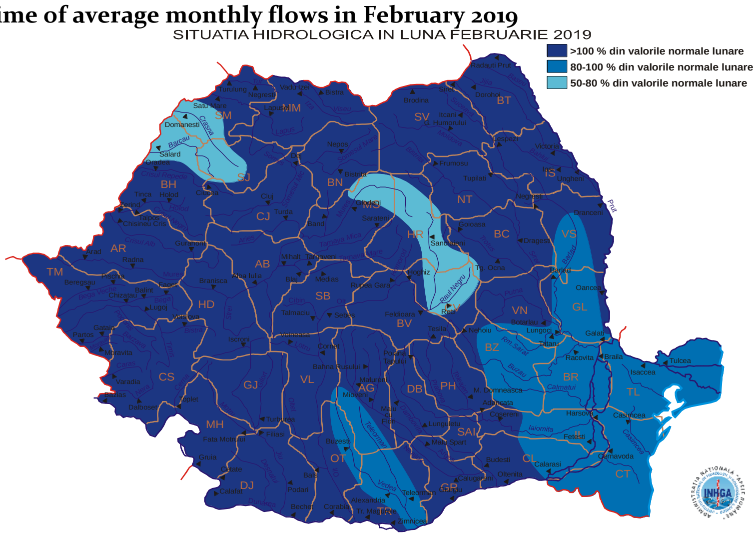
Figure II.5 Hydrological regime of average monthly flows in January 2019



Source: ANAR

In February 2019, the hydrological regime of the Romanian river basins (figure II.6) was above the multiannual monthly averages, except for the rivers in the Vedea and Rm. Sărat river basins, the middle and lower courses of Buzău and Bârlad, the lower course of Ialomiţa and the rivers from Dobrogea where they had values between 80-100% of the normal monthly values, as well as the rivers from the basins of Crasna, Barcău and those from the upper basins of Mureş and Olt, with values between 50-80%.

Figura II.6 Hydrological regime of average monthly flows in February 2019

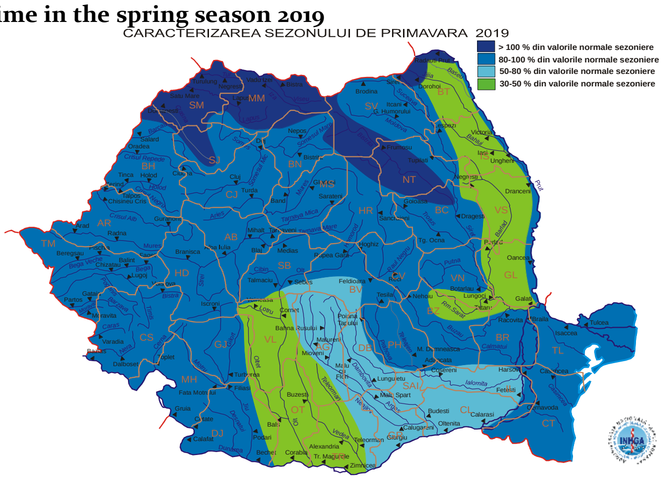


Source: ANAR

Characterization of the 2019 spring season

In the spring of 2019, the hydrological regime of the rivers in Romania (figure II.7) was generally at values below the seasonal multiannual averages, with modulus coefficients between 80-100%, higher (over 100%) on the rivers in the river basins: Vișeu, Iza, Tur, Lăpuș, Crasna, Bistrița, on the lower course of the Someș and on the upper courses of the Siret and the Prut and smaller (50-80%) on the rivers in the Argeș basin and on the course of the Ialomița. The lowest values of the average seasonal flows (30-50%) were registered on the rivers from the hydrographic basins: Olt inferior, Vedea, Râmnicu Sărat, Bârlad and on the tributaries of the Prut.

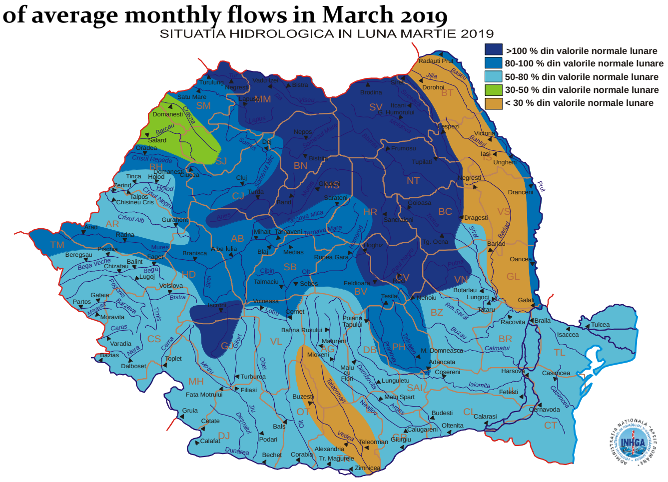
Figure II.7 The hydrological regime in the spring season 2019



Source: ANAR

In March 2019, the hydrological regime of the river basins in Romania (figure II.8) was at the following values:
- over the multiannual monthly averages on the rivers from the hydrographic basins: Vișeu, Iza, Tur, Lăpuș, Someșul Mare, Arieș, Bistrița, Moldova, Suceava, in the upper river basins: Mureș, Jiu, Olt, Putna and Trotuș and on the upper and middle course of Siret;
- between 80-100% of the monthly norms on the rivers from the hydrographic basins: Someș - downstream Dej, Crișul Repede, Mureș middle and lower, Olt middle, Prahova and along the Prut;
- between 50-80% of the monthly multiannual averages in the river basins: Crișul Negru, Crișul Alb, Bega, Timiș, Bârzava, Moravița, Caraș, Nera, Cerna, middle and lower Jiu, Olt inferior, Argeș, Buzău, Râmnicu Sărat, on the Ialomita river, on the middle and lower river of Putna, on the lower river of Siret and on the rivers of Dobrogea;
- between 30-50% of the monthly norms on Crasna and Barcău;
- less than 30% in the river basins of the rivers Vedea, Bârlad and on the tributaries of the Prut.

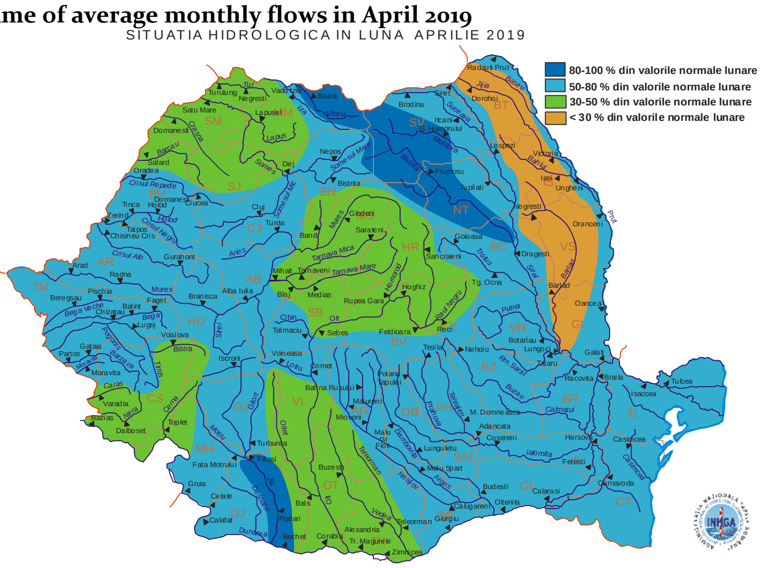
Figure II.8 Hydrological regime of average monthly flows in March 2019



Source: ANAR

In April 2019 the hydrological regime of the Romanian river basins (Figure II.9) was generally between 50-80% of the monthly multiannual averages. Higher values (between 80-100% of monthly normals) were recorded on Vişeu, Bistriţa, on the upper course of Moldova and on the lower course of Jiu and lower on the rivers of the river basins: Tur, Someş inferior, Crasna, Barcău, Caraş, Nera, Cerna, Olt inferior, Veda and in the upper basins of Timiş, Mureş and Olt (between 30-50%), as well as on the rivers of the basins of Bârlad and Jijia (less than 30%).

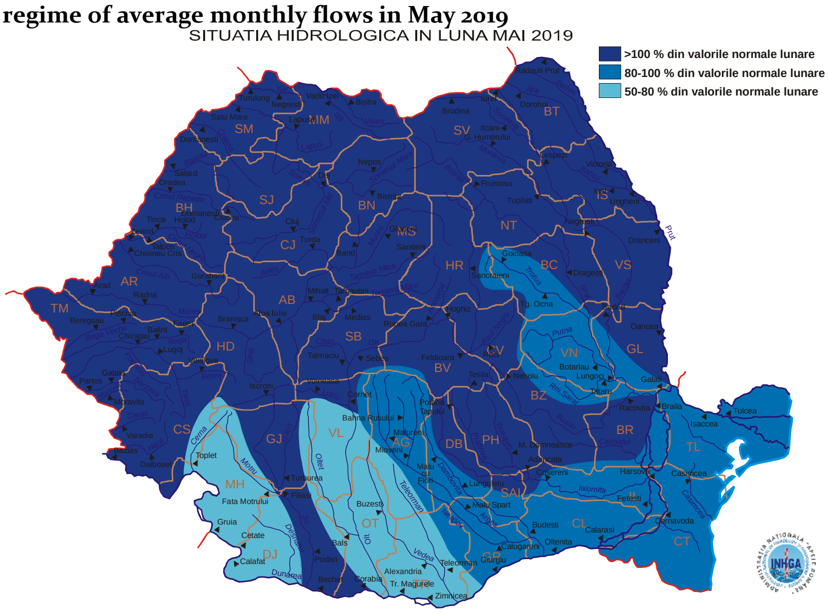
Figure II.9 Hydrological regime of average monthly flows in April 2019



Source: ANAR

In May 2019 the hydrological regime of the Romanian river basins (Figure II.10) was above the monthly multiannual averages, except rivers in river basins: Argeş, Rm. Sărat, Putna, Trotuş, the lower course of Ialomiţa and the rivers of Dobrogea where they had values between 80-100% of the monthly normals and rivers in the river basins: Cerna, Motru, Desnăţăţui, Olt inferior and Vedea where the hydrological regime was between 50-80% of the multiannual averages of the month.

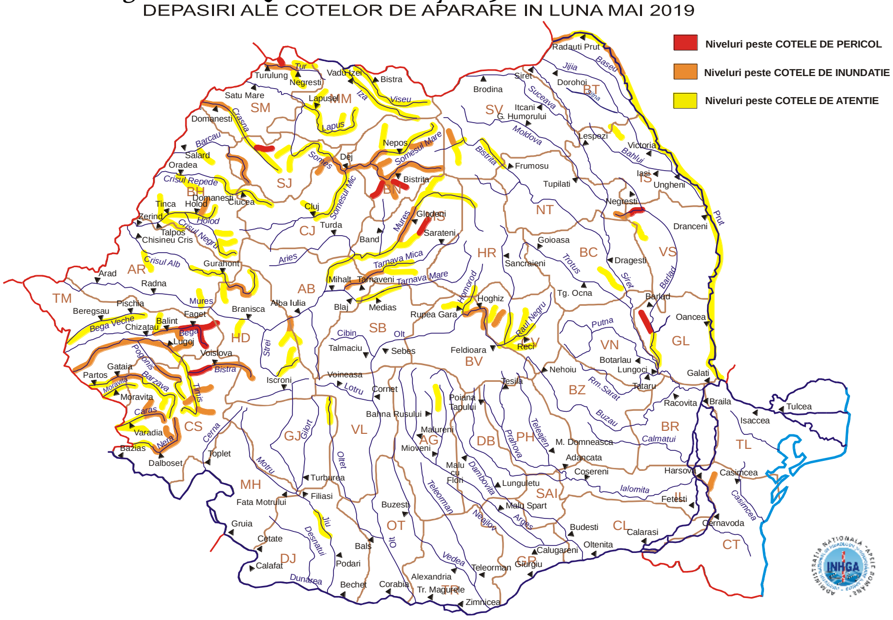
Figure II.10 Hydrological regime of average monthly flows in May 2019



Source: ANAR

The situation of exceeding the DEFENSE QUOTAS in May 2019 (maximum preliminary values determined based on the data from the operative flow) is presented in figure II.11.

Figure II.11 Situation of exceeding DEFENSE QUOTAS for May 2019

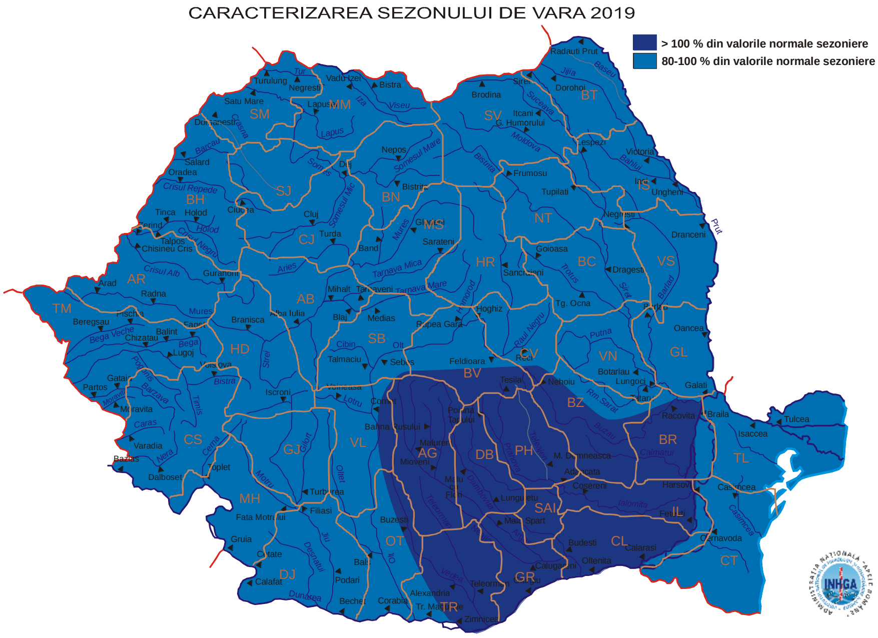


Source: ANAR

Characterization of the 2019 summer season

In the summer of 2019 the hydrological regime of rivers in Romania (Figure II.12) was between 80-100% of the seasonal multiannual averages, excluding rivers in the river basins: Vedea, Argeş, Ialomiţa and Buzău where they were above these values.

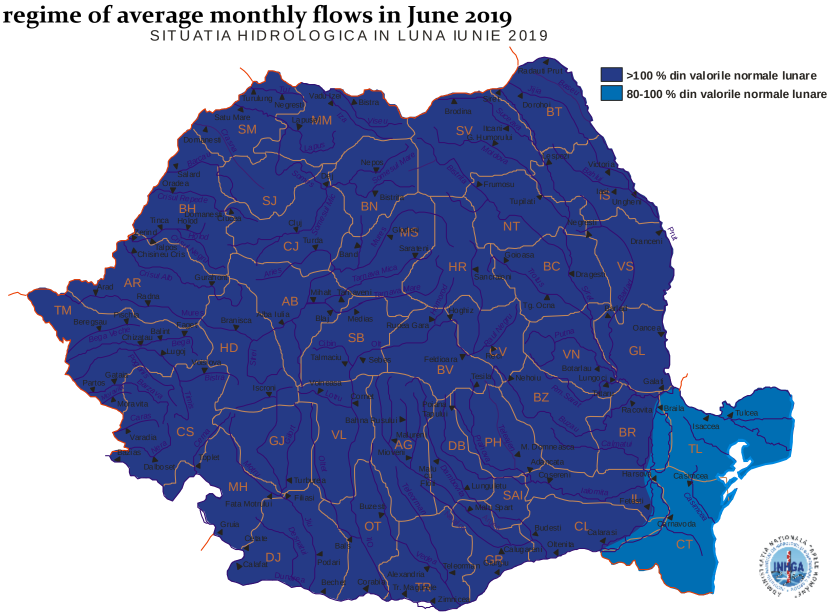
Figure II.12 Hydrological regime in the summer season 2019



Source: ANAR

In June 2019 the hydrological regime of the Romanian river basins (Figure II.13) was above the monthly multiannual averages, except for the rivers in Dobrogea where they had values between 80-100% of the monthly normals.

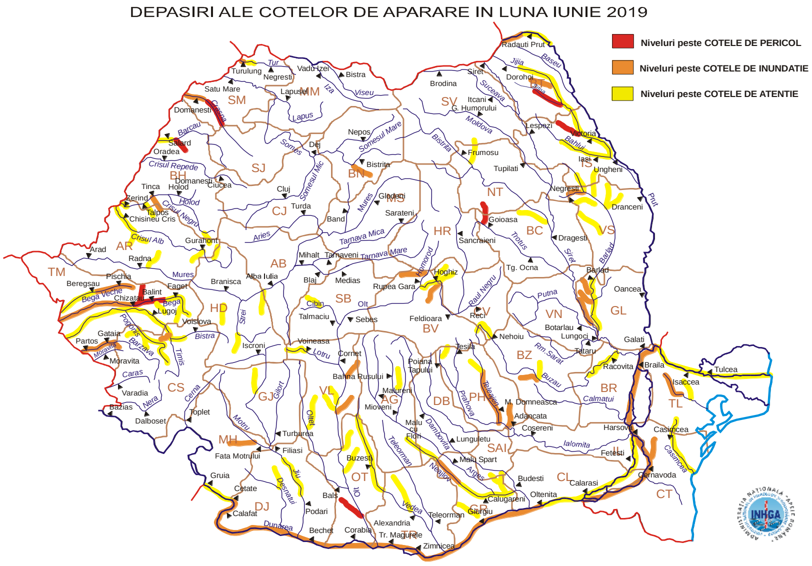
Figure II.13 Hydrological regime of average monthly flows in June 2019



Source: ANAR

The situation of exceeding the DEFENSE QUOTAS in June 2019 (maximum preliminary values determined based on the data from the operative flow) is presented in figure II.14.

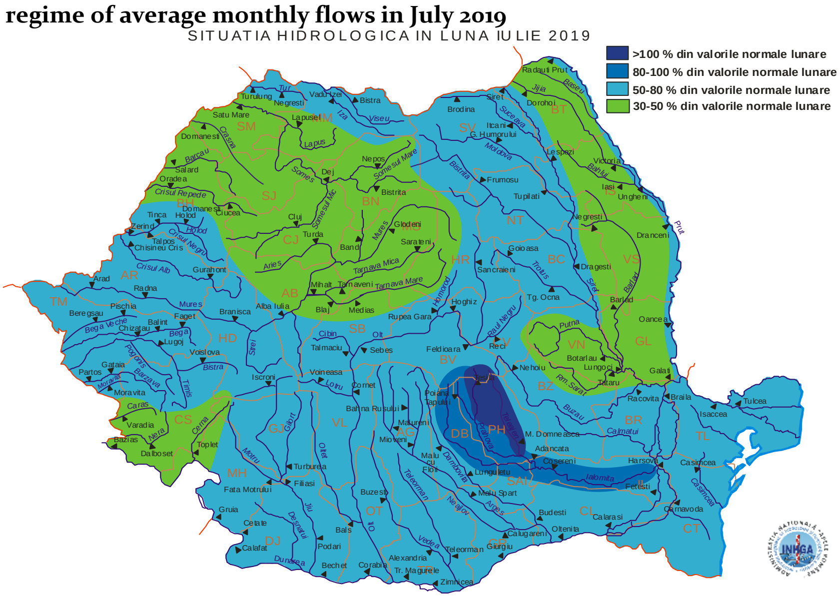
Figure II.14 Situation of exceeding DEFENSE QUOTAS for June 2019



Source: ANAR

In July 2019 the hydrological regime of the Romanian river basins (Figure II.15) was between 50-80% of the monthly multiannual averages, smaller on the rivers of the river basins: Someş, Crasna, Barcău, Crişul Repede, Upper and Middle Mureş, Caraş, Nera, Cerna, Rm. Sărat, Putna, Barlad and on the Prut tributaries (30-50% of the monthly normals) and higher on the rivers of the Ialomiţa basin where they had values generally between 80-100% , except Doftana and Teleajen where the hydrological regime was above the monthly normals.

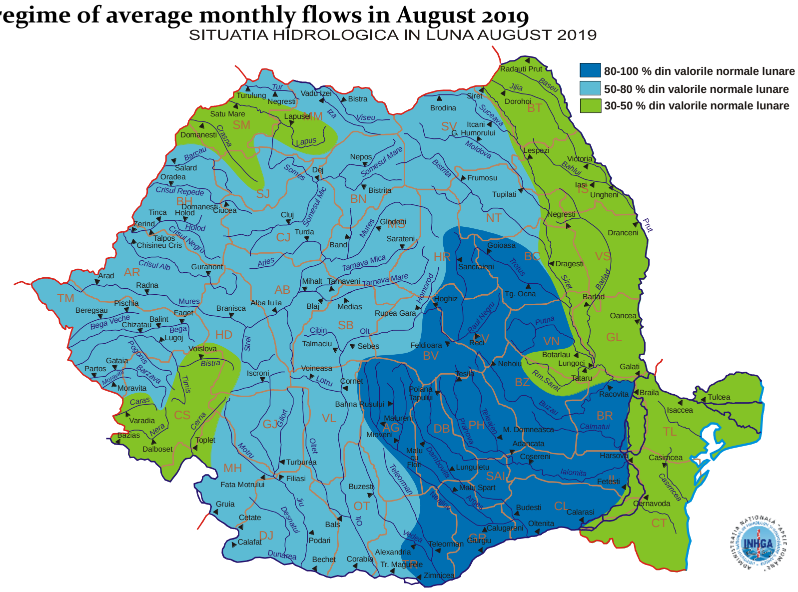
Figure II.15 Hydrological regime of average monthly flows in July 2019



Source: ANAR

In August 2019 the hydrological regime of the Romanian river basins (Figure II.16) was between 50-80% of the monthly multiannual averages, higher (80-100%) on the rivers of the river basins: Argeş, Ialomiţa, Buzău, Putna, Trotuş, Upper Olt and Lower Vedea (30-50% of the monthly normals) on the rivers of the river basins: Lower Someş, Crasna, Upper Timiş, Caraş, Nera, Cerna, Râmnicu Sărat, Bârlad, Prut, on the Siret River and on the rivers of Dobrogea.

Figure II.16 Hydrological regime of average monthly flows in August 2019

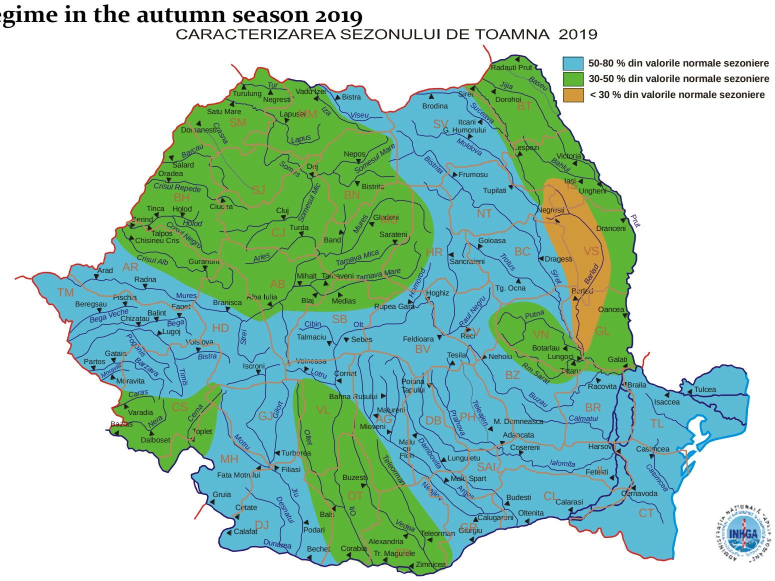


Source: ANAR

Characterization of the autumn season of 2019

In autumn 2019 the hydrological regime of the Romanian river basins (Figure II.17) was below the seasonal multiannual averages on all rivers, with modulic coefficients between 30-50%, higher (50-80%) on the rivers of the river basins: Vişeu, Mureş inferior, Bega, Timiş, Bârzava, Moraviţa, Jiu, Upper and Middle Olt, Argeş, Ialomiţa, Buzau, Trotuş, Bistriţa, Moldova, Suceava and on the rivers of Dobrogea and lower (less than 30%) on the rivers of the Bârlad basin.

Figure II.17 Hydrological regime in the autumn season 2019



Source: ANAR

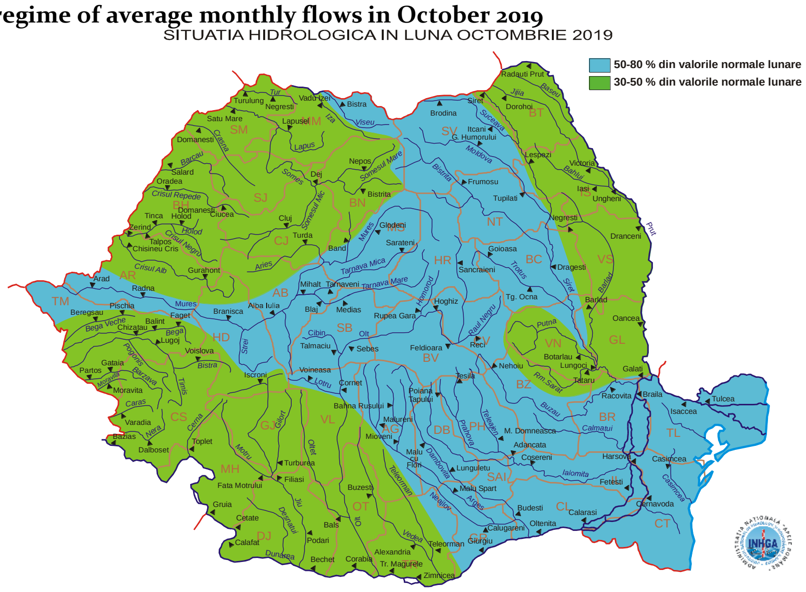
In September 2019, the hydrological regime of the Romanian river basins (Figure II.18) was between 30-50% of the monthly multiannual averages, higher (50-80%) on the rivers of the river basins: Upper Mureş, Upper and Middle Olt, Vedea, Argeş, Ialomita, Upper Trotuş, Bistriţa and on the rivers of Dobrogea and lower (less than 30% of the monthly normals) on the rivers of the Bârlad river basin and on the Prut tributaries.

Figure II.18 Hydrological regime of average monthly flows in September 2019

Source: ANAR

In October 2019, the hydrological regime of the Romanian river basins (Figure II.19) was between 50-80% of the monthly multiannual averages on the rivers of the river basins: Vişeu, Mureş (except Arieş), Upper and Middle Olt, Argeş, Ialomiţa, Buzău, Trotuş, Bistriţa, Moldova, Suceava and the rivers of Dobrogea and between 30-50% of the monthly normals on the other rivers.

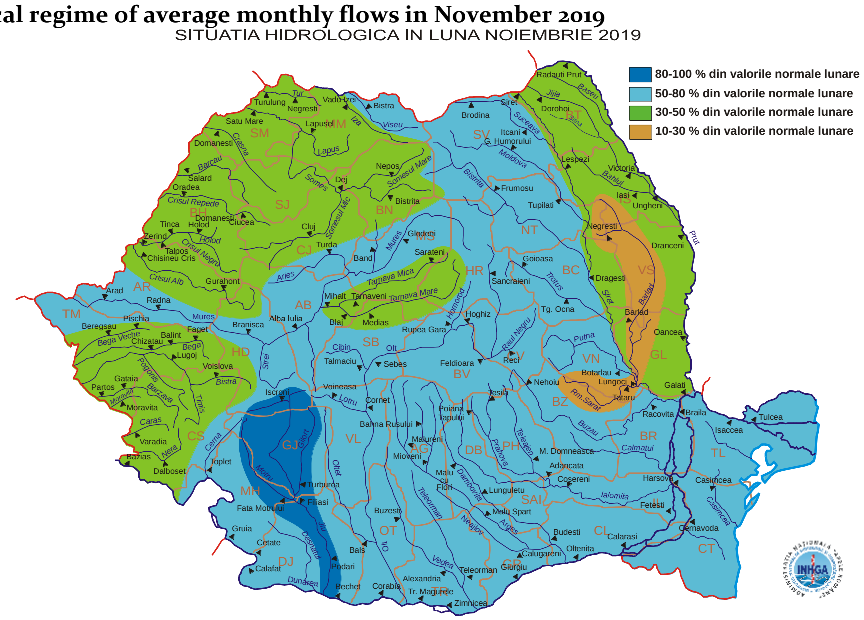
Figure II.19 Hydrological regime of average monthly flows in October 2019



Source: ANAR

In November 2019, the hydrological regime of the Romanian river basins (Figure II.20) was between 50-80% of the monthly multiannual averages, lower (30-50%) on the rivers of the river basins: Iza, Tur, Someş, Crasna, Barcău, Crişul Repede, Crişul Negru, Crişul Alb, Tarnave, Bega, Timiş, Bârzava, Moraviţa, Caraş, Nera and Prut and higher (80-100%) on the rivers of the Jiu basin. The lowest values (less than 30% of the monthly normals) were recorded on the rivers of the Râmnicu Sărat and Bârlad river basins.

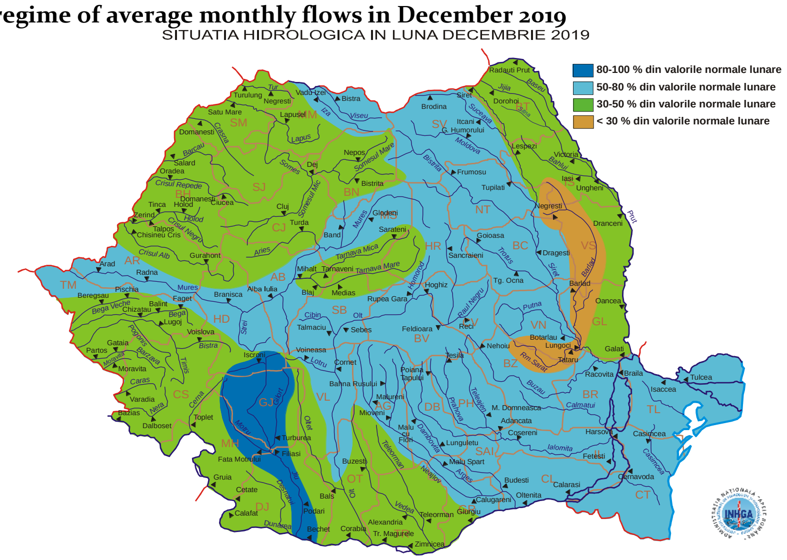
Figure II.20 Hydrological regime of average monthly flows in November 2019



Source: ANAR

In December 2019 the hydrological regime of the Romanian river basins (Figure II.21) was between 50-80% of the monthly multiannual averages, lower (30-50%) on the rivers of the river basins: Tur, Someş, Crasna, Barcău, Crişul Repede, Crişul Negru, Crişul Alb, Tarnave, Bega, Timis, Bârzava, Moraviţa, Caraş, Nera, Cerna, Olteţ, Vedea and Prut and higher (80-100%) on the rivers of the Jiu basin. The lowest values (less than 30% of the monthly normals) were recorded on the rivers of the Râmnicu Sărat and Bârlad river basins.

Figure II.21 Hydrological regime of average monthly flows in December 2019

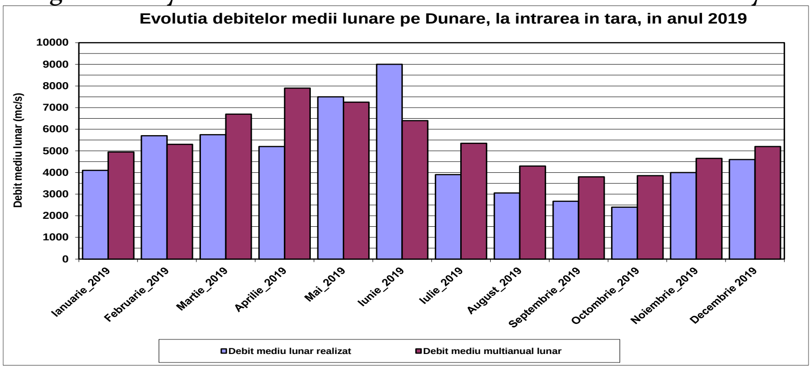


Source: ANAR

Danube River

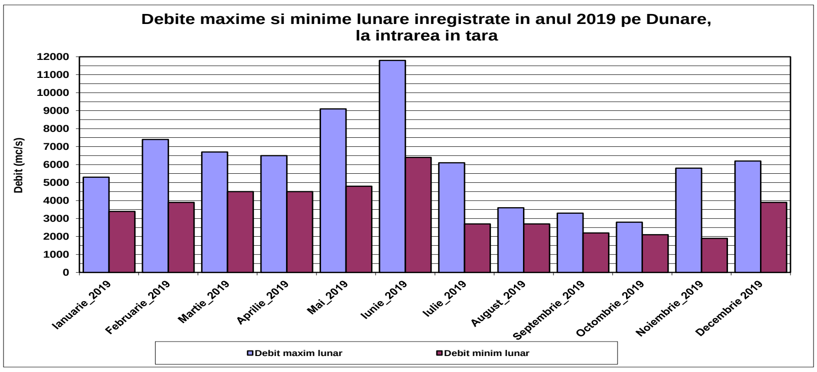
In 2019, the average monthly flows recorded on the Danube at the entrance to the country (Baziaş section) were above the monthly multiannual averages in February, May and June 2019 and below the monthly normals, with values ranging from 62-88% of the monthly multiannual averages in January, March, April and July till December 2019. Figures II.22 to II.23 show the evolution of the average, maximum and minimum monthly flows on the Danube at the entrance to the country.

Figure II.22 Evolution of average monthly flows on the Danube at the entrance to the country in 2019



Source: ANAR

Figure II.23 Evolution of the maximum and minimum monthly flows recorded on the Danube, at the entrance to the country, in 2019



Source: ANAR

Characterization of the Danube hydrological regime in the winter season 2019

In the winter season the average entry flows (Baziaş section) were below the monthly multiannual average in January (83%) and above the monthly multiannual average in February (107%). In January 2019 the entry flows (Baziaş section) were reduced from 5300 m3/s (maximum monthly value) recorded on the first day of the month to 3400 m3/s on 12 January (minimum monthly value), increasing to 4400 m3/s between 25-27 January and then decreasing to 3900 m3/s on the last day of the month.

In **February 2019** the entry flows (Baziaş section) were increased from 3900 m3/s (minimum monthly value) recorded on the first day of the month to 7400 m3/s s on 11 February (maximum monthly value), then decreasing to 4800 m3/s on 25 and 26 days and then increasing slightly to 4900 m3/s in the last two days of the month.

Characterization of the hydrological regime of the Danube in spring 2019

In the spring 2019 season, the average flows recorded on the Danube at the entrance to the country (Baziaş section) were below the monthly multiannual averages in March and April (65-85%) and above the monthly normal in May (103%) – Table II.8.

In **March** 2019 the entry flows (Baziaş section) were reduced from 5000 m3/s recorded on the first day of the month to 4500 m3/s on 6 March (minimum monthly value), increasing to 6700 m3/s on 19 March, decrease slightly over the next two days to 6300 m3/s, again increasing to 6700 m3/s on 24 and 25 March (maximum monthly value), then decreasing to 5800 m3/s on the last day of the month.

In **April** 2019 the entry flows (Baziaş section) were decreasing from 5600 m3/s recorded on the first day of April to 4500 m3/s between 6 and 8 April (minimum monthly value), in increase to 6500 m3/s on 18 April (maximum monthly value), decreasing to 4500 m3/s on 27 and 28 April and then increase slightly to 4700 m3/s on the last day of the month.

In **May** 2019 the entry flows (Baziaş section) were generally increased from 4800 m3/s recorded on the first day of May (minimum monthly value) to 9100 m3/s on 19 and 20 May (maximum monthly value), decreasing to 8100 m3/s on 25 and 26 May, then again increasing to the maximum monthly value of 9100 m3/s recorded in the last two days of the month.

Table II.8 Characteristic values of March, April and May

Characteristic values	Month		
	March	April	May
Daily highs (1931-2017)	14800 m³/s (1981)	15800 m³/s (2006)	13200 m³/s (2006;2014)
Maximum monthly averages	10400 m³/s (1981)	14100 m³/s (2006)	10500 m³/s (2006)
Daily highs 2019	6700 m³/s	6500 m³/s	9100 m³/s
Multiannual monthly averages	6700 m³/s	7900 m³/s	7250 m³/s
Monthly averages 2019	5750 m³/s	5200 m³/s	7500 m³/s

Source: ANAR

Characterization of the hydrological regime of the Danube in the summer of 2019

In the summer season 2019 the average monthly flows of the Danube at the entrance to the country (Baziaş section) were below the monthly normals in July and August, with values between 70-73% and above the monthly normal in June (Table II.9).

Table II.9 Characteristic values of June, July and August

Characteristic values	Month		
	June	July	August
Daily lows (1931-2017)	2630 m³/s (1993)	2130 m³/s (2003)	1520 m³/s (2003)
Minimum monthly averages	3120 m³/s (1993)	2340 m³/s (2003)	1950 m³/s (2003)
Multiannual monthly averages	6400 m³/s	5350 m³/s	4300 m³/s
Daily lows 2019	6400 m³/s	2700 m³/s	2700 m³/s
Monthly averages 2019	9000 m³/s	3900 m³/s	3050 m³/s

Source: ANAR

In **June** 2019 the entry flows (Baziaş section) were increased from 9000 m3/s recorded in the first two days of June to 11800 m3/s on 9 June (maximum monthly value), then decreasing to 6400 m3/s (monthly minimum value), recorded in the last two days of the month.

In **July** 2019 the entry flows (Baziaş section) were reduced from 6100 m3/s recorded on the first day of July (maximum monthly value) to 2700 m3/s between 29 and 31 July (minimum monthly value).

In **August** 2019 the entry flows (Baziaş section) were increased from 2700 m3/s recorded on the first day of August (minimum monthly value) to 3600 m3/s on 5 and 6 August (maximum monthly value). From 7 August the debits were slightly decreasing until 26 and 27 August to 2700 m3/s, then slightly increasing, around 2800 and 2900 m3/s in the last days of the month.

Characterization of the hydrological regime of the Danube in autumn 2019

The average monthly flows of the Danube at the entrance to the country (Baziaş section) recorded in the autumn season of 2019 were below the monthly normals, with values ranging from 53-72% of the monthly normals (Table II.10).

Table II.10 Characteristic values of September, October and November

Characteristic values	Month		
	September	October	November

Daily lows (1931-2017)	1470 m³/s (2003)	1040 m³/s (1949)	1040 m³/s (1949)
Minimum monthly averages	1900 m³/s (1947;2003)	1440 m³/s (1947)	2080 m³/s (1947)
Multiannual monthly averages	3800 m³/s	3850 m³/s	4650 m³/s
Daily lows 2019	2200 m³/s	2100 m³/s	1900 m³/s
Monthly averages 2019	2670 m³/s	2400 m³/s	4000 m³/s

Source: ANAR

In **September 2019** the entry flows (Baziaş section) were down from 2800 m3/s recorded on the first day of September to 2500 m3/s between 7 and 9 September. From 10 September the flows were increasing to the maximum value of 3300 m3/s recorded on 16 and 17 September, then decreasing until the end of the month, at the monthly minimum value of 2200 m3/s, recorded between 27-29 September, and on the last day of the month the flows were slightly increasing at 2300 m3/s.

In **October 2019** the entry flows (Baziaş section) were relatively stationary in the first decade of the month, with values between 2300-2400 m3/s, increasing slightly to the maximum value of 2800 m3/s recorded between 15-18 October, then decreased to the monthly minimum value of 2100 m3/s, recorded in the last four days of the month.

In **November 2019** the entry flows (Baziaş section) were decreasing from the value of 2050 m3/s recorded on the first day of the month to the value of 1900 m3/s on 3 days and 4 November (minimum monthly value), increasing to 5800 m3/s between 24-27 November (maximum monthly value), then decreasing slightly to 5400 m3/s on the last day of the month.

Characterization of the Danube hydrological regime in December 2019

In December 2019 the entry flows (Baziaş section) were decreasing from 5200 m3/s recorded on the first day of the month to 3900 m3/s between 16-19 December (minimum monthly value), then increasing to 6200 m3/s on the last day of the month (maximum monthly value).

The hydrological regime of the Danube at the entrance to the country (Baziaş section) in 2019 is among the years with a deficient hydrological regime, a regime resulting from the monthly average values located predominantly below the monthly normals in nine months of the twelve months analysed. Also, of the other three months in which average flow values above monthly normals were achieved, only in June, the average value of 9000 m3/s was 140% above the monthly normal, and in February and May the hydrological regime was slightly above the normals of these months (104 –107%).

Hydromorphological changes in watercourses

Table II.11 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.

Table II.11. Classification of water bodies at national level in the period 2004-2018

Year	Category of water body			
	% 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

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

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

The updating of the classification and the number of water bodies will be carried out in preparation for the third planning cycle with the application of the requirements of Article 13 of the Water Framework Directive 2000/60/EC

The criteria for identifying the hydromorphological pressures used in the National Management Plan approved by H.G. no. 80/2011 (defined within the UNDP-GEF Regional Project of the Danube), were also used in the updated National Management Plan approved by H.G. 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 second National Management Plan of the basins / hydrographic spaces in Romania, the types of potentially significant hydromorphological pressures identified at national level were inventoried (table II.12), due to the following categories of works.:

- Cross-baring works located on the body of water – dam type, bottom sills, reservoirs with areas greater than 0,5 km2, with effects on the hydrological regime, the stability of the river bed, the transport of sediments and the migration of biota, which interrupt the longitudinal connectivity of the water body;
- Works along the river - such as dams, agricultural and fishing facilities, shore regularization and consolidation works, meandering - with effects on floodplain vegetation and breeding areas and on the longitudinal profile of the river, substrate structure and biota, which lead to loss of lateral connectivity;
- Samples and refunds / derivatives - water intakes, use refunds (discharges), derivatives with effects on minimum flow, riverbed and biota stability;
- Waterways – with effects on the stability of the riverbed and biota.

These works have been carried out on water bodies for various purposes, namely: ensuring water demand, regulating natural flows, defending against the destructive effects of water, producing electricity, combating excess moisture, etc., with functional effects for human communities (drinking and industrial water supply, irrigation, etc.).

According to the updated National Management Plan, approved by H.G. no. 859/2016, the centralization at national level of the pressures that significantly affect the hydromorphological characteristics of the water bodies is further presented in table II.12 and figure II.24. Thus, at national level, a number of 1960 potentially significant hydromorphological pressures were identified. 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 226 significant hydromorphological pressures were identified.

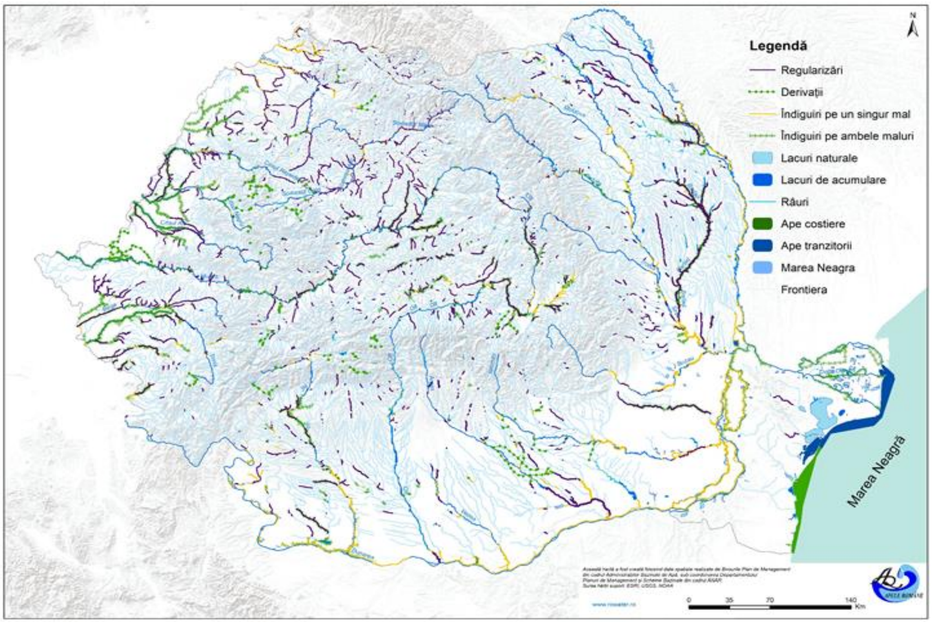
Table II.12. Potentially significant hydromorphological pressures of water bodies

No. crt.	Hydromorphological pressures		Number	Length(km)	Examples
1	Cross-baring work located on the water body	Accumulation lakes *	231	-	The accumulations were built for multiple purposes: flood defences, 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 the water courses	Dams		9309	The most important regularization and impounding 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 works	-	6750	
3	Water sampling and restitution work	Water samples	103	-	
		Restitutions	38	-	
		Derivatives and channels	99	952	Their purpose is to supplement the tributary flow for certain accumulations, as well as to ensure the water requirement for the related localities producing significant changes in the flow rates of the watercourses on which they operate. The most important derivatives are: Cerna - Motru, Power channel Timiș-Bega, Nera, Motru/Tismana, Jieț/Lotru, Buta/ Accumulation Valea de Pești, Ialomița-Mostiștea-Dridu-Hagiești, Crișul Repede, Tileagd – Sacadat, Channel Matca, Cătămărești, Pușcași and Râpa Albastră, Râușor-Odovașnița - Cârlete, Vulcănița, Channel Timiș and Lueta, Argeș/Dâmbovița, Ilfov/Dâmbovița, Iara (Lindru, Calu)-Dumitreasa, Pârâul Negru (Negruța)-Dumitreasa, Dumitreasa-Someșul Rece.
4	Waterways	-	-	-	The Danube River is the main waterway route in Romania; also, the Danube - Black Sea channel (CDMN) and the Poarta Albă - Midia - Navodari channel (CPAMN). The only inland waterway is the Bega Channel. Currently, only recreational navigation is carried out on the Bega channel very low and only on the section Timişoara - Sânmihaiul Român, due to the non-functioning of the lock from Sânmihaiul Român.

Source: National Administration "Romanian Waters", National Management Plan approved by H.G. nr. 859/2016 for the approval of the updated National Management Plan for the portion of the international river basin of the Danube River which is contained in the territory of Romania

Figure II.24 Hydrotechnical works – potentially significant hydromorphological pressures in 2013



Source: National Administration "Romanian Waters", National Management Plan approved by HG nr. 859/2016 for the approval of the updated National Management Plan for the portion of the international river basin of the Danube River which is contained in the territory of Romania

Updating the inventory of potentially significant hydromorphological pressures of water bodies will be carried out in 2020, as part of the process of updating the Water Shed/Pool Management Plans for the Third Planning Cycle (2022-2027), with a view to establishing the necessary measures to improve the ecological status/ecological potential of surface water bodies.

Flood risks and pressures

RO 53
Indicator code Romania: RO 53 EEA indicator code: CLIM 17
TITLE: FLOODS
DEFINITION: The indicator highlights the tendency of major floods to occur at national level, as well as the expected changes in the variation of floods with a return period of 100 years.

For the years 2017, 2018 and 2019 I.N.H.G.A. Bucharest did not establish significant historical flood events.

Table II.13 Synthetic table on floods in Romania

No. Crt.	Year	No. events	No. significant events	Affected urban areas
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

Source: ANAR

During 2019 there were 154 extreme weather events from which:

- 140 extreme events caused by flooding through river overflows or spills from the slopes
- 12 events caused by melting snow or due to the freeze-thaw phenomenon
- 1 coastal erosion event on the Black Sea coast
- 1 extreme event caused by drought.

The following events accompanied the flood phenomena.

- 27 extreme events caused by heavy rainfall and puddles
- 14 extreme events caused by heavy rainfall and hail
- 11 extreme events caused by heavy rainfall and wind.

At least once 1243 UATs and 3246 localities were affected by the floods. Flood-affected population: 6945 inhabitants.

WATER QUALITY

WATER QUALITY: STATE AND CONSEQUENCES

Water quality of watercourses

RO 65

Indicator code Romania: RO
EEA Indicator Code: VHS 02

TITLE: DANGEROUS SUBSTANCES IN WATER COURSES

DEFINITION: The indicator quantifies the concentrations (annual averages) of dangerous substances present in the watercourses. The dangerous substances required for reporting are those listed in H.G. no. 351/2005 regarding the approval of the Program for the gradual elimination of discharges, emissions and losses of priority dangerous substances, modified and completed by H.G. no. 1038/2010.

Note – The latest data submitted by ANAR on water quality of watercourses are at the level of 2017.

For this indicator, it was considered the reporting of priority substances from H.G. no. 570/2016 underlying the assessment of the chemical status of surface waters (WATER investigation environment). Also, by overruns against SCM are meant both overruns against SCM-MA and over SCM-MAC (according to H.G. no. 570/2016). The distribution of the number of priority substances monitored in watercourses by river basins in 2017 is shown in Table II.14 and Figure II.25.

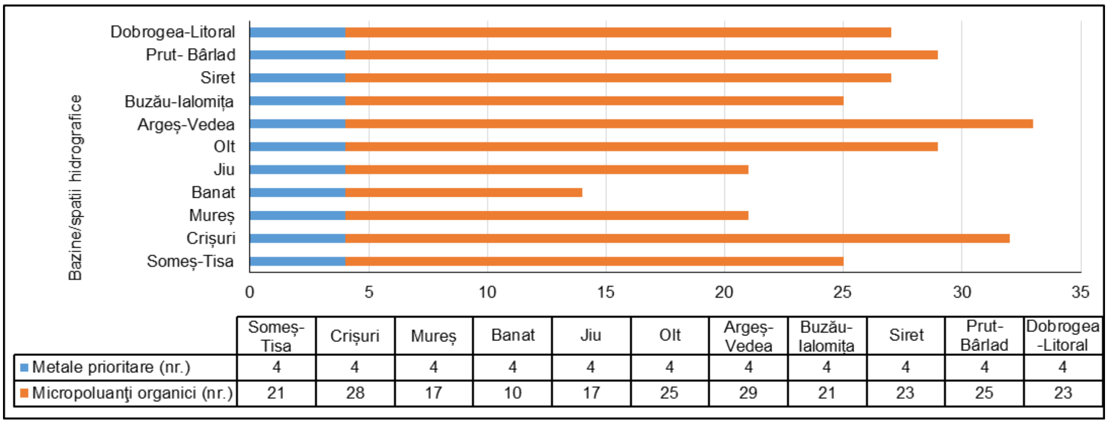
Table II.14 Priority substances monitored in watercourses by river basins in 2017 (no.) - WATER investigation environment

Space / River basin	Monitored length (km)	Monitored sections (no.)	Priority substances monitored	
			Priority metals (no.)	Organic micropollutants (no.)
Someș - Tisa	3525,87	61	4	21
Crișuri	1088,02	40	4	28
Mureș	3066,68	61	4	17
Banat	1888,39	35	4	10
Jiu	1994	32	4	17
Olt	1496	51	4	25
Argeș - Vedea	502,46	15	4	29

Buzău - Ialomița	798	18	4	21
Siret	1861,22	23	4	23
Prut - Bârlad	2462,59	38	4	25
Dobrogea - Litoral	742,31	11	4	23
Total	**19425,54**	**385**	**4**	**29**

Source: Data transmitted by the National Administration "Romanian Waters "

Figure II.25 Priority substances monitored in watercourses by river basins / hydrographic basins in 2017 - WATER investigation environment



Source: Data transmitted by the National Administration "Romanian Waters "

Table II.15 shows the share of monitoring sections with a concentration higher than the SCM (%) in the period 2011 - 2017

Table II.15 The share of monitoring sections with a concentration higher than the SCM (%) in the period 2011 - 2017

Year	2011	2012	2013	2014	2015	2016	2017
Priority substances monitored (number)	34	37	37	37	36	42	33
Monitoring sections (number)	430	510	498	418	435	392	385
Share of sections with higher concentration than SCM (%)	11,39	20,19	37,95	5,49	3,44	3,82	5,71

Source: Data transmitted by the National Administration "Romanian Waters "

RO 67

Indicator code Romania: RO 67
EEA indicator code: WEC 04

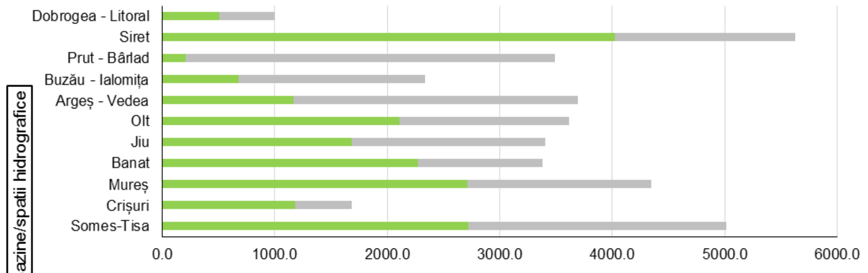
TITLE: WATER COURSE CLASSIFICATION SCHEMES

DEFINITION: Watercourse classification schemes are designed to provide an indication of the degree of pollution

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

The assessment of the ecological status/ecological potential of monitored watercourses (natural, heavily modified, artificial - river bodies) on hydrographic spaces/basins in 2017 (km) is shown in the figureII.26.

Figure II.26 Ecological status / ecological potential of monitored watercourses (natural water bodies, strongly modified, artificial - rivers) on spaces / hydrographic basins in 2017 (km)



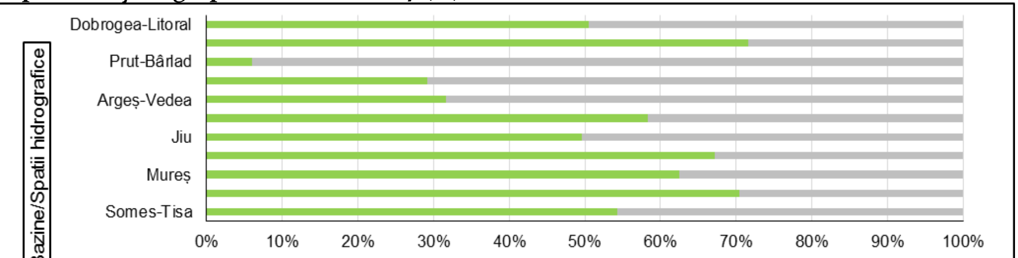
	Someș-Tisa	Crișuri	Mureș	Banat	Jiu	Olt	Argeș - Vedea	Buzău - Ialomița	Prut - Bârlad	Siret	Dobrogea - Litoral
SE bună / bun (km)	2724.8	1184.1	2714.8	2271.7	1687.3	2109.5	1168.8	682.8	208.3	4026.8	505.0
SE inferioară stării bune (km)	2290.7	497.8	1634.1	1109.4	1719.3	1506.0	2529.2	1654.6	3283.1	1603.1	494.5

***SE - ecological status / ecological potential*

Source: Data transmitted by the National Administration "Romanian Waters "

The assessment of the ecological status / ecological potential of the monitored watercourses (natural water bodies, strongly modified, artificial - rivers) on spaces / hydrographic basins in 2017 (%) is presented in figure II.27.

Figure II.27 Ecological status / ecological potential of monitored watercourses (natural water bodies, strongly modified, artificial - rivers) on spaces / hydrographic basins in 2017 (%)

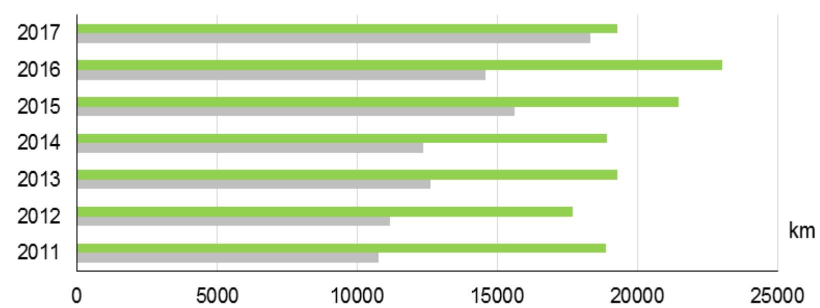


	Someș-Tisa	Crișuri	Mureș	Banat	Jiu	Olt	Argeș-Vedea	Buzău-Ialomița	Prut-Bârlad	Siret	Dobrogea-Litoral
SE bună / bun (%)	54.33	70.40	62.43	67.19	49.53	58.35	31.61	29.21	5.96	71.53	50.53
SE inferioară stării bune (%)	45.67	29.60	37.57	32.81	50.47	41.65	68.39	70.79	94.04	28.47	49.47

Source: Data transmitted by the National Administration "Romanian Waters"

The evolution of the ecological status / ecological potential of the monitored watercourses (natural water bodies, strongly modified, artificial - rivers) at national level in the period 2011 - 2017 (km) is presented in figure II.28.

Figura II.28 The evolution of the ecological status / ecological potential of the monitored watercourses (natural water bodies, strongly modified, artificial - rivers) at national level in the period 2011 - 2017 (km)

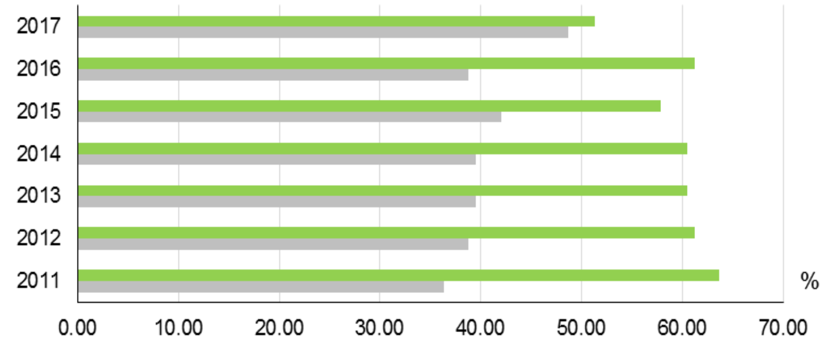


	2011	2012	2013	2014	2015	2016	2017
SE bună / bun (km)	18877.32	17696.49	19290.4	18910.44	21489.82	23035.7	19283.8
SE inferioară stării bune (km)	10758.22	11189.98	12602.4	12352.14	15621.2	14575.9	18321.6

Source: Data transmitted by the National Administration "Romanian Waters "

The evolution of the ecological state / the ecological potential of the watercourses (natural water bodies, strongly modified, artificial - rivers) monitored at national level between 2011 and 2017 (%) is presented in figure no. II.29.

Figure II. The evolution of the ecological state / the ecological potential of the watercourses (natural water bodies, strongly modified, artificial - rivers) monitored at national level between 2011 and 2017 (%)



	2011	2012	2013	2014	2015	2016	2017
SE bună / bun (%)	63.70	61.26	60.49	60.49	57.91	61.25	51.28
SE inferioară stării bune (%)	36.30	38.74	39.51	39.51	42.09	38.75	48.72

Source: Data transmitted by the National Administration "Romanian Waters "

The evolution of the ecological status / ecological potential of the monitored watercourses (natural water bodies, strongly modified, artificial - rivers) at national level during 2011 - 2017 is presented in table II.16.

TableII.16 The evolution of the ecological status / ecological potential of the monitored watercourses (natural water bodies, strongly modified, artificial - rivers) at national level during 2011 - 2017

Ecological status / Ecological potential	2011	2012	2013	2014	2015	2016	2017
Very good and Good (%) /	63,7	61,26	61,43	60,49	57,87	61,26	51,28
Maximum and Good (%)	35,88	38,55	37,99	38,11	39,91	36,68	44,33
Moderate (%) / Moderate (%)	0,28	0,04	0,26	1,22	1,7	1,45	2,82
Poor (%)	0,15	0,15	0,32	0,18	0,52	0,59	1,57
Bad (%)	36,3	38,73	38,57	39,5	42,13	38,72	48,72
SE infertor to the good status (%)	29635,54	28886,47	31892,8	31262,58	37111,02	38128,85	37605,38
Length of monitored river network (km)	1384	1407	1409	1332	1465	1464	1498

Source: Data transmitted by the National Administration "Romanian Waters "

Water quality of lakes

Note – The latest data submitted by ANAR on lake water quality are at the level of 2017.

RO 66

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

TITLE: DANGEROUS SUBSTANCES IN LAKES

DEFINITION: The indicator quantifies the concentrations (annual averages) of dangerous substances present in lakes. The dangerous substances required for reporting are those listed in H.G. no. 351/2005 regarding the approval of the Program for the gradual elimination of discharges, emissions and losses of priority dangerous substances, modified and completed by H.G. no. 1038/2010.

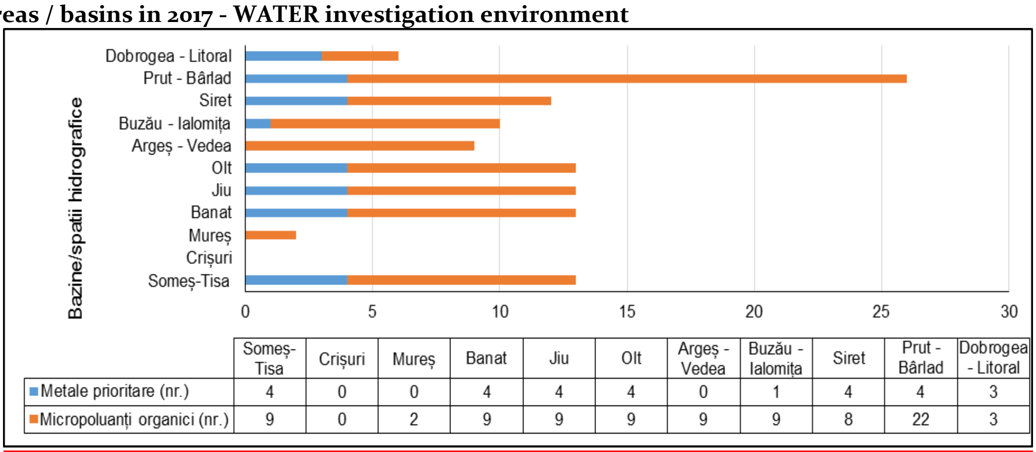
The distribution of the number of priority substances monitored in lakes (natural, heavily modified and artificial lakes) by hydrographic areas/basins in 2017 is shown in Table No. II.17 and Figure No. II.30.

Tabelul II.17 Distribution of priority substances monitored in lakes (natural, strongly modified and artificial lakes) by hydrographic areas / basins in 2017 - WATER investigation environment

Space / river basin	Water bodies (no.)	Priority substances monitored		Monitored sections (no.)
		Metale prioritare (nr.)	Micropoluanți organici (nr.)	
Someș - Tisa	12	4	9	10
Crișuri	8	0	0	0
Mureș	8	0	2	2
Banat	9	4	9	4
Jiu	16	4	9	3
Olt	11	4	9	7
Argeș - Vedea	18	0	9	2
Buzău - Ialomița	29	1	9	3
Siret	10	4	8	3
Prut - Bârlad	26	4	22	11
Dobrogea - Litoral	22	3	3	10
Total	**169**	**4**	**22**	**55**

Source: Data transmitted by the National Administration "Romanian Waters" "

Figure II.30 Distribution of priority substances monitored in lakes (natural, strongly modified and artificial lakes) by hydrographic areas / basins in 2017 - WATER investigation environment



Source: Data transmitted by the National Administration "Romanian Waters "

Table II.18 The share of the sections for monitoring the priority substances with concentrations higher than the SCM (%) for the year 2017 on hydrographic areas / basins - WATER investigation environment

Space / river basin	Monitored sections (no.)	Monitored sections with concentrations higher than SCM (no.)	Share of monitored sections with concentrations higher than SCM (%)
Someș - Tisa	10	0	0
Crișuri	0	0	0
Mureș	2	0	0
Banat	4	0	0
Jiu	3	0	0

Olt	7	0	0
Argeș - Vedea	2	0	0
Buzău - Ialomița	3	0	0
Siret	3	0	0
Prut - Bârlad	11	0	0
Dobrogea - Litoral	10	1	10
Total	**55**	**1**	**1,82**

Source: Data transmitted by the National Administration "Romanian Waters "

The evolution of the monitoring sections with higher concentration than the SCM is presented in table II.19.

Table II.19 Share of monitored sections with a concentration higher than SCM (%) between 2011 and 2017

Year	2011	2012	2013	2014	2015	2016	2017
Priority substances monitored (no.)	34	37	37	37	31	37	26
Monitoring sections (no.)	110	109	98	92	71	95	55
Share of sections with higher concentration than SCM (%)	13,64	24,77	53,06	11,96	2,81	3,15	1,82

Source: Data transmitted by the National Administration "Romanian Waters "

Groundwater quality

RO 20

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

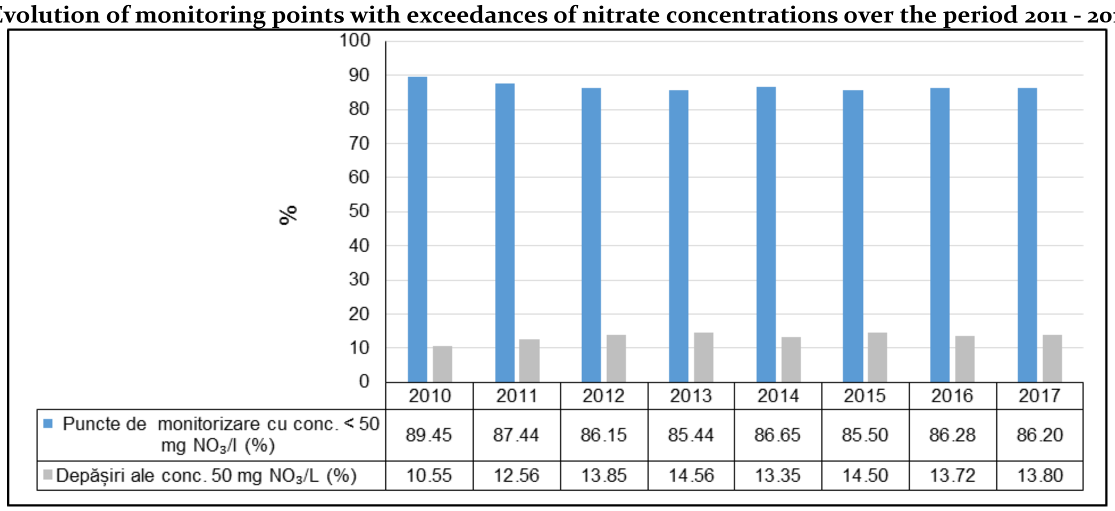
TITLE: NUTRIENTS IN WATER

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

Note – The latest data submitted by ANAR on groundwater quality are at the level of 2017.

EVOLUTION OF THE NUMBER OF MONITORING POINTS WITH EXCEEDANCES IN THE NITRATE CONTENT IN THE PERIOD 2011 – 2017 (%)

Figure II.31 Evolution of monitoring points with exceedances of nitrate concentrations over the period 2011 - 2017 (%)



Source: Data transmitted by the National Administration "Romanian Waters "

RO 64

Indicator code Romania: RO 64
EEA Indicator Code: VHS 01

TITLE: PESTICIDES IN GROUNDWATERS

DEFINITION: The indicator shows the concentration of an active substance or the sum of the concentrations of the active substances in the class of pesticides determined in the groundwater. The pesticides required for reporting are those listed in the list of priority substances in H.G. no. 351/2005 regarding the approval of the Program for the gradual elimination of discharges, emissions and losses of priority dangerous substances, modified and completed by H.G. no. 1038/2010.

Distribution of the number of monitoring points for pesticides on hydrographic areas / basins in 2017

Table II.20 Pesticides monitored in 2017 (number)

	2017			
Space / river basin	Monitored water bodies (number)	Monitoring points (total no.)	Points where pesticides are monitored (number)	Monitored pesticides (number)
Someș - Tisa	15	131	1	2
Crișuri	9	130	1	3
Mureș	23	122	6	16
Banat	20	215	0	0
Jiu	8	93	76	2
Olt	14	143	45	15
Argeș - Vedea	11	168	162	21
Buzău - Ialomița	18	192	191	21
Siret	6	111	12	18
Prut- Bârlad	7	113	49	12
Dobrogea - Litoral	10	118	7	11
Total	141	1536	550	21

Source: Data transmitted by the National Administration "Romanian Waters "

The share of monitoring points with a higher concentration than 0.1 µg / L from the number of boreholes in which pesticides are monitored for 2017

Table II.21 The share of monitoring points with a higher concentration than 0.1 µg / L from the number of boreholes in which pesticides are monitored for 2017 (%)

Space / river basin	Points where pesticides are monitored (no.)	Monitoring points with conc. > 0,1 µg/L (no.)	Monitoring points with conc. > 0,1 µg/L (%)
Someș - Tisa	1	1	100
Crișuri	1	0	0
Mureș	6	0	0
Banat	0	0	0
Jiu	76	0	0
Olt	45	0	0
Argeș - Vedea	162	7	4,32
Buzău - Ialomița	191	3	1,57
Siret	12	0	0
Prut- Bârlad	49	0	0
Dobrogea - Litoral	7	0	0
Total	550	11	2,0

Source: Data transmitted by the National Administration "Romanian Waters "

Evolution of monitoring points with higher concentration than 0.1 µg / L for the period 2011 - 2017 (%)

Table II.22 Evolution of monitoring points with higher concentration than 0.1 µg / L for the period 2011 - 2017 (%) (%)

Year	2011	2012	2013	2014	2015	2016	2017
Number of monitored pesticides	20	20	19	19	19	20	21
Total number of monitored points	1314	1300	1271	1318	1310	1523	1536
Number of points where pesticides are monitored	278	368	333	284	365	574	550
Share of monitoring points with a higher concentration than 0.1µg / L from the no. of the points where the pesticides are monitored (%)	6,12	2,99	2,7	0	6,3	3,31	2,0

Source: Data transmitted by the National Administration "Romanian Waters "

Table nr. II.23 Number of monitored points where pesticides are monitored and number of points with a higher concentration than 0.1µg / L in 2017

Pesticides	No. of points where pesticides are monitored	No. of monitoring points with higher conc. than 0,1 µg/L
Alaclor	462	2
Atrazin	457	9
Clorfenvinfos	141	-
Clorpirifos	140	-
DDT-Total	457	-
Diuron	164	-
gama HCH - Lindan	461	-
Izoproturon	164	-
p,p-DDT	459	-
p,p-DDE	5	-
Aldrin	460	-
Dieldrin	460	-
Endrin	463	-
Isodrin	460	-
Simazin	460	-
Trifluralin	103	-
delta-Hexaclorciclohexan	1	-
Diclorvos	9	-
Mevinfos	89	-
beta-Endosulfan	487	-
Endosulfan	547	-

Source: Data transmitted by the National Administration "Romanian Waters "

The bathing waters quality

RO 22

Indicator code Romania: RO 22
EEA indicator code: CIS 22

TITLE: BATHING WATER QUALITY

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

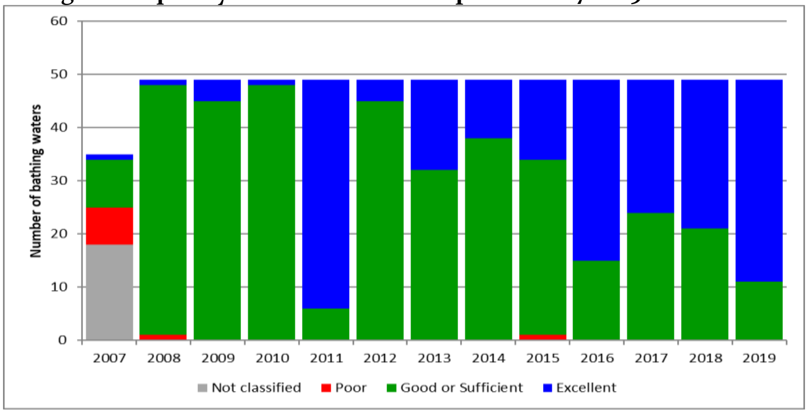
In the bathing season 2019 (June 1st - September 15th), 50 natural bathing areas were inventoried on the territory of Romania, for which the territorial PH (DSP) have established a monitoring calendar. The list of these areas and the monitoring calendar were posted on the Ministry of Health website. In 49 of these areas the bathing water is marine and in one area it is on a lake with fresh water.

The evaluation of 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 2019 was performed for continuously monitored areas in the last 4 years and the evaluation was applied by classification, using the database from the current season (2018) and from the 3 previous seasons; this assessment was performed according to Directive 2006/7 / EC, respectively the provisions of H.G. no. 546/2008, art. 18-24, and the provisions of annex no. 2.

- Excellent 76,00% (38),
- good 20.00% (10),
- satisfactory 4,00% (2) și
- unsatisfactory 0.00% (0).

During the 2019 bathing season, pollution of petroleum products was reported in the Mangalia area but due to rapid interventions the water quality in the bathing area was not influenced. No further short-term pollution was reported and no abnormal situation was reported.
Profiles can be accessed on the MS website at the link: http://www.ms.ro/organizare/directia-generala-de-asistenta-medicala-si-sanatate-publica-2/
Regarding the evolution of bathing water quality from 2007 to 2019 it is shown in the chart in Figure II.32 in the "BWD Report For the Bathing Season 2019 Romania" of the EAA.

Figure II.32 The trend in bathing water quality in Romania for the period 2007-2019



Source: NATIONAL PUBLIC HEALTH INSTITUTE

Figure II.32 shows that in Romania in the classifications of the last 4 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 bathing waters is predominantly consistent only with the values in the mandatory rules and not with the reference ones to which they should be used. Consideration should be given to the objective of continuously improving the quality of surface water, as EC bath water specialists/responsibles wish to eliminate in the near future the 'satisfactory' quality water category (according only to mandatory rules).

DETERMINING FACTORS AND PRESSURES THAT AFFECT THE QUALITY OF WATERS

Significant pressures on water resources in Romania

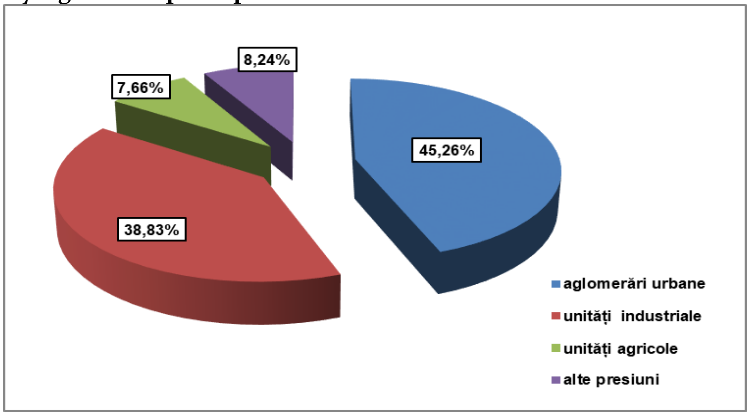
RO 25
Indicator code Romania: RO 25 EEA indicator code: CIS 25
TITLE: GROSS NUTRIENT BALANCE
DEFINITION: The indicator estimates the nitrogen surplus on agricultural land. This is achieved by calculating the balance between the total amount of nitrogen entering the agricultural system and the total amount of nitrogen coming out of the agricultural system, reported on the surface unit of the agricultural land. The indicator shows all the inputs and outputs of nitrogen from an agricultural field. The inputs consist of the amount of nitrogen applied through mineral and natural fertilizers, nitrogen fixed by plants and emissions into the air. Exit nitrogen is contained in crops, grass and crops consumed by animals. Nitrogen emissions in the form of NO_2 are difficult to estimate and are not taken into account. The gross balance of the nutrients provides an indication of the risk of contamination of surface and groundwater bodies as a result of the surplus of nutrients from agricultural surfaces.

Wastewater and sewage networks

In accordance with the Water Framework Directive 2000/60/EC, significant pressures were considered in the framework of the water supply/space management plans that result in the failure to achieve environmental objectives for the water body. Depending on how the water body reception system works, it can be known whether a pressure can cause an impact. This approach, coupled with the list of all pressures and the particular characteristics of the reception basin, leads to the identification of significant pressures.

In the National Management Plan of the basins / hydrographic spaces in Romania, updated and approved by H.G. no. 859/2016, a total number of 2970 water users were inventoried at national level which use surface water resources as a receiver of discharged water, from which, taking into account the criteria mentioned above, resulted a total number of **1409 sources potentially significant points (626 urban, 563 industrial, 106 agricultural and 114 other pressures such as forestry, aquaculture, etc.).**

Figure II.33 Share of potentially significant point pressures

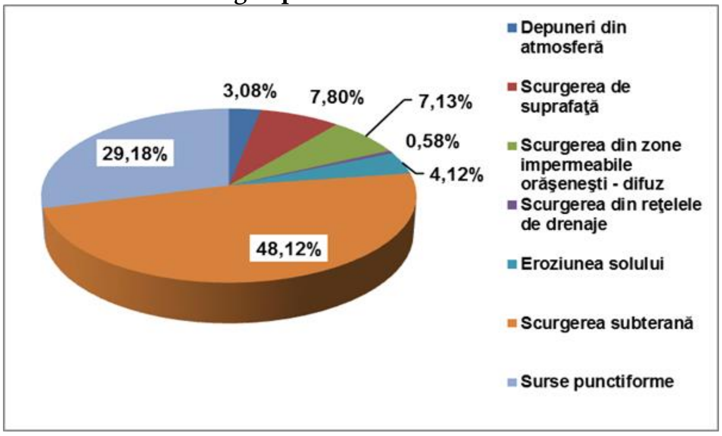


Data source: National Administration "Romanian Waters", National Management Plan approved by HG no. 859/2016 for the approval of the updated national management plan for the portion of the international river basin of the Danube river which is included in the territory of Romania

It is found that the largest share of point pressures is represented by human agglomerations, with approx. 45%, respectively the waste water evacuated from the systems of collection and treatment of urban agglomerations.

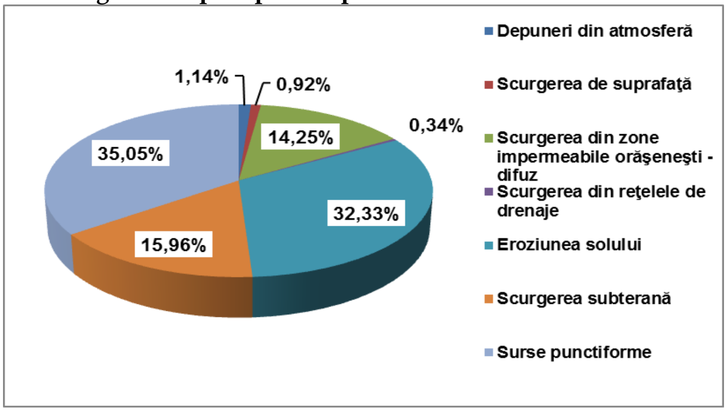
Figures II.34 and II.35 show the contribution of the modes of production of diffuse nitrogen and phosphorus pollution for 2012, taking into account the ways presented above.

Figure II.34 Ways (modes) to produce diffuse nitrogen pollution



Data source: National Administration "Romanian Waters", National Management Plan approved by HG no. 859/2016 for the approval of the updated national management plan for the portion of the international river basin of the Danube river which is included in the territory of Romania

Figure II.35 Ways (modes) of producing diffuse phosphorus pollution



Data source: National Administration "Romanian Waters", National Management Plan approved by HG no. 859/2016 for the approval of the updated national management plan for the portion of the international river basin of the Danube river which is included in the territory of Romania

Table II.24 presents nitrogen and phosphorus emissions from diffuse pollution sources, taking into account the contribution of each category of pollution sources.

Table II.24 Nitrogen and phosphorus emissions from different sources for 2012

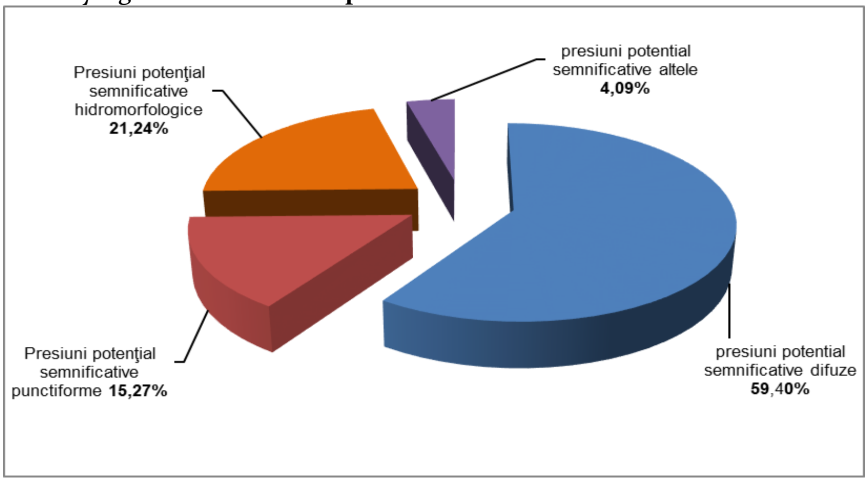
Diffuse sources of pollution	Nitrogen emissions		Phosphorus emissions	
	tones	%	tones	%
Agriculture	16295	22,47	2.943,097	55,18
Human agglomerations	5035	6,94	1.014,474	19,02
Other sources	37148	51,21	566,124	10,61
Natural background	14056	19,38	810,124	15,19
Total diffuse sources	**72.533**	**100**	**5.334**	**100**
Specific average diffuse emission over the total surface	3,05 kg N/ha		0,22 kg P/ha	
Specific average diffuse emission from agriculture on the agricultural surface	1,18 kg N/ha		0,21 kg P/ha	

Data source: National Administration "Romanian Waters", National Management Plan approved by HG no. 859/2016 for the approval of the updated national management plan for the portion of the international river basin of the Danube river which is included in the territory of Romania

It is observed that approx. 22% of the amount of nitrogen emitted by diffuse sources is due to agricultural activities and about 19% of the total diffused phosphorus emission is due to human settlements / agglomerations.
Compared to the total emissions from diffuse sources of pollution evaluated in the first National Plan for the management of river basins / hydrographic spaces (since 2005), there is a significant reduction of the total emissions of nitrogen (by approx. 39%) and phosphorus (by approx. 45%), mainly due to the application of efficient measures and the reduction / closure of some economic activities. Thus, in the period 2009 - 2012 the number of human agglomerations without sewerage systems was reduced, by the construction of new sewerage networks and the level of connection to them was increased, and in agriculture the provisions of the Action Programs for the protection of waters against pollution with nitrates from agricultural sources were applied and the Code of Good Agricultural Practice.
According to the Water Quality Synthesis developed by the National Administration "Romanian Waters", a number of 1272 water users have been identified at the national level who can cause accidental pollution and who have developed their own plans for preventing and combating accidental pollution. In 2017, there were 70 accidental pollutions of surface watercourses, mainly on inland rivers: 19 with petroleum product and other hydrocarbons, 28 with unpurified wastewater, two mine water pollution, 6 low oxygenation pollution, 4 with

unidentified substances, 5 with other substances and 6 with semi-solid waste. The phenomena had local/basinal impact, and due to the reduced duration, the nature of the pollutant, the length of the affected section and the inertia of the communities in the structure of aquatic biocenosis, the effects of the phenomena in question were reduced only to the local change in the values of the physico-chemical indicators, without them inducing a significant change in aquatic biodiversity in the long term. Accidental pollution is mainly due to the negligence of some economic operators during the development of technological processes or non-compliance with the legislative provisions on the discharge of waste water into water resources.

Figure II.36 Share of potentially significant identified pressures



Data source: National Administration "Romanian Waters", National Management Plan approved by HG no. 859/2016 for the approval of the updated national management plan for the portion of the international river basin of the Danube river which is included in the territory of Romania

In the first National Management Plan, 19 underground water bodies were identified that did not reach the good chemical status due to the following parameters: nitrogen and ammonium, for which exceptions from the objectives were reached until 2027. Due to the measures taken in the first cycle of implementation and as a result of the current assessment of the chemical state (year 2015), 128 underground water bodies are in good chemical condition and 15 are in poor chemical condition.

The update of the inventory of significant pressures on water resources, respectively the analysis of pressures and impact, based on the use of the DPSIR (Driver-Pressure-State-Impact-Response-Anthropic-Pressure-State-Impact-Response) concept, will be carried out in 2020, within the process of updating the Basin / Spatial Management Plans for the third planning cycle (2022-2027), in order to establish the necessary measures to improve the ecological status / ecological potential and the chemical status of surface water bodies and the quantitative and chemical state of groundwater bodies.

Wastewater and sewerage networks

RO 24
Indicator code Romania: RO 24 EEA indicator code: CSI 24
TITLE: URBAN WASTEWATER TREATMENT
DEFINITION: The indicator quantifies the level of population connection to wastewater collection and treatment systems. The indicator also illustrates the efficiency of national wastewater treatment programs, the efficiency of policies to reduce nutrient and organic substances discharges, as well as the implementation stage of the national wastewater treatment requirements (91/271 / EEC and 98/15 / EC) at national level.

In relation to their provenance, wastewater is classified as follows: *domestic waste water*, are those that are discharged after they have been used for household needs in homes and units of public use; *urban* *wastewater*, defined as domestic wastewater or a mixture of domestic wastewater with industrial wastewater and / or meteorological water and *industrial wastewater*, those that are discharged as a result of their use in technological processes for obtaining industrial or agro-industrial finished products.

Urban wastewater is defined as domestic wastewater or a mixture of domestic wastewater with industrial wastewater (generally from the agro-food industry) is collected through sewerage systems and taken over and treated in wastewater treatment plants.

Structure of discharged wastewater. Polluting substances and waste water pollution indicators

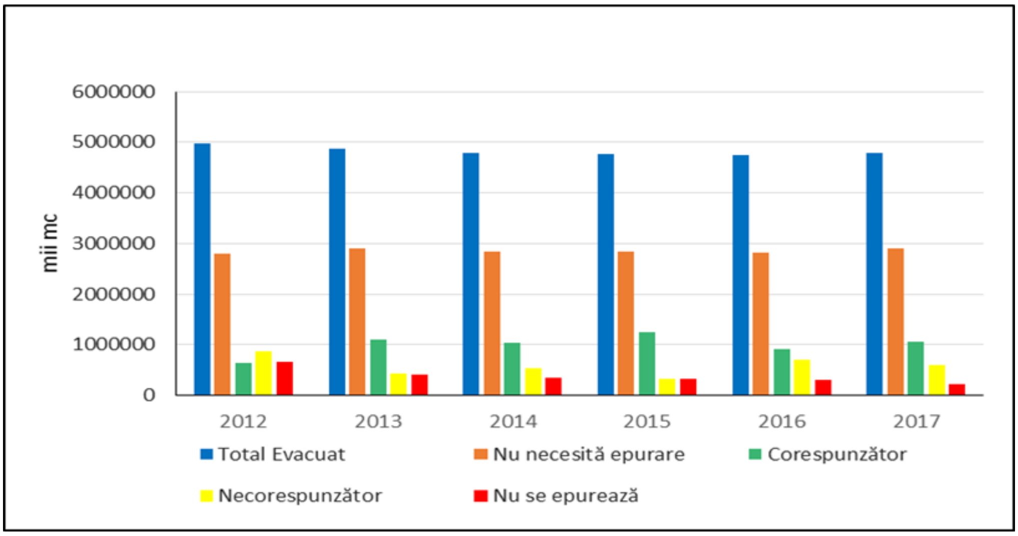
According to the results of the national assessment, the **total volume evacuated in 2017 was 4795.96 million m3**, of which 2905.16 million, m3 (60.57%) means cooling water, water falling into the category of *waste water which does not require purification*. The situation regarding the volumes of waste water discharged between 2012 and 2017 is shown in Table II.25 and Figure II.37.

Table II.25 Volumes of wastewater evacuated at national level in natural receivers between 2012 and 2017 (thousands m³)

Year	Total Evacuated	It does not require purification	It is purified		It is not purified
			Adequate	Inadequate	
2012	4985141,14	2787700,63	650290,43	881306,72	665843,36
2013	4872641,26	2911880,03	1113315,00	433497,30	413948,93
2014	4784719,64	2845917,86	1039378,07	541982,06	357441,65
2015	4762839,23	2846131,59	1242300,03	336213,33	338194,27
2016	4745681,89	2811834,25	914232,29	705086,32	314529,02
2017	4795960,86	2911561,51	1055539,91	604374,29	224485,15

Source: National Administration "Romanian Waters", Synthesis of Romanian Water Quality

Figure II.37 Volumes of wastewater evacuated at national level in natural receivers in 2012 -2017 (thousands m3)



Source: National Administration "Romanian Waters", Synthesis of Romanian Water Quality

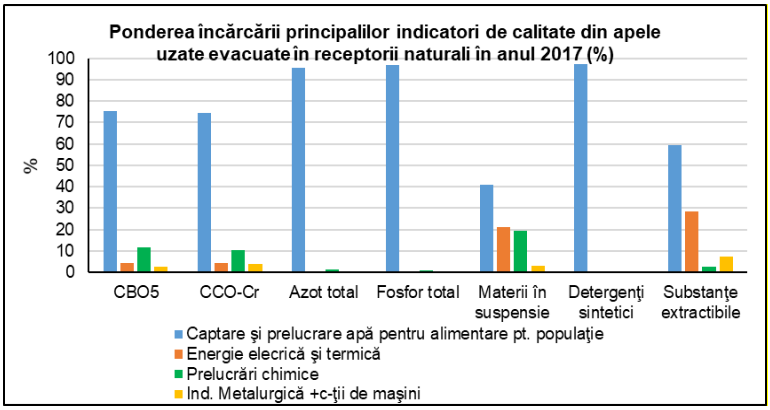
Regarding the weight of loading of the main quality indicators from wastewater discharged into natural receivers, **by activities of the national economy**, without taking into account the loading related to the cooling waters, the situation is presented in table II.26 and figure II.38.

Table II.26 Share of loading of the main quality indicators from wastewater discharged into natural receivers in 2017 (%)

The main economic activities	Share of loading of the main quality indicators from wastewater discharged into natural receivers in 2017 (%)						
	CBO5	CCO-Cr	Total nitrogen	Total phosphorus	Materials in suspension	Synthetic detergents	Extractable substances
Collection and processing of water for food supply to the population	75,26	74,41	95,75	96,70	40,77	97,35	59,25
Electricity and thermal energy	4,28	4,43	0,05	0,03	21,01	0,03	28,43
Chemical processing	11,64	10,22	1,31	0,86	19,51	0,45	2,43
Metallurgical Industry and Construction of cars	2,83	3,82	0,12	0,07	3,03	0,06	7,22

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

Figure II.38 Share of loading of the main quality indicators from wastewater discharged into natural receivers in 2017 (%)



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

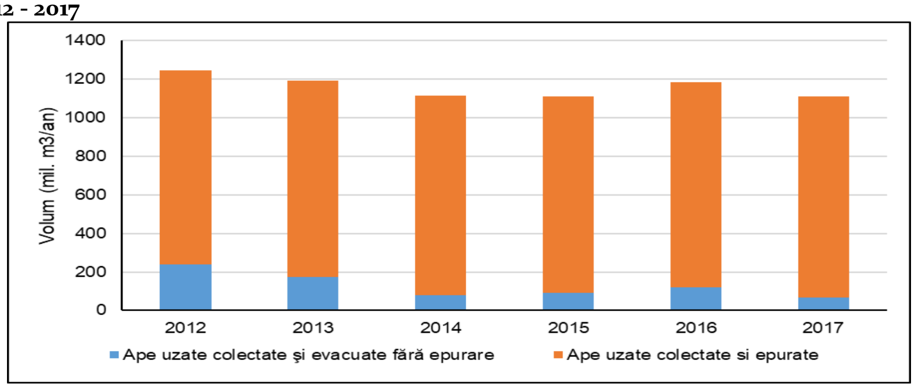
The statistics compiled and presented annually in the "Synthesis of water quality in Romania" prove that of the wastewater that requires treatment, the greatest impact is wastewater from urban agglomerations, especially regarding the pollution with organic substances (CBO5 and CCO-Cr) and nutrients (total nitrogen and total phosphorus).
Tables II.27 şi II.28 and respectivelly figures II.39 şi II.40 highlight the ones stated above.

Table II.27 The total volume of urban waste water discharged into natural receivers during the period 2012 – 2017 (mil. m3/year)

Year	Volume of urban waste water discharged into natural receivers				
	Total	It does not require purification	Properly purified	Inappropriate purified	It is not purified
2012	1248,129	1,483	524,769	484,921	236,956
2013	1194,423	3,024	744,003	275,164	172,232
2014	1115,475	3,144	605,266	426,280	80,785
2015	1110,701	0,485	757,153	260,195	93,352
2016	1182,080	0,471	431,128	630,170	120,310
2017	1111,128	0,479	496,515	545,421	68,711

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

Figure II.39 Evolution of the collection and treatment of volumes of urban waste water discharged into natural receivers during the period 2012 - 2017



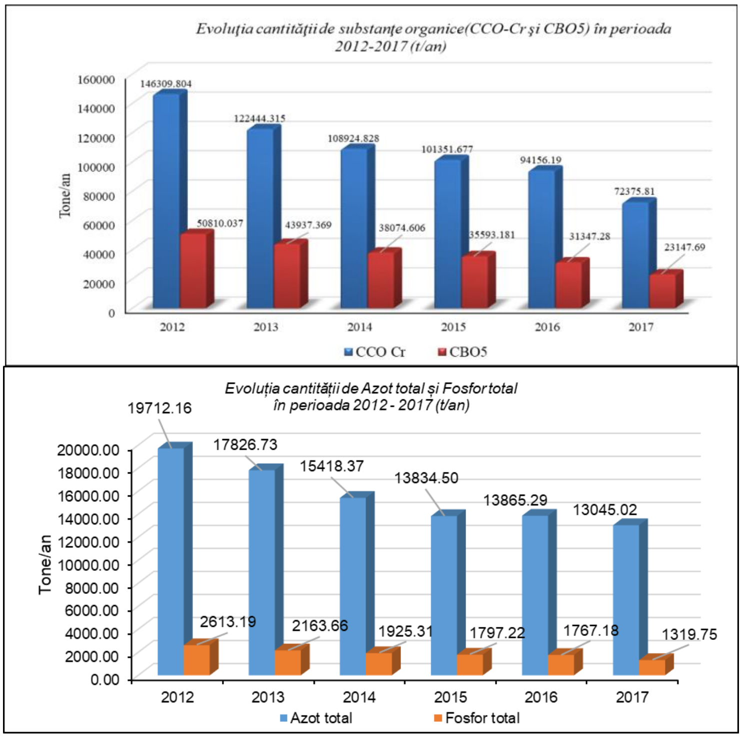
Source: ANAR

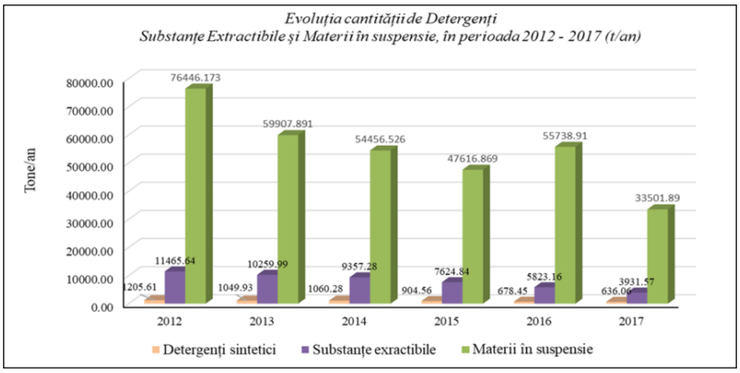
Table II.28 The pollutant loading (tonnes / year) of the effluents evacuated from the urban agglomerations in the natural receivers

Pollutant	Amount of pollutants (tonnes / year)					
	2012	2013	2014	2015	2016	2017
CBO_5	50810,04	43937,37	38074,61	35593,18	31347,28	23147,69
CCO-Cr	146309,80	122444,32	108924,83	101351,68	94156,19	72375,81
Total nitrogen	19712,16	17826,73	15418,37	13834,49	13865,29	13045,02
Total phosphorus	2613,19	2163,66	1925,31	1797,22	1767,18	1319,76
Materials in suspension	76446,17	59907,89	54456,53	47616,87	55738,90	33501,89
Synthetic detergents	1205,61	1049,93	1060,28	904,56	678,45	636,07
Extractable substances	11465,64	10259,99	9357,28	7624,84	5823,16	3931,57

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

Figure II.40 Developments on pollutant loading of urban waste water discharged into water resources during the period 2012 - 2017





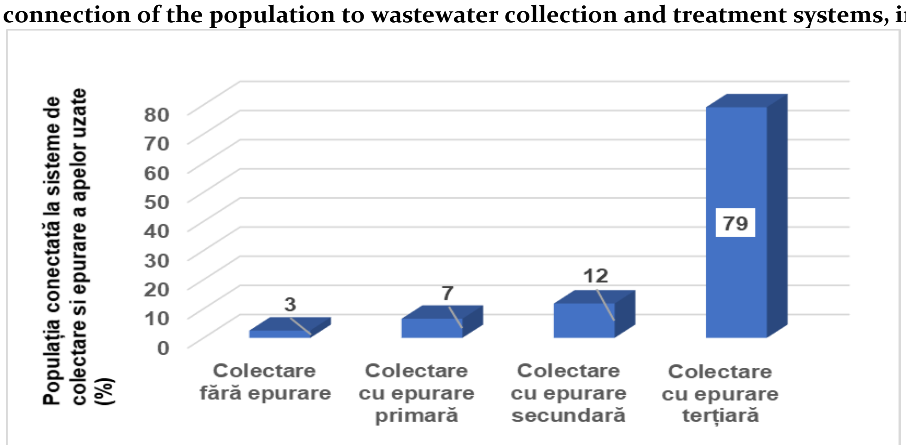
Source: National Administration "Romanian Waters", Synthesis of Romanian water quality

The level of collection and treatment of urban waste water

According to the National Statistical Institute, in 2018, 10,293,041 inhabitants had their homes connected to sewerage systems, which represented about 52.7% of Romania's population. As regards wastewater treatment, the population with homes connected to sewage systems equipped with sewage treatment plants was 10,035,288 people, representing about 51.4% of the country's population. In addition, the degrees of connection of the population to waste water collection and treatment systems differentiated by treatment levels are shown in *Figure II.41*.

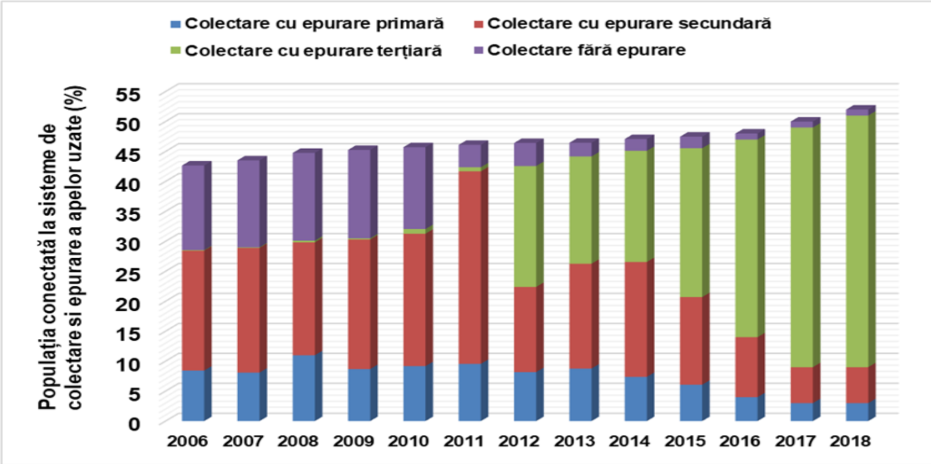
The evolution of the degree of connection of the population to waste water collection and treatment systems according to the type of treatment process applied (Figure II.42) indicates a steady increase in the number of the population benefiting from wastewater services, as a consequence of the extension and construction of the related infrastructure. It is noted that in recent times the proportion of tertiary purification collection systems has increased in particular. Primary (mechanical) purification removes part of suspended solids (approximately 40-70%), while secondary (biological) purification uses aerobic and/or anaerobic micro-organisms to break down a large part of organic substances (approximately 50-80%), to remove ammonium (approximately 75%) and to retain some of the nutrients (approx. 20-30%). Tertiary (advanced) purification effectively removes organic matter, phosphorus compounds and nitrogen compounds.

Figure II.41 Degree of connection of the population to wastewater collection and treatment systems, in the year 2018



Source: National Statistical Institute, www.insse.ro

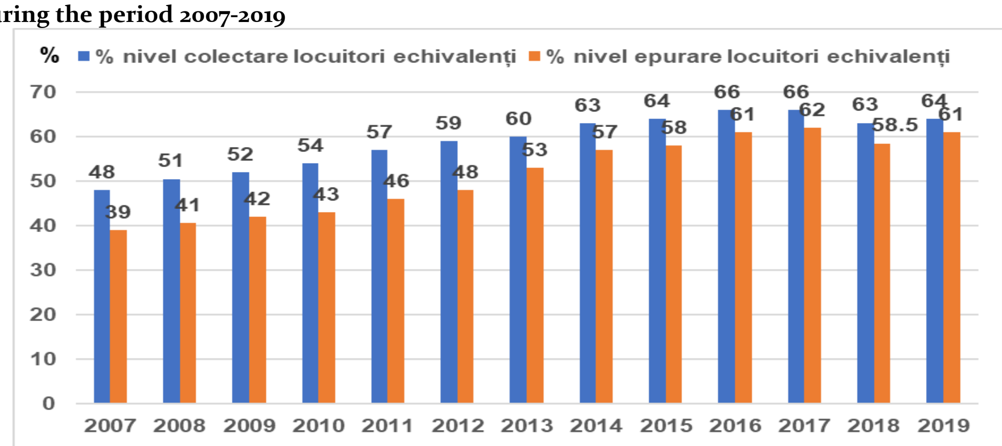
Figure II.42 Degree of connection of the population to wastewater collection and treatment systems, 2006 - 2018



Source: National Statistical Institute, www.insse.ro

According to the report by the National Administration "Romanian Waters", in human agglomerations greater than 2000 l.e., the degree of connection to the waste water collection system has registered an increase of approx. 16% at the end of 2019 compared to 2007 (Figure II.43). In terms of the degree of connection to urban treatment plants, it has increased by approx. 22% between 2007 and 2019.

Figure II.43 Evolution of the levels of collection and treatment (%) of biodegradable organic loads (l.e.) of wastewater at national level during the period 2007-2019



Source: National Administration "Romanian Waters", report "Stage of the completion of works for urban waste water treatment and capacities in operation and put into operation for human agglomerations"

There is a decrease in national levels of collection and purification compared to 2017 which has the main causes: the change in the number and size of agglomerations, following the development of feasibility studies for European funding in the period 2014-2020, and the fact that in human agglomerations rehabilitation works are under way so that the collected waste water is discharged directly , without purification, in the water resource. Thus, the modification of national levels of collection and purification has several causes, of which it is mainly mentioned:

- change in the number and size of agglomerations - the number and organic load (in equivalent inhabitants) of agglomerations greater than 10,000 l.e. decreased, and of the agglomerations by 2,000 - 10,000 l.e. increased, following the redelimitation of agglomerations, based on the updating of planning documents, respectively County Master Plans and financing applications for carrying out the necessary works for the realization of wastewater collection and treatment systems from human agglomerations; the decrease in the size of agglomerations also contributes to the decrease in the number of population and economic activities, which has led to a change in the classification of agglomerations by size categories and thus to a change in their number and size.;
- the low level of confidence of 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;

- in human agglomerations, rehabilitation of treatment plants is under way, so that the collected waste water is discharged directly, without purification, into the water resource.

At county level, the highest degrees of connection to sewerage networks (over 80%) are identified in the counties: Caraş Severin, Cluj, Constanța, Hunedoara, Sibiu, Timiș and in the Bucharest agglomeration, and at the opposite pole (below 30%) there are the counties of Dâmbovița and Giurgiu. Regarding the degrees of connection to the treatment plants, the situation is as follows: in 5 counties (Cluj, Constanța, Hunedoara, Sibiu and Timiș) values of the level of connection to the treatment plant of over 80% were registered. In some of the counties the purification percentage increased compared to December 2018, values lower than 30% being registered in Dâmbovița and Giurgiu counties.

MARINE AND COSTIER ENVIRONMENT

THE STATUS OF THE MARINE AND COASTAL ECOSYSTEMS AND CONSEQUENCES

Status of protected marine areas

RO 41
Indicator code Romania: 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

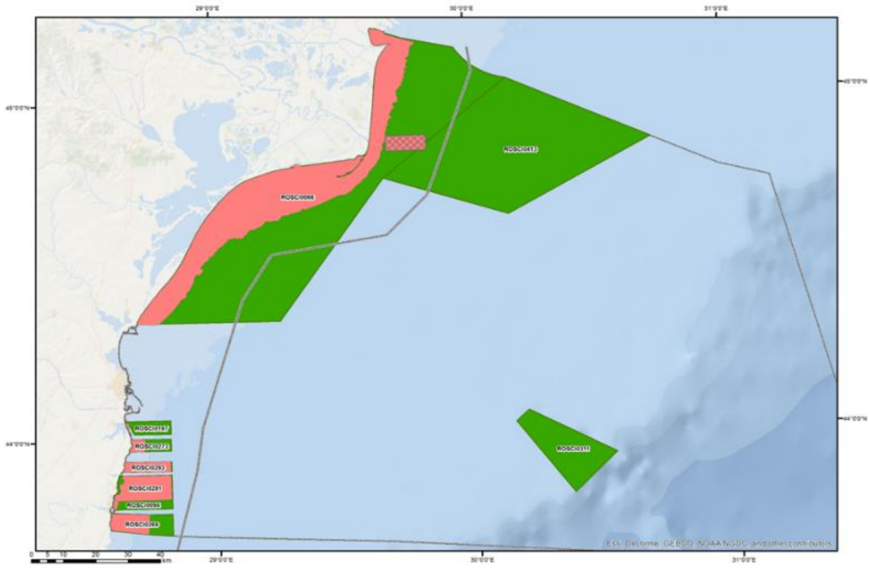
According to international and European Union directives, the Protected Marine Network must have a suitable surface to fulfill the assigned protection role and consist of protected areas linked through "green corridors" that provide natural conditions for movement, reproduction and refuge for species of marine flora and fauna. Specific legislative directives are represented by:

1.Directive 92/43 / EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora;
2. Council Directive 79/409 / EEC of 2 April 1979 on the conservation of wild birds;
3. Common Fisheries Policy - Regulation no. No 1967/2006 of the European Council of 21 December 2006;
4.Directive 2000/60 / EC establishing a framework for Community action in the field of water policy;
5.Directive 2014/89 / EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for the development of the maritime space;
6. United Nations Convention on the Law of the Sea;
7. Convention on Biological Diversity;
8. Regional maritime conventions: OSPAR (North-East Atlantic Ocean), HELCOM (Baltic Sea), Barcelona Convention (Mediterranean) and the Bucharest Convention (Black Sea).

In accordance with ***Order no. 46/2016 on the establishment of the protected natural habitat regime and the declaration of sites of Community importance as an integral part of the Natura 2000 European ecological network in Romania***, published in the Official Gazette no. 114 / 15.02.2016 the Romanian Protected Areas Network (Figure II.44) consists of the following sites of Community Importance:

1.ROSCI0066 Rezervația Biosferei Delta Dunării - zona marină
2.ROSCI0413 Lobul sudic al Câmpului de Phyllophora al lui Zernov
3.ROSCI0197 Plaja submersă Eforie Nord - Eforie Sud
4.ROSCI0273 Zona marină de la Capul Tuzla
5.ROSCI0281 Cap Aurora ROSCI0094
6.ROSCI0293 Costinești - 23 August
7.ROSCI0311 Canionul Viteaz
8.ROSCI0094 Izvoarele sulfuroase submarine de la Mangalia
9.ROSCI0269 Vama Veche - 2 Mai.

Figure II.44 Map of sites of Community importance (under the Habitats Directive) in the Romanian Black Sea sector. Green = site boundaries in 2016, Red = site boundaries 2011-2015



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Table II.28 shows the areas of sites of community importance in the Romanian Black Sea sector.

Tabelul II.30. The areas of sites of community importance in the Romanian Black Sea sector

Nr. crt.	Site	Surface în 2018 (km^2)
1.	ROSCI0066 DD-ZM	3.362,91
2.	ROSCI0094 Mangalia	57,85
3.	ROSCI0197 Eforie	57,17
4.	ROSCI0269 Vama Veche	123,11
5.	ROSCI0273 Cap Tuzla	49,47
6.	ROSCI0281 Cap Aurora	135,92
7.	ROSCI0293 Costinești	48,84
8.	ROSCI0311 Canionul Viteaz	353,77
9.	ROSCI0413 ZPF-SL	1.868,15
	TOTAL	**6.057,19**

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The share of marine sites of Community importance in the Romanian Black Sea sector is shown in table no II.29.

Table II.31 Ponderea siturilor de importanță comunitară (SCI) din sectorul românesc al Mării Negre

Area	Surface SCI (km^2)	Surface SCI (%)
Territorial waters (0-12 nautical miles)	3.529,09	84,95
Contiguous Zone and the Exclusive Economic Zone	2.528,10	10,38

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In 2018, the legislation regarding the administration of protected natural areas was modified (Emergency Ordinance No. 75/2018 for amending and supplementing normative acts in the field of environmental protection and the regime of aliens). Thus, scientific reserves, nature reserves, nature monuments and, as the case may be, geoparks, sites of universal natural heritage, wetlands of international importance, sites of community importance, special conservation areas and special avifaunistic protection areas that do not require special management structures are administered by the National Agency of Protected Natural Areas.

Marine and coastal habitats

In 2019, monitoring of coastal and marine habitats of Community interest was initiated within the framework of the POIM SMIS 120009 project - 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 under Article 17 of the Habitats Directive 92/43/EEC. Also in 2019, reporting to the European Commission on the basis of Article 17 of the Habitats Directive was carried out. This is the second assessment of the conservation status under the Habitats Directive (period 2013 to 2018), allowing a first comparative assessment to be carried out at European Union level, in general and in the present case at Romanian level. An additional advantage is that significant improvements have been made in knowledge of conservation status and trends for protected species and habitats compared to the last reporting period (2007 – 2012).

The results of the general assessment of conservation status at the end of the reporting period in the biogeographic or marine region concerned (2013-2018), which carried out in April 2019 and continued until the end of August 2019, are presented. This format derives from the matrix in Annex E of the official reporting format. The results of the assessment of the parameters for the favourable conservation status (SCF) were presented using the four available categories: favorable (FV), inadequate (U1), unfavorable (U2) and unknown (XX). Also, if the state of preservation is determined to be inadequate or unfavourable, the signs "+", "-", "=" or "x" were also used to indicate whether the status is improved, damaged, stable or unknown: e.g. "U1+" = inadequate but with improvement, "U1-" = inadequate and damaged.
https://www.eionet.europa.eu/article17/reports2012/).
For habitats, the following aspects were assessed: area, area, structure and functions,.

Table II.30 Results of the assessment of the conservation status of marine and coastal habitats of community interest in Romania for the reporting period 2013-2018

1110 Shallow submerged sandbanks Biogeographical region: MBLS Habitats Directive: Annex I OUG 57/2007 (Law 49/2011): missing from Annex 2. It was mentioned in Annex 4 of O.M. 2387/2011 General assessment of the conservation status in Romania: Inadequate with unknown trend		
Paramter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km^2)	n/a	5500 FV
Suprface(km^2)	n/a	3000 - 4100 FV
Structure and functions	n/a	FV
Perspectives	n/a	U1
1130 Estuaries and mouths of major rivers Biogeographical region: MBLS Habitats Directive: Annex I GEO 57/2007 (Law 49/2011): missing from Annex 2. It was mentioned in Annex 4 to O.M. 2387/2011 General assessment of the conservation status in Romania: Favorable with an unknown trend		
Paramter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km^2)	n/a	1200 FV
Suprface(km^2)	n/a	400-700 FV
Structure and functions	n/a	FV
Perspectives	n/a	FV
1140 Surfaces of sand and mud discovered at low tide Biogeographic region: MBLS Habitats Directive: Annex I GEO 57/2007 (Law 49/2011): Annex 2 General assessment of the conservation status in Romania: Inadequate with unknown trend		
Paramter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km^2)	n/a	2500 FV
Suprface(km^2)	n/a	2-2.5 FV

Structure and functions	n/a	U1
Perspectives	n/a	U1
1150 * Coastal lagoons **Biogeographical region: PON** **Habitats Directive: Annex I GEO 57/2007 (Law 49/2011): Annex 2** **General assessment of the conservation status in Romania: Inadequate with unknown trend**		
Paramter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km²)	900 FV	n/a
Suprface(km²)	150-190 FV	n/a
Structure and functions	XX	n/a
Perspectives	U1	n/a
1160 Sea arms and shallower bays **Biogeographic region: MBLS** **Habitats Directive: Annex I GEO 57/2007 (Law 49/2011): Annex 2** **General assessment of the conservation status in Romania: Favorable with an unknown trend**		
Paramter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km²)	n/a	400 FV
Suprface(km²)	n/a	18-21 FV
Structure and functions	n/a	FV
Perspectives	n/a	FV
1170 Recifi **Biogeographic region: MBLS** **Habitats Directive: Annex I GEO 57/2007 (Law 49/2011): Annex 2** **General assessment of the conservation status in Romania: Inadequate with unknown trend**		
Paramter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km²)	n/a	16600 FV
Suprface(km²)	n/a	3000-8000 FV
Structure and functions	n/a	FV
Perspectives	n/a	U1
1180 Submarine structures created by gas emissions **Biogeographical region: MBLS Habitats Directive: Annex I GEO 57/2007 (Law 49/2011): Annex 2** **General assessment of the conservation status in Romania: Favorable with an unknown trend**		
Paramter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km²)	n/a	1100 FV
Suprface(km²)	n/a	Minim 50 FV
Structure and functions	n/a	Necunoscut
Perspectives	n/a	FV
1210 Annual vegetation along the shoreline **Biogeographical region: PON** **Habitats Directive: Annex I GEO 57/2007 (Law 49/2011): Annex 2** **General assessment of the state of conservation in Romania: Inadequate with unknown trend**		
Paramter / Bioregion	Black Sea - Pontic (PON)	Black Sea Marine Region (MBLS)
Area (km²)	2100 FV	n/a
Suprface(km²)	2.5 - 3 FV	n/a
Structure and functions	FV	n/a
Perspectives	U1	n/a

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The state of marine living resources and ecosystems

RO 09
Indicator code Romania: RO09 EEA indicator code: CSI 09
TITLE: DIVERSITY OF SPECIES
DEFINITION: The indicator describes the status 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 maximum production to ensure sustainable use of fish resources).

FITOPLANCTON

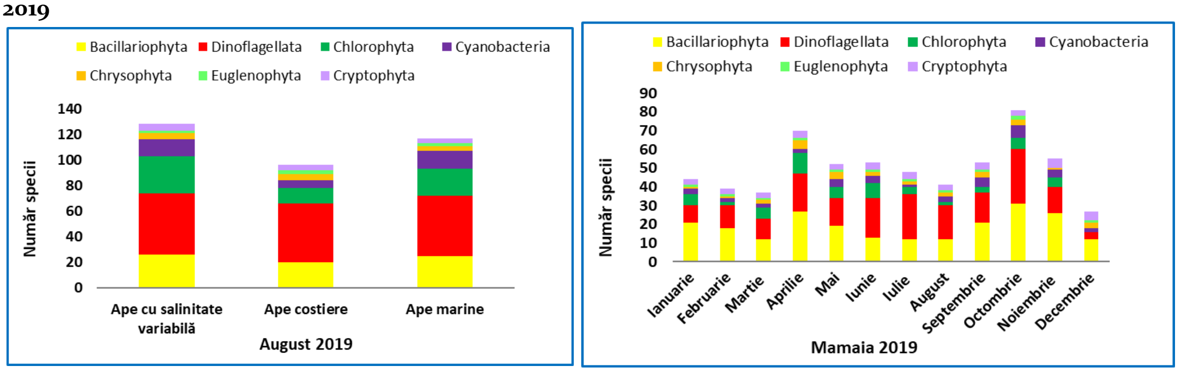
The identification of the qualitative and quantitative structure of phytoplankton, as an indicator of the state of eutrophication, was carried out following the analysis of the samples collected in August 2019 (41 stations) on the profiles of the monitoring network of waters with variable salinity, coastal and marine waters from the Romanian Black Sea coast (Sulina, Mila 9, Sfântul Gheorghe, Portița, Gura Buhaz, Cazino Mamaia, Constanța Nord , Constanța Est, Constanța Sud, Eforie Sud, Costinești, Mangalia and Vama Veche), as well as those collected twice a week from Mamaia station.

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

- BLK_RO_RG_TT03 – waters with variable salinity (from baseline to 30 m isobath),
- BLK_RO_RG_CT – ape costiere (coastal waters (from baseline to 30 m isobath),
- BLK_RO_RG_MT01 – seawater (shelf) - over the 30 m isobath to the 200 m isobath,
- BLK_RO_RG_MT02 – seawater - over 200 m isobath.

In the composition of phytoplankton were identified 147 species (in August) and 145 species (in the shallow waters of Mamaia), with varieties and forms belonging to 7 taxonomic groups (Bacillariophyta, Dinoflagellate, Chlorophyta, Cyanobacteria, Chrysophyta, Euglenophyta and Cryptophyta) (Figure II.45).

Figure II.45 Taxonomic composition of phytoplankton on the continental shelf (left) and in the shallow waters of Mamaia (right) in 2019

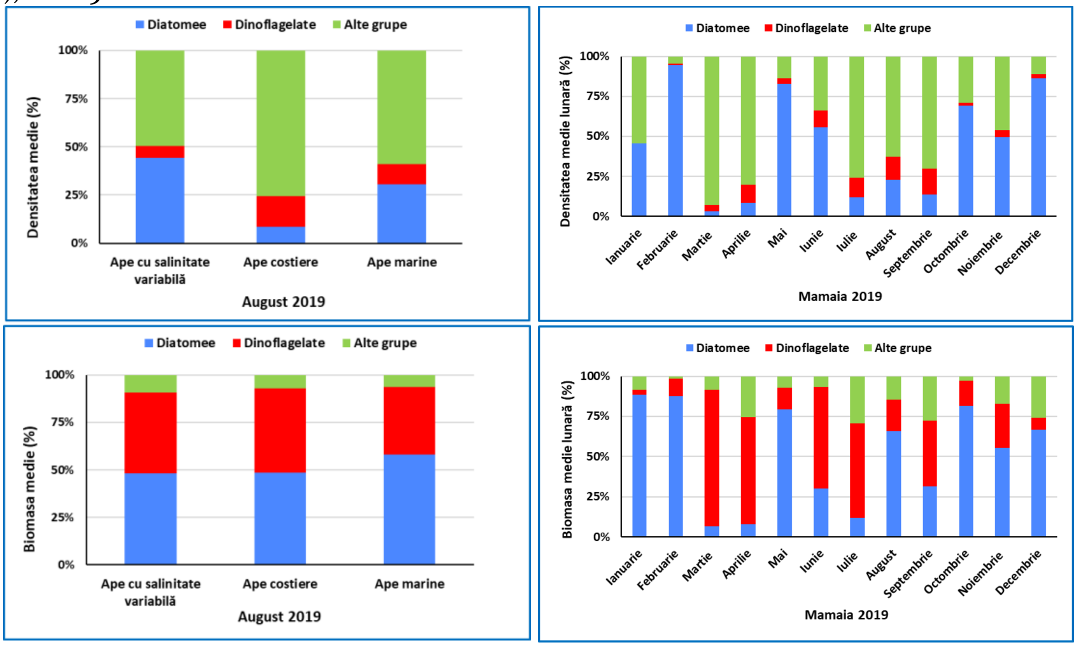


Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

As regards the quantitative structure of phytoplankton (Figure II.46) the density dominance of species in the other groups is observed in all water typologies analysed.

In waters with variable salinity, the proportion of other groups (50%) exceeded that of diatoms (44%), of which species were noted: cyanobacteria Planktolyngbya circumcreta ($161.80 \cdot 10^3$ cel/L), Anabaena sp. ($104.89 \cdot 10^3$ cel/L), Pseudanabaena limnetica ($100.32 \cdot 10^3$ cel/L), the chrysophyte Emiliania huxleyi ($180 \cdot 10^3$ cel/L) and c Dictyosphaerium pulchellum ($112,80 \cdot 10^3$ cel/L), due to the sweet water intake of the Danube, the majority of these species being sweet and sweet – salmastricole (Figure II.46).

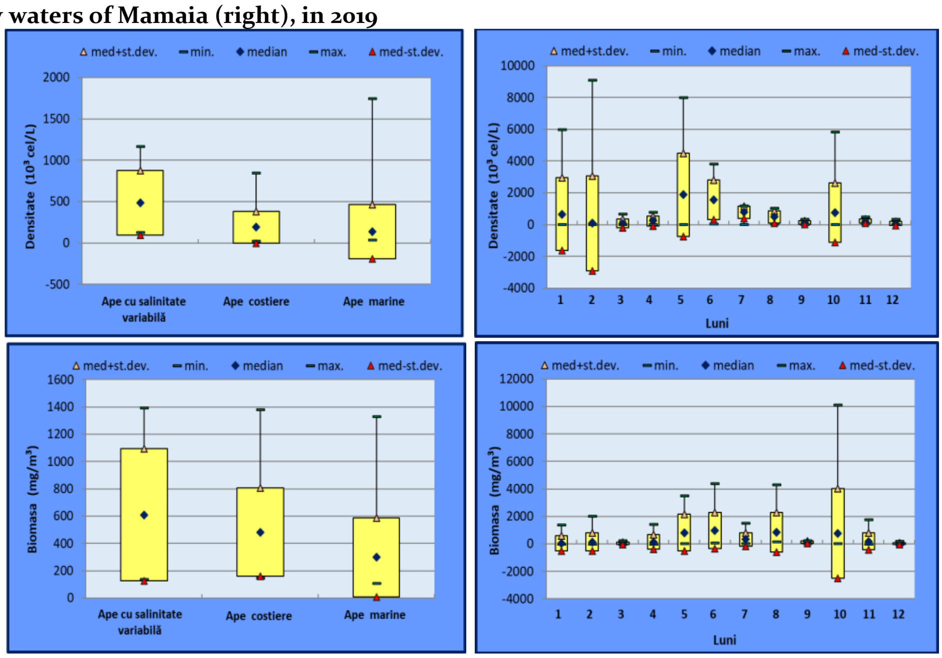
Figure II.46 Quantitative structure of phytoplankton by water typologies in August 2019 (left) and in the shallow waters of Mamaia (right), in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In the shallow waters of Mamaia, the annual abundance and biomass of phytoplankton ranged from 6•10³ to 9118•10³ cel/L and 3.58 –10135.80 mg/m³ (Figure II.47). The distribution of total densities per month shows maximum values recorded in January (9118•10³ cel/L), February (9118•10³ cel/L), May (8020•10³ cel/L), June (3830•10³ cel/L) and October (5831•10³ cel/L). The distribution of total biomass per month peaked in October (10135.80 mg/m³). High total biomass values were also observed in May (3538.13 mg/m³), June (4395.13 mg/m³) and August (4315.39 mg/m³).

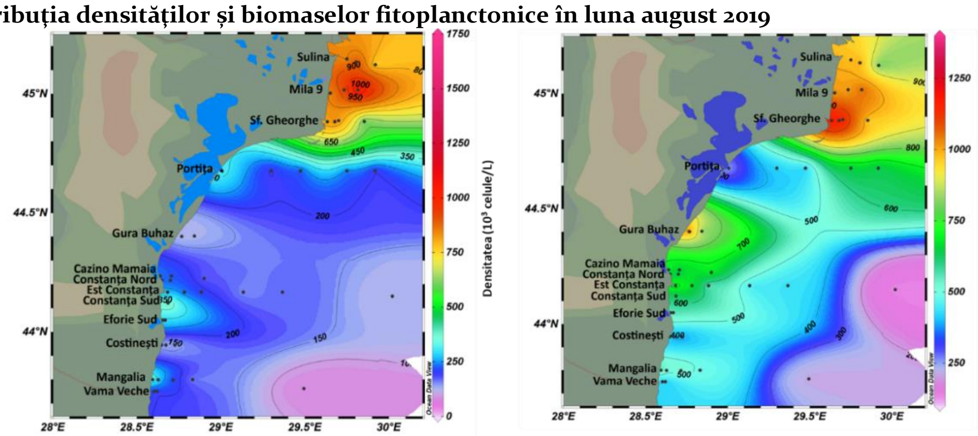
Figure II.47 Variation of phytoplankton densities and biomasses in Romanian coastal, marine and transitional waters (left) and in the shallow waters of Mamaia (right), in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In August, the maximum values of phytoplankton densities and biomasses were recorded in the surface horizon. In waters with variable salinity the values were 1167,74,10³ cel/L (Sulina station, on 20m isobath) and 1395,02 mg/m³ (Sfântul Gheorghe station, on 5m isobath), in coastal waters of 851•10³ cel/L (South Constanta station, on isobath of 20m) and 1383.23 mg/m³ (Gura Buhaz station, on 5m isobath), and in marine waters of 1747.92•10³ cel/L and 1332.21 mg/m³ (Mila 9 station, on 30m isobath) (Figure II.48).

Figura II.48 Distribuția densităților și biomaselor fitoplanctonice în luna august 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The 2019 summer season was characterized by a broader development of the phytoplankton community compared to the last year. Thus, the annual average of the phytoplankton quantities in the surface horizon, in August 2019, it was 284.66-10³ at/L and 516.61 mg/m³, compared to the average values recorded in July 2018 (282-10³ at/L and 663.83 mg/m³) and September 2018 (109.82-10³ cel/L and 236.27 mg/m³) and September 2018 (109.82-10³ cel/L and 236.27 mg/m³).

Algae blooms

During 2019, five phytoplankton species experienced developments of more than one million cells per litre (in the shallow waters of Mamaia only), with only one species in addition to 2018 (Table II.31). The magnitude of these phenomena has been much smaller this year, with one species reaching a density of 8,65,10⁶ at/L, compared to the maximum value of 2018 (23,44,10⁶ cel/L).

Table II.31 Important species in the phytoplankton community (density – 10³ cel/L) in 2019

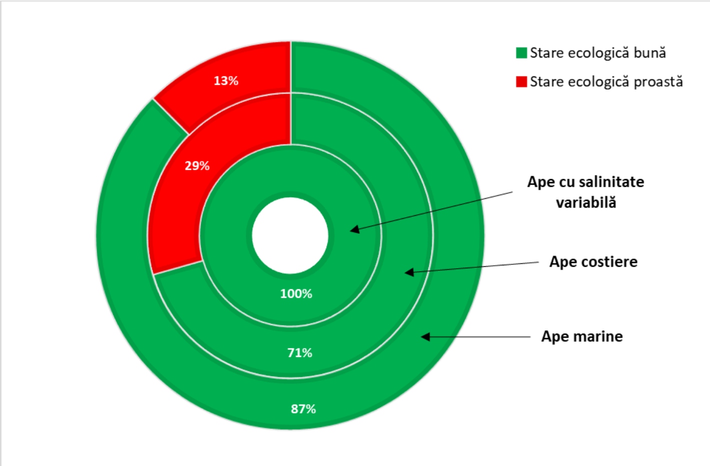
Species	2019	August 2019		
	Mamaia	Waters with variable salinity	Coastal waters	Marine waters
Skeletonema costatum	8650 (II)	0	21,12	7,92
Pseudanabaena limnetica	4994 (I)	100,32	20,24	96,48
Pseudo-nitzschia delicatissima	4710 (V)	246,00	47,68	411,6
Chaetoceros curvisetus	1320 (X)	0	0	0
Cerataulina pelagica	1080 (X)	0,42	0,92	0,54

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Assessment of the ecological status of water bodies based on the biomass element (mg / m3) in 2019

For waters with variable salinity, it was observed that the values of phytoplankton biomass were below the target value, this body being 100% good ecologically in 2019. Even in the case of marine and coastal waters, the number of stations in poor ecological status has been reduced, being predominant those in good ecological status (Figure II.49).

Figure II.49 Ecological status of water bodies based on biomass element in 2019

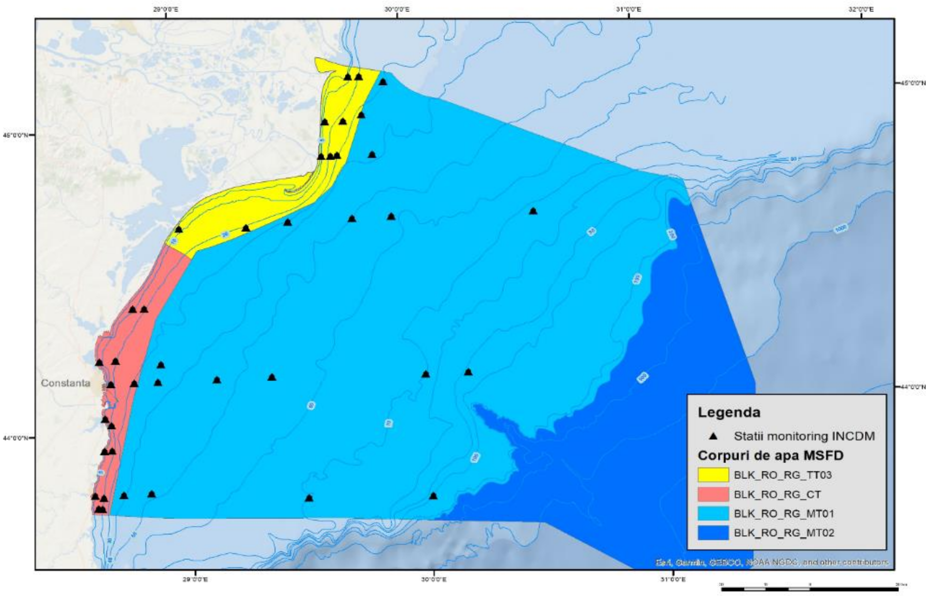


Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

ZOOPLANKTON

The stations from which samples were collected covered the entire Romanian continental shelf of the Black Sea (figure II.50).

Figure II.50 Map with the location of zooplankton sampling stations in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

Microzooplanctonul

In 2019, the target population of the microzooplankton component was evaluated in August. In this respect, 41 samples from the 0 m horizon collected from 13 profiles located along the Romanian coast were analysed. During the period analysed, the tintinide population was characterized by 22 species belonging to 10 genera (Table II.32).

Table II.32 List of tintinid species identified in August 2019, on the Romanian Black Sea coast

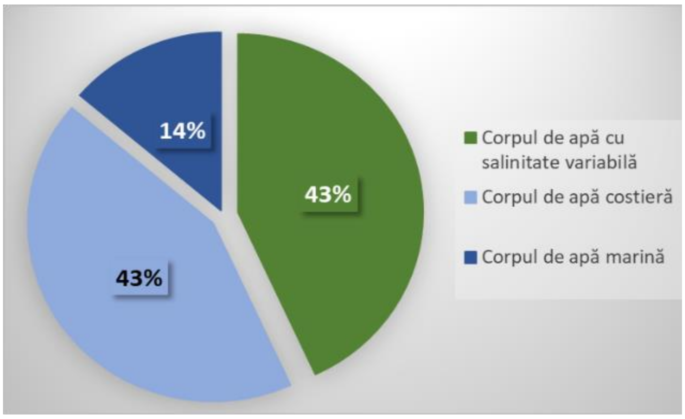
Ord.	Subordin	Familie	Gen	Specie	Corpul de apă cu salinitate variabilă	Corpul de apă costieră	Corpul de apă marină
Choreotrichida	Tintinnina	Codonellidae	*Codonella*	*Codonella cratera*		+	+
			Tintinnopsis	*Tintinnopsis baltica*	+	+	+
				Tintinnopsis beroidea	+	+	+
				Tintinnopsis campanula	+	+	+
				Tintinnopsis compressa		+	+
				Tintinnopsis cylindrica	+		+
				Tintinnopsis lobiancoi	+	+	+
				Tintinnopsis minuta	+	+	
				Tintinnopsis tocantinensis	+	+	+
				Tintinnopsis tubulosa		+	
			Rhizodomus	*Rhizodomus tagatzi*	+	+	+
		Codonellopsidae	*Stenosemella*	*Stenosemella ventricosa*	+		
		Metacylididae	*Metacylis*	*Metacylis mediterranea*	+	+	+
		Ptychocylididae	*Favella*	*Favella ehrenbergii*	+	+	+
		Tintinnidae	*Eutintinnus*	*Eutintinnus apertus*	+	+	+
				Eutintinnus lusus-undae	+	+	
				Eutintinnus pectinis	+	+	
				Eutintinnus tubulosus	+	+	+
				Eutintinnus sp.	+	+	+
			Amphorellopsis	*Amphorellopsis acuta*	+		
		Tintinnidiidae	*Leprotintinnus*	*Leprotintinnus pellucidus*		+	
			Tintinnidium	*Tintinnidium mucicola*		+	
Total					**17**	**19**	**14**

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

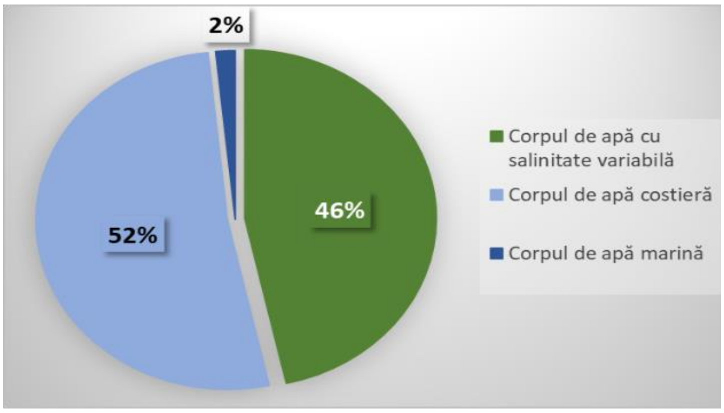
The body of water with variable salinity was qualitatively characterized by 17 species of tintinide (Table II.32). Quantitatively, the tintinide population in this water body represents 43% of the density and 46% of the total biomass of this component respectively (Figure II.51). The species with the highest quantitative representation in this body of water is Leprotintinus pellucidus (density 446 ind/l and biomass 19.04 µgC/l respectively), these values being identified in the SU 10m station.

Figure II.51 Distribution of density (a) and biomass (b) of the tintinid population, on water bodies, on the Romanian coast, in August 2019

a

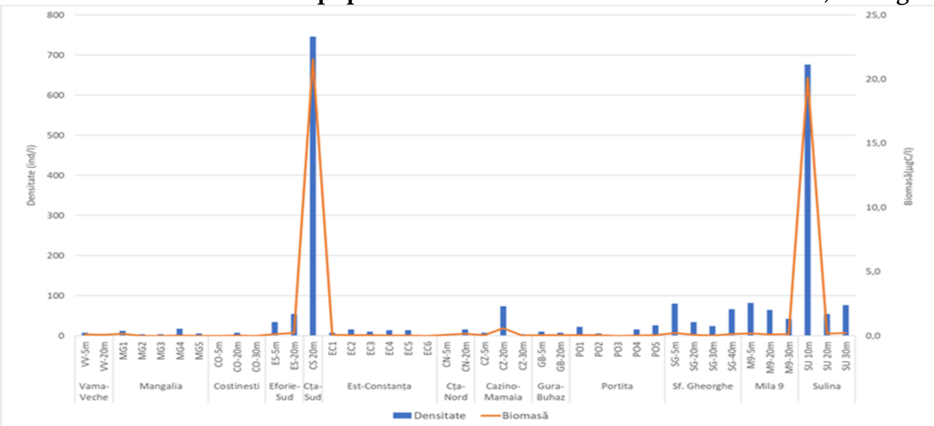


b



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Figure II.52 Quantitative distribution of the tintinid population on the Romanian Black Sea coast, in August 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Conclusions

In August 2019, the tintinide population of the microzooplankton component was represented by 22 species belonging to the genus: *Codonella, Tintinnopsis, Rhizodomus, Stenosemella, Metacylis, Favella, Eutintinnus, Amphorellopsis, Leprotinnus and Tintinnidium respectively.*

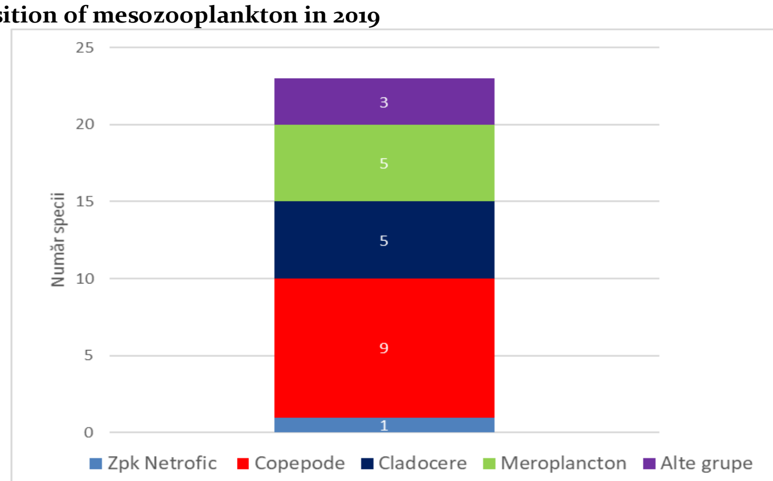
In terms of quality, the marine water body recorded the smallest diversity of species (14) while the coastal water body was best represented in this respect (19 species). Following the quantitative analysis of the tintinide population on the Romanian coast, the highest density was found in water bodies with variable and coastal salinity, each with a percentage of 43% and the lowest in the marine water body (14%).

Following the analysis of the dominance of species on each body of water, it was observed that the species *Leprotintinnus pellucidus* dominates the body of water with variable salinity, *Favella ehrenbergii* is dominant in the body of coastal water while the species *Tintinnopsis minuta* dominates the body of marine water. This situation indicates a dominance of indigenous species, to the detriment of non-indigenous ones, identified in recent years, at the Romanian coast. Compared to last year, there is a trend of increasing densities and biomasses of target populations from the south to the north of the Romanian coast.

Mesozooplankton

The qualitative composition of the mesozooplankton population in the summer of 2019 reached a total of 23 species. It is noted the dominance of copepods with nine species, followed by cladocers and the meroplankton component which recorded a number of five species (Figure II.53).

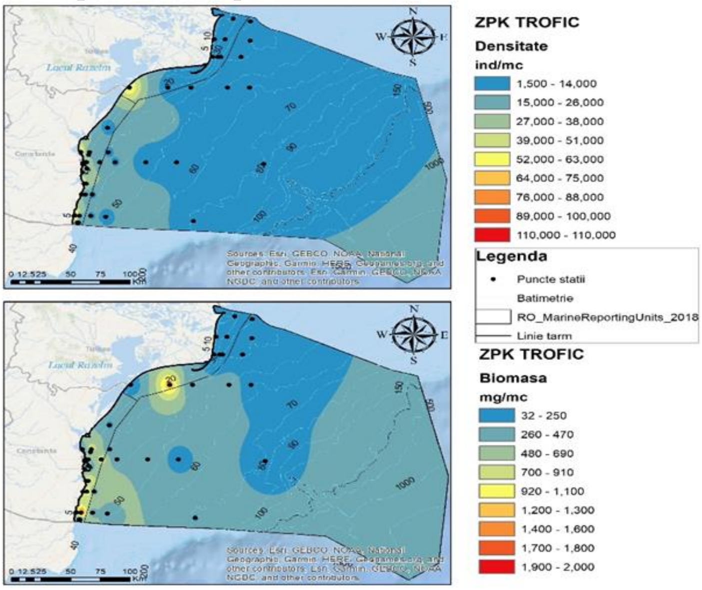
Figure II.53 Qualitative composition of mesozooplankton in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Regarding the quantitative structure of the mesozooplankton community, the trophic component was dominant, in contrast to the non-trophic mesozooplankton which was much less represented. The trophic component recorded the highest average values in coastal waters (figure II.54).

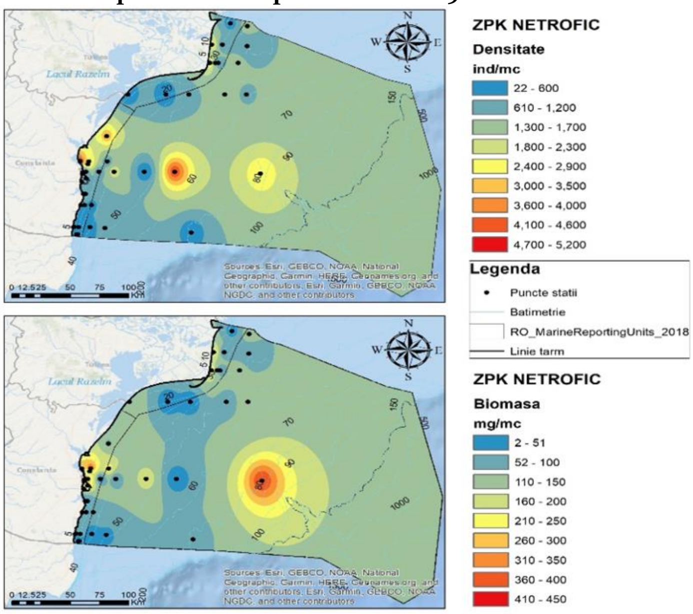
Figure II.54 Spatial distribution of trophic mesozooplankton in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The nontrophic mesozooplankton represented by Noctiluca scintillans reached higher average values of density and biomass in the coastal and marine water body (figure II.55), but compared to the trophic component it registered low average values (maximum density of 5200 ind.m- 3 and biomass of 450 mg.m-3).

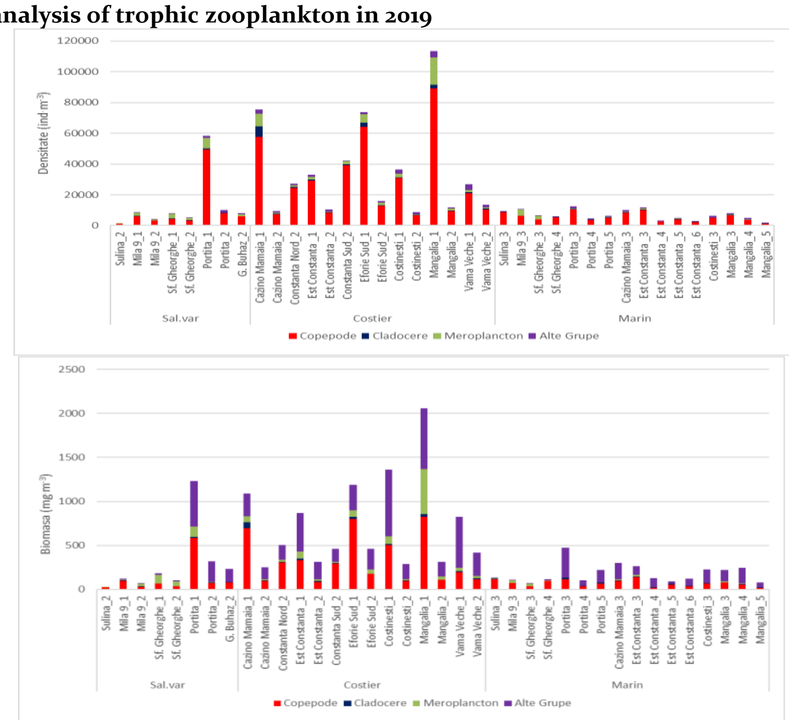
Figure II.55 Spatial distribution of nontrophic mesozooplankton in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Meroplankton also recorded higher values within the same station (Mangalia 1), cladocerans and other groups reaching low values, compared to the other trophic elements (figure II.56).

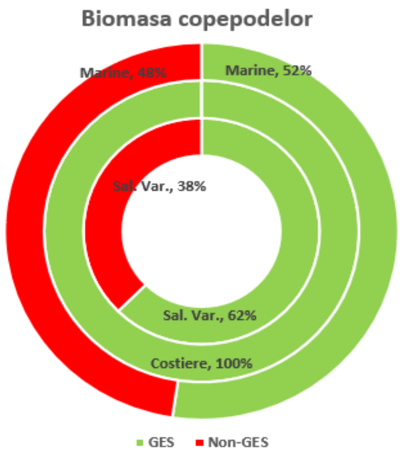
Figure II.56 Quantitative analysis of trophic zooplankton in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The assessment of the ecological status of the marine environment in terms of the zooplankton component for 2019 was made only for the warm season taking into account the division by water bodies corresponding to the Marine Strategy Framework Directive (DCSMM).
From the biomass values obtained for the analyzed indicators were calculated the percentages that characterize each body of water, depending on the ecological status achieved in the samples analyzed in 2019. The body of water that in proportion of over 50% recorded values above the established threshold is considered to be in good ecological condition. Thus, in the case of the indicator "Biomass of copepods" values were recorded above the threshold of good ecological status in all three water bodies, good ecological status being reached in proportion of 62% in waters with variable salinity, 100% in coastal waters and 52 % in the marine ones (figure II.57).

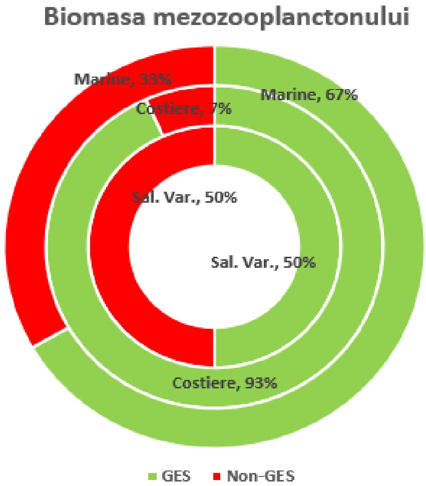
Figure II.57 Ecological status of water bodies based on the Biomass Copepod indicator in the warm season 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In the case of the indicator "Biomass of mesozooplankton", good ecological status was achieved 93% in coastal waters and 67% in marine waters (Figure II.58), in waters with variable salinity there was a poor ecological status (Figure II.59).

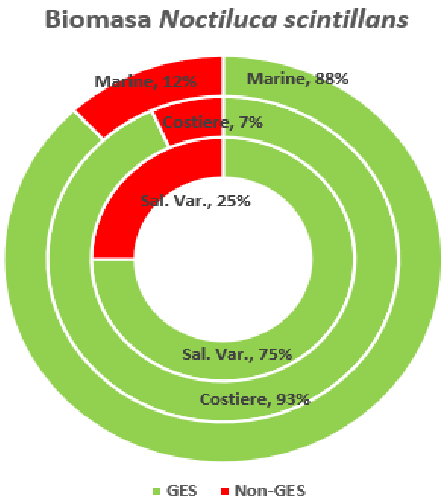
Figure II.58 Ecological status of water bodies based on the Biomass mesozooplankton indicator in the warm season 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In the case of the indicator "Biomass Noctiluca scintillans", the good ecological status was reached 75% in waters with variable salinity, 93% in coastal waters and 88% in marine waters (Figure II.59)

Figure II.59 Ecological status of water bodies based on the Biomass Noctiluca scintillans indicator in the warm season 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Conclusions

From a qualitative point of view, the 2019 mesozooplankton was represented by a total of 23 species, dominant being copepods, cladocers and meroplankton.

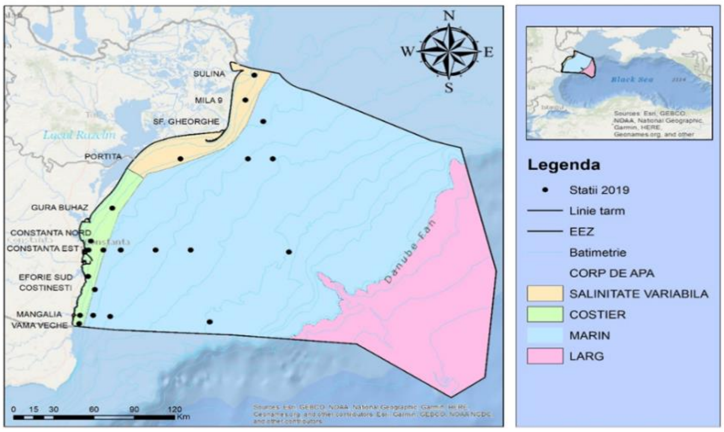
The mesozooplankton community was dominant by trophic zooplankton, with non-trophic zooplankton represented by the noctiluca scintillans dinoflagellate being poorly represented.

Within the trophic component, the copepods dominated quantitatively, followed by the meroplankton component, the highest values being recorded in the coastal water body.
Analyzing the ecological status of water bodies, it is noted that in the warm season the indicators "Biomass copepods" and "Biomass Noctiluca scintillans" have achieved good ecological status in all three bodies of water analysed (variable salinity, coastal and marine).
The indicator "Mesozooplankton biomass" achieved good ecological status only in the coastal and marine water body, with the variable salinity water body recording values for Non-GES.

Zooplankton gelatinos

In order to determine the state of the macrozooplankton populations, an expedition was carried out in August 2019, taking a number of 21 samples from the Romanian continental shelf (Figure II.60).

Figure II.60 Location of macrozooplankton sampling stations in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

Five macrozooplankton species were identified in this expedition: scifozosors *Aurelia aurita* and *Rhizostoma pulmo* ctenoforreples *Pleurobrachia pileus, Mnemiopsis leidyi and Beroe ovata*. *Rhizostoma pulmo* was assessed only as a presence through visual observations, which could not be collected with the equipment used to evaluate macrozooplankton. Macrozooplankton has always been taken from research vessels which have enabled the proper and safe handling of the Hansen fillet (Figure II.61).

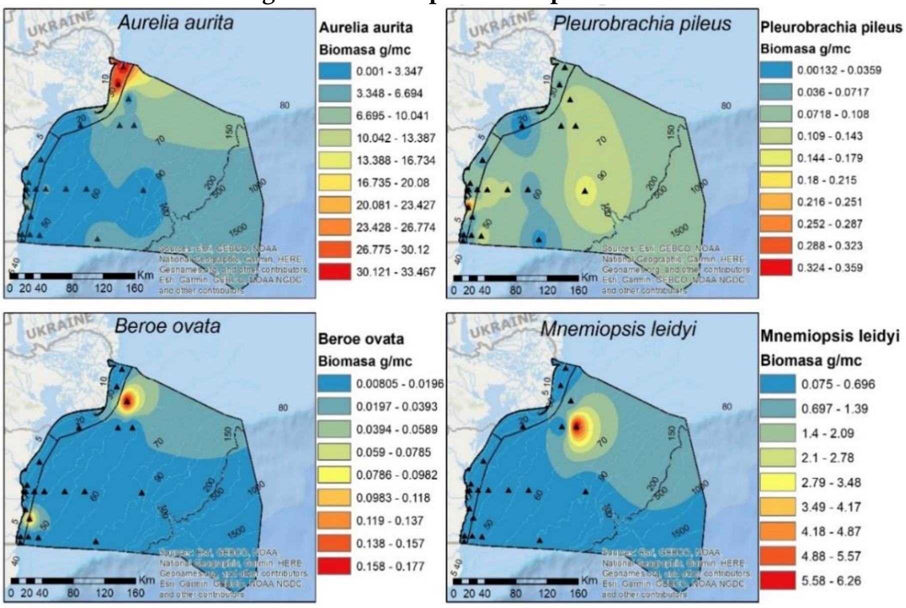
Figure II.61 Method of sampling on board the vessel of gelatinous zooplankton

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

In the Romanian marine sector, the sampling of macrozooplankton samples is performed with the Hansen type net with a diameter of 70 cm and a mesh size of 300 µm. The biological material is obtained by towing the net vertically in the mass of water (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 of the sieve. After collection, the fillet is gently washed with a seawater hose to remove organisms or mucus from them.

In the body of marine water, the species Aurelia aurita reached the maximum biomass value of 2.389 g / m3, and the species Beroe ovata reached the lowest biomass value of 0.016 g / m3 (figure II.62, figure II.63 and table II.33).

Figure II.62 Distribution of biomass values of gelatinous zooplankton species on the Black Sea continental shelf in 2019

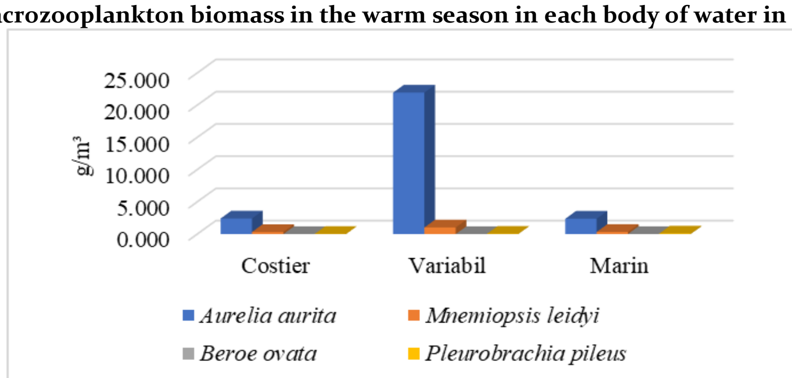


Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Table II.33 Average biomass of zooplankton gelatinos in August in water bodies (g/m3)

Species / Water body	Coastal	Variable	Marine
Aurelia aurita	2,425	21,948	2,389
Mnemiopsis leidyi	0,330	1,025	0,338
Beroe ovata	0	0	0,016
Pleurobrachia pileus	0,026	0,050	0,096

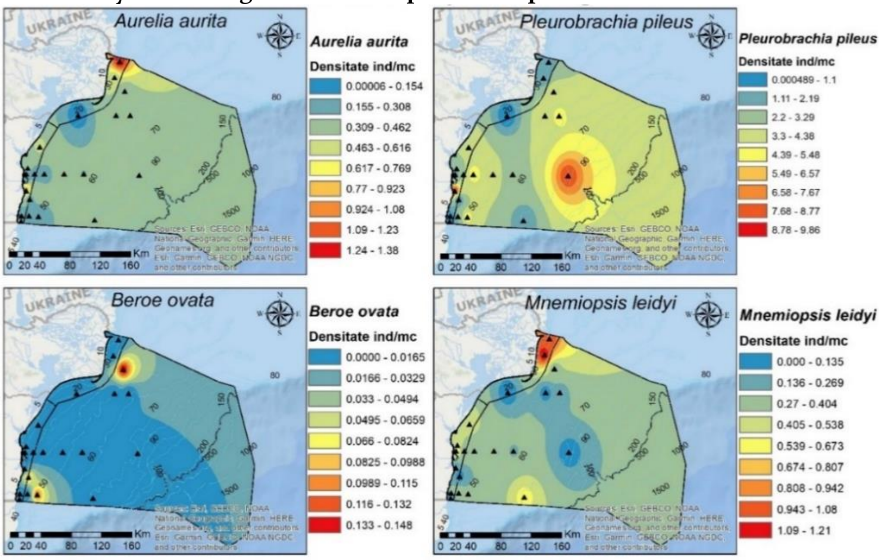
Figure II.63 Gelatinous macrozooplankton biomass in the warm season in each body of water in 2019, (g/m3)



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

As regards the density of macrozooplankton organisms, in the warm season, the dominant species was Pleurobrachia pileus with high density values in all water bodies. In the coastal water body, the species Pleurobrachia pileus reached the maximum density value of 2,977ind/m³, while Mnemiopsis leidyi recorded the lowest density value (0,358 ind /m³). In the body of water with variable salinity the species Pleurobrachia pileus reached the maximum density value of 1,039 ind/m³, and the species Aurelia aurita recorded the lowest biomass value of 0.635 ind/m³. In the marine water body, the species Pleurobrachia pileus recorded the maximum density value of 3,824 ind/m³, while Beroe ovata reached the lowest density values (0.022 ind/m³) (Figure II.65, Figure II.65 and Table II.34).

Figure II.64 Distribution of density values of gelatinous zooplankton species on the Black Sea continental shelf



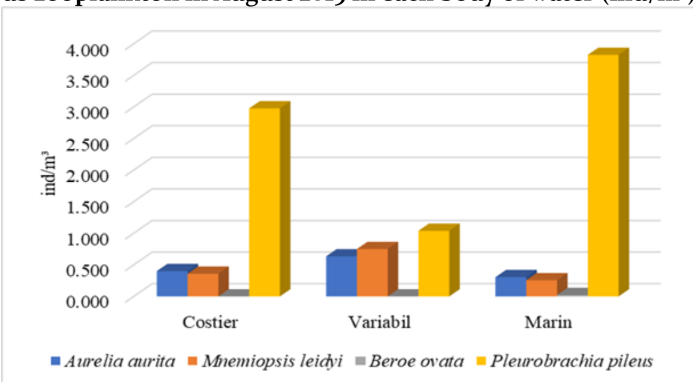
Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

TableII.34 Density of zooplankton gelations in August (ind/m³)

Water body	Coastal	Variable	Marine
Aurelia aurita	0,401	0,635	0,305
Mnemiopsis leidyi	0,358	0,751	0,256
Beroe ovata	0,000	0,000	0,022
Pleurobrachia pileus	2,977	1,039	3,824

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Figure II.65 Density of gelatinous zooplankton in August 2019 in each body of water (ind/m³)



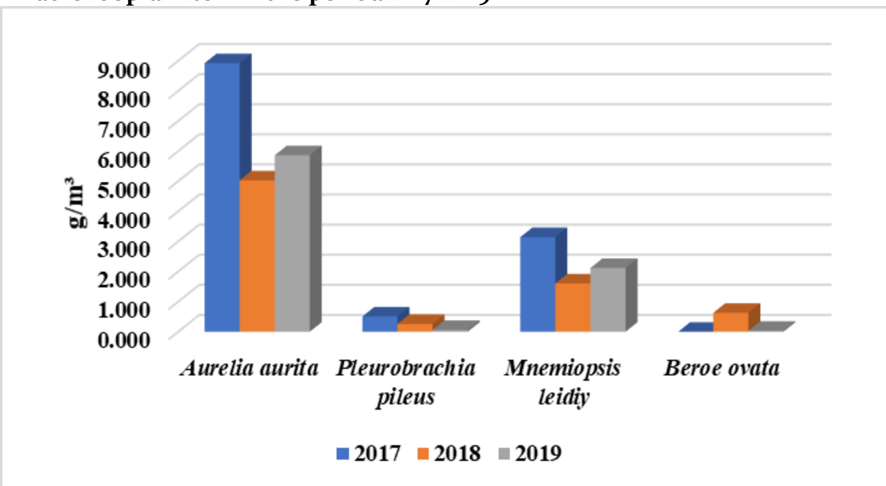
Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Conclusions:
The community of zooplankton gelatinos was represented in 2019 by five species: scifozosors Aurelia aurita, Rhizostoma pulmo and ctenofors Pleurobrachia pileus, Mnemiopsis leidyi and Beroe ovata.
In all three bodies of water evaluated, aurelia aurita was dominant in terms of biomass. The spatial distribution of the density of the species Pleurobrachia pileus recorded high values from north to south along the Romanian continental platform of the Black Sea, being dominant in terms of density.
Ctenofor Mnemiopsis leidyi was present throughout the analyzed area, and high density values were concentrated in the north of the Romanian continental shelf at depths of 50-60m.
Ctenofor Beroe ovata was present only in the marine water body, in two analyzed stations, at the depth of 30-40m.

Evolution of macrozooplankton in 2017-2019

In the period 2017-2019, the species Aurelia aurita had a tendency to decrease biomass values, in 2017 it was 8,920 g/m³, and in 2019 it was 5,861 g/m³. In the last three years, the species Pleurobrachia pileus has suffered a significant decrease in biomass. Biomass recorded in 2017 was 0.506 g/m³, compared to 2019 when it was 0.057 g/m³. Ctenofor Mnemiopsis leidiy had no large variations in biomass values (Table II.35). Beroe ovata recorded the lowest values over the period considered, in 2019 the biomass value was 0.028 g/m³ (Figure II.66 and Table II.35).

Figure II.66 Biomass of macrozooplankton in the period 2017-2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Table II.35 Biomass of macrozooplankton in the period 2017 – 2019

Year	Aurelia aurita	Pleurobrachia pileus	Mnemiopsis leidiy	Beroe ovata
2017	8,920	0,506	3,142	0,000
2018	5,028	0,259	1,604	0,628
2019	5,861	0,057	2,118	0,028

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

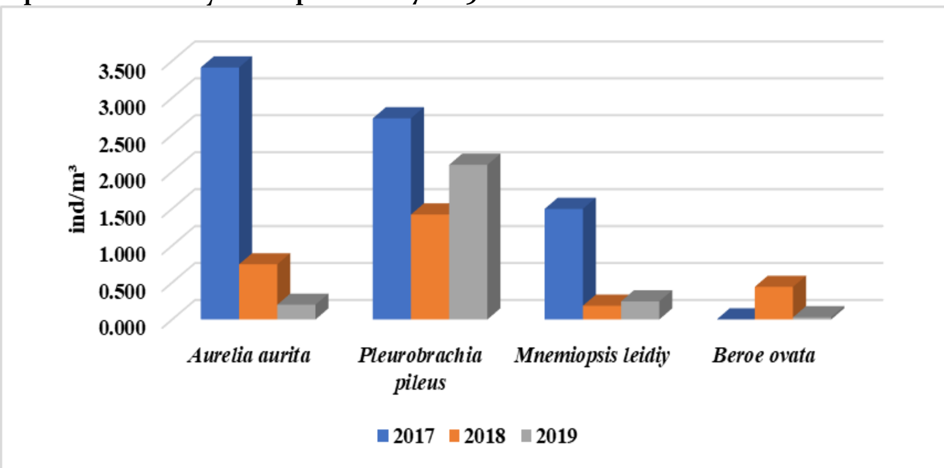
The Aurelia Aurita species recorded a considerable decrease in density from 3,411 ind/m3 (2017) to 0,200 ind/m3 (2019). The species Pleurobrachia pileus had small variations in density values in 2019 being 2,093 ind/m3. The Mnemiopsis leidiy ctenofor has suffered a decrease from the density value of 1,497 ind/m3, recording in 2019 the value of 0.246 ind/m3. Beroe ovata recorded the lowest values over the period, with the biomass value in 2019 being 0.030 ind/m3 (Figure II.67 and Table II.35).

Table II.35 Macrozooplankton density in the period 2017 – 2019

Year	Aurelia aurita	Pleurobrachia pileus	Mnemiopsis leidiy	Beroe ovata
2017	3,411	2,722	1,497	0.000
2018	0,747	1,421	0,185	0,441
2019	0,200	2,093	0,246	0,030

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Figure II.67 Macrozooplankton density in the period 2017-2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

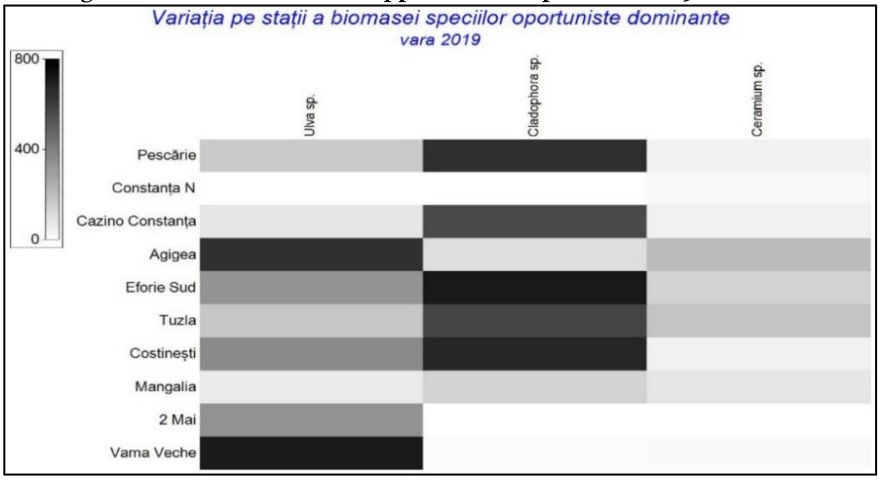
After these results, a decrease in the biomass and density of gelatinous zooplankton can be concluded, indicating a lower degree of pollution of marine waters with gelatinous organisms.

PHYTOBENTOS

As in previous years, the dominant was during the warm season throughout the whole coast, the photophile association Ulva – Cladophora – Ceramium, consisting exclusively of opportunistic species generating algal deposits. Biomass highs developed in 2019 by these species were lower compared to those in summer 2018, so:

- *Ulva* species presented a maximum biomass at Vama Veche (720 g/m2), within the association *Cystoseira mana – Ulva rigida* characteristic of zone 2 Mai – Vama Veche.
- The species of *Cladophora*, generating large biomassines in previous years, have not developed so intensely, showing a maximum of 710 g/m2 at Eforie Sud, the area being known to be conducive to the development of this opportunistic species.
- of rhodophises, it was the species of *Ceramium* that developed more intensively in 2019, with a maximum of 210 g/m2 at Agigea (Figure II.68).

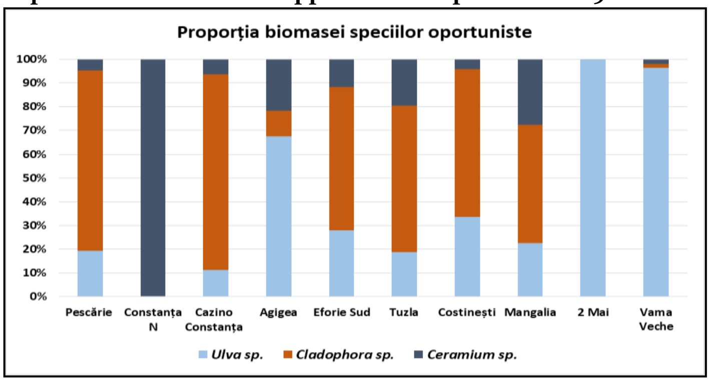
Figure II.68 Variation of average biomass for dominant opportunistic species in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

With regard to the proportion of biomass of these species at the level of each station, the clear dominance of chlorophytes is observed at most stations, with exceptions in the area of North Constanta or Mangalia, where sub-habitat types with *Phyllophora and Cystoseira* are found and where rhodophytes have a higher weight (Figure II.69).

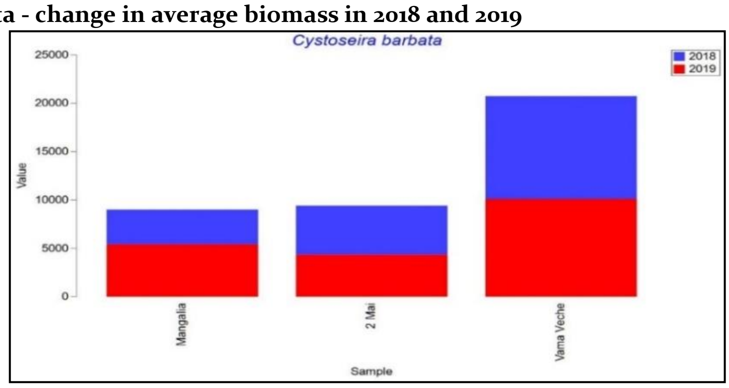
Figure II.69 Average biomass proportion for dominant opportunistic species in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Cystoseira mana formed well-developed fields to the south of the coast, with high average biomasses, which ranged from 2700 to 10100 g/m2 (maximum value recorded at Vama Veche), slightly higher compared to 2018. Biomass values have gradually increased from Mangalia to Vama Veche (Figure II.70).

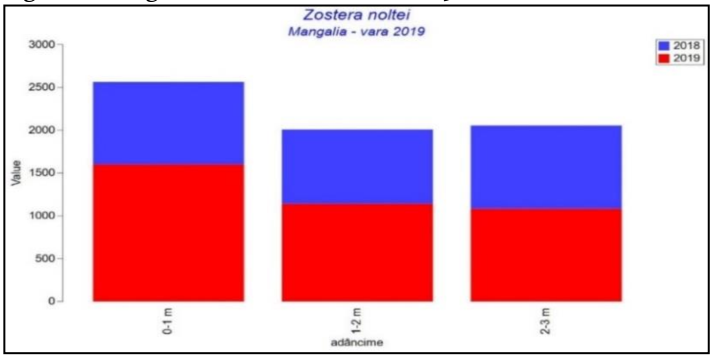
Figure II.70 Cystoseira barbata - change in average biomass in 2018 and 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Marine fanerogama Zostera noltei maintained its distribution range at Mangalia, with average biomass ranging between 860 and 1600 g/m2, higher compared to 2018 (Figure II.71).

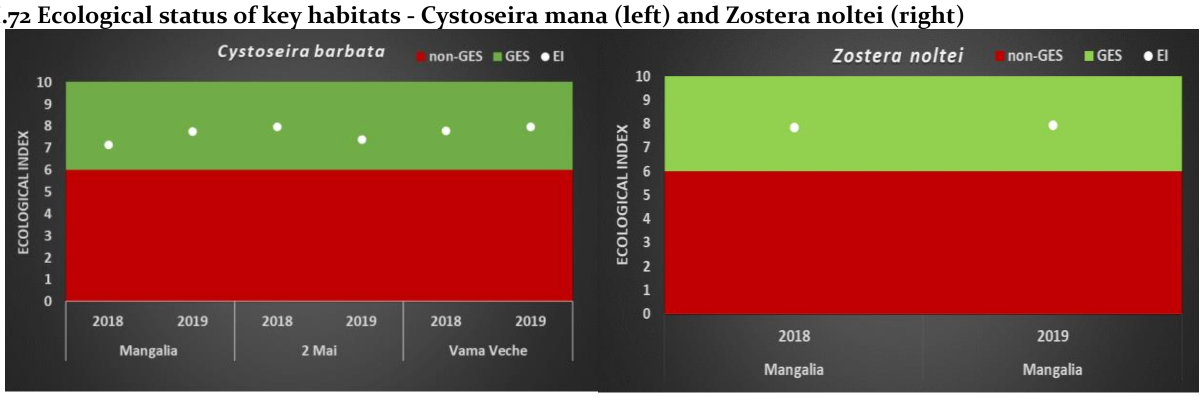
Figure II.71 Zostera noltei - change in average biomass in 2018 and 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The ecological assessment of the two sub-types of key habitats, the habitat with Cystoseira (part of the main habitat Infralcoral rock and biogenic reefs) and the habitat with Zostera (part of the main habitat Infralittoral muds), showed that both were in a good ecological status (SEB) in the last two years. It should be mentioned, however, that these habitats have a fragmentary distribution on the Romanian coast, withdrawn to the southern part of the coast, hence their high degree of sensitivity (figure II.72).

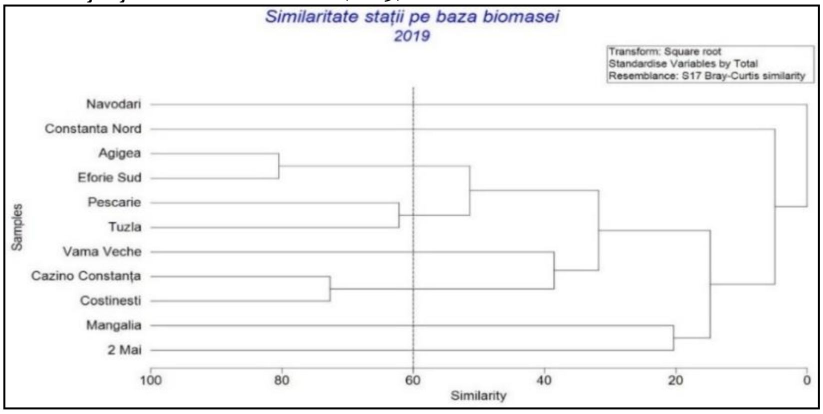
Figure II.72 Ecological status of key habitats - Cystoseira mana (left) and Zostera noltei (right)



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

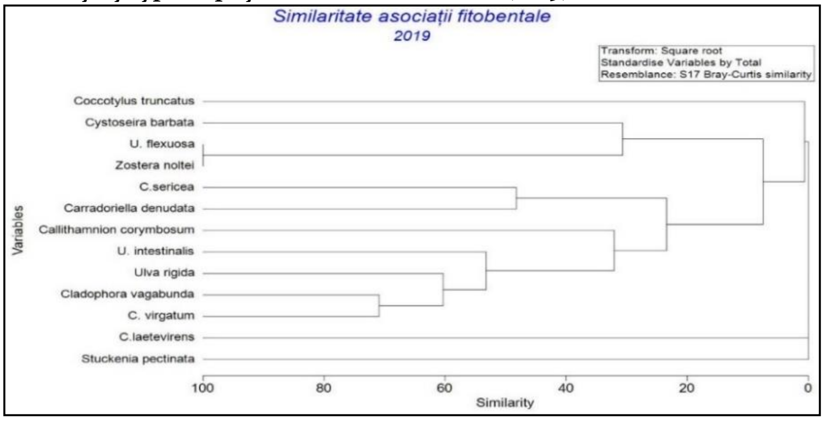
As regards the degree of similarity between stations on the basis of the type of dominant algal associations and biomass values, there is a high similarity between the Stations Agigea and Eforie Sud, Pescarie and Tuzla, as well as between Casino Constanta and Costinești (Figure II.81), as a result of the dominance of the photofile association characteristic of the summer season Ulva - Callowophora - Ceramium and the uniformity of the algal structure in these areas (Figure II.73).

Figure. II.73 Bray-Curtis similarity by macrofit biomass (2019)



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

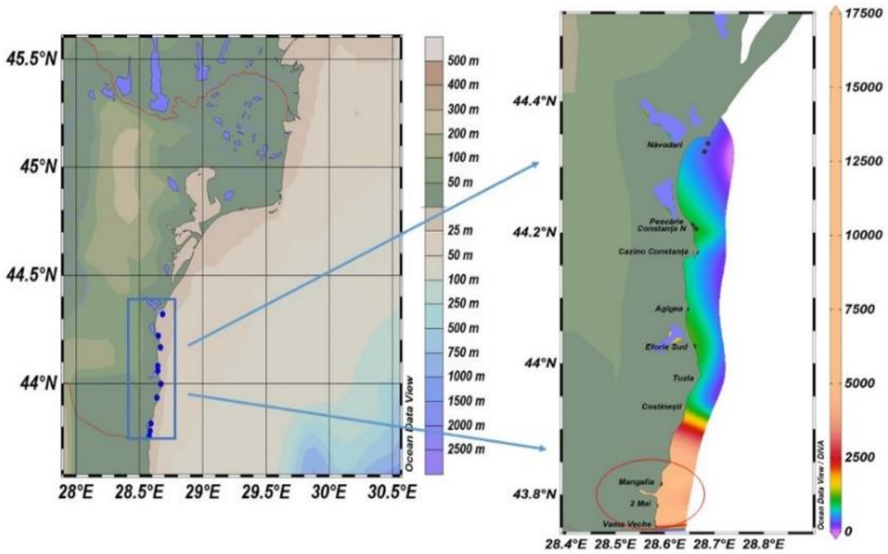
Figure II.74 Bray-Curtis similarity by type of phytobental associations (2019)



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Analyzing biomass values for phytobental species throughout the entire coastal area, it is noted that the highest values were recorded in the southern part of the Romanian coast, due to the presence of algal communities formed dominantly from perennial species (Figure II.75).

Figure II.75 Phytobental communities - graphic representation of the distribution of fresh biomass (g/m2)



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Among the species of *Phyllophora*, two species have now been identified at the Romanian coast, namely *P. crispa* – in the north of the Romanian coast and *Coccotylus truncatus* – in the area of Constanta Nord. The restoration of these species to the Romanian coast is a very slow process, the mere presence being a particularly important aspect. A notable aspect in the study of phytobental communities was the recent identification of a species of rhodophyte considered extinct on the Romanian coast – *Dasya elegans (syn. Dasya baillouvian*a (S.G.Gmelin) Montagne, 1841). In 2018 it was observed in the form of stranded beach soles, and in 2019 the species was observed in the natural environment fixed to hard substrate.

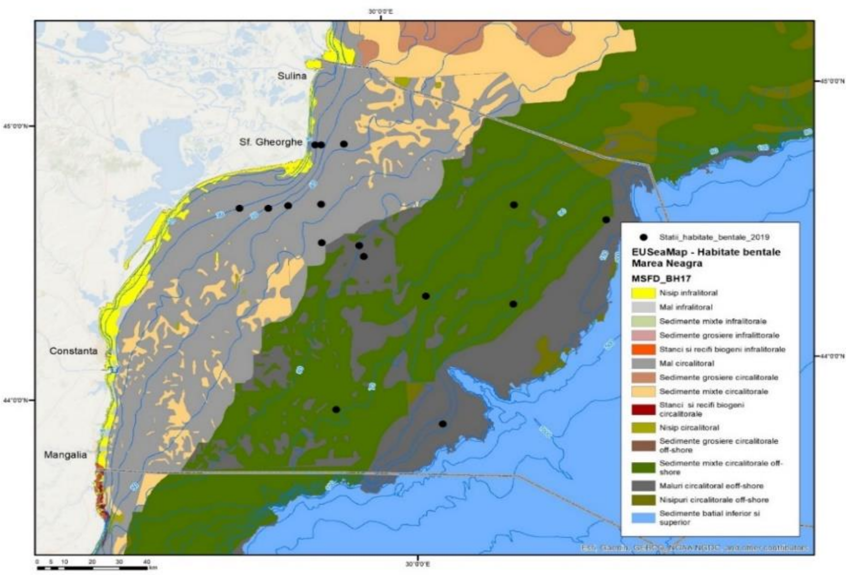
Conclusions:

- clear dominance of green algae of the genus *Ulva and Cladophora* during the summer season 2019.
- the two sub-types of habitats with a key ecological role, the habitat with *Cystoseira* and the habitat with *Zostera* are in good ecological status (SEB) according to the DCSM criteria.
- signaling *Phyllophora* species on the Romanian coast.
- identification in the natural environment, in fixed form of *Dasya elegans* red algae after a long period in which it was considered extinct.

ZOOBENTHOS

In 2019, macrozoobentos was monitored on the Romanian continental shelf, especially in the wide area, i.e. at depths of more than 60 m, in order to collect a greater number of data, which will contribute to the revision of the boundaries between quality ecological classes, made only on recent data. From the depth range 20-50 m samples were collected mainly from the northern area of the continental platform with sedimentary substrate. As a result, 39 samples were collected from 16 stations located on 5 profiles between Sfântul Gheorghe and Mangalia (Figure II.76). The collection of samples was carried out with the Van Veen type bodengreifer, according to the agreed methodology at regional level (Todorova, Konsulova, 2005). A total of 114 zoobental species were identified as a result of the processing of the samples, the highest number of species in 2010-2019. Although in the last 5 years, the tendency to vary in the number of zoobental species has been stationary, looking at the situation over the entire decade, an increasing trend is observed (R^2 = 0.82) (Figure II.77).

Figure II.76 Map of the stations from which zoobentos samples were taken in 2019, superimposed over the main types of physical habitats and bodies of water, according to the Marine Environment Strategy Framework Directive (DCSMM)



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Figure II.77 Variation in the number of identified zoobental species in Romanian marine waters in the period 2010-2019

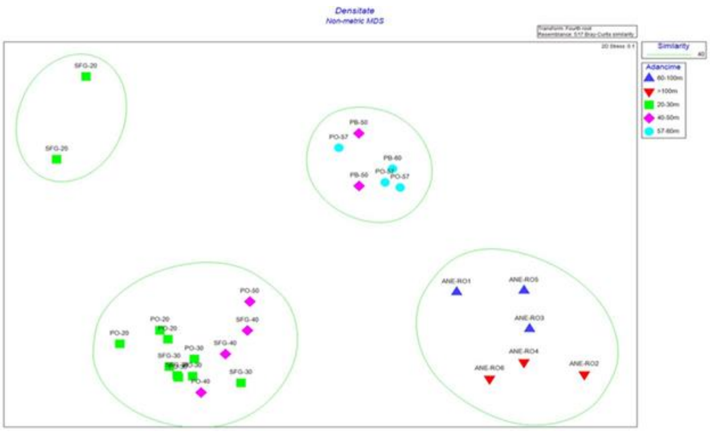
Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The identified bental invertebrate species were distributed on large types of physical habitats:

- 45 species on the muddy circulatory habitats;
- 103 species in muddy and mixed offshore habitats.

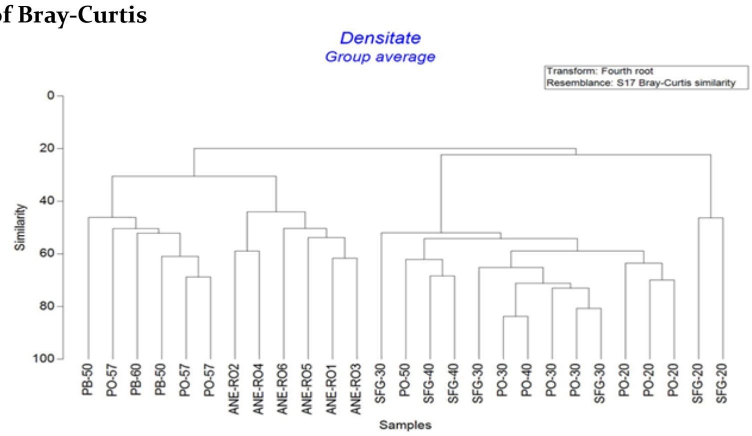
The distribution of the main faunal communities by depth in the analyzed stations is very well illustrated in Figures II.78 and II.79.

Figure II.78 Distribution of macrobental fauna communities by batimetric intervals in the masy circalitoral and the large and mixed-wide circalitoral



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

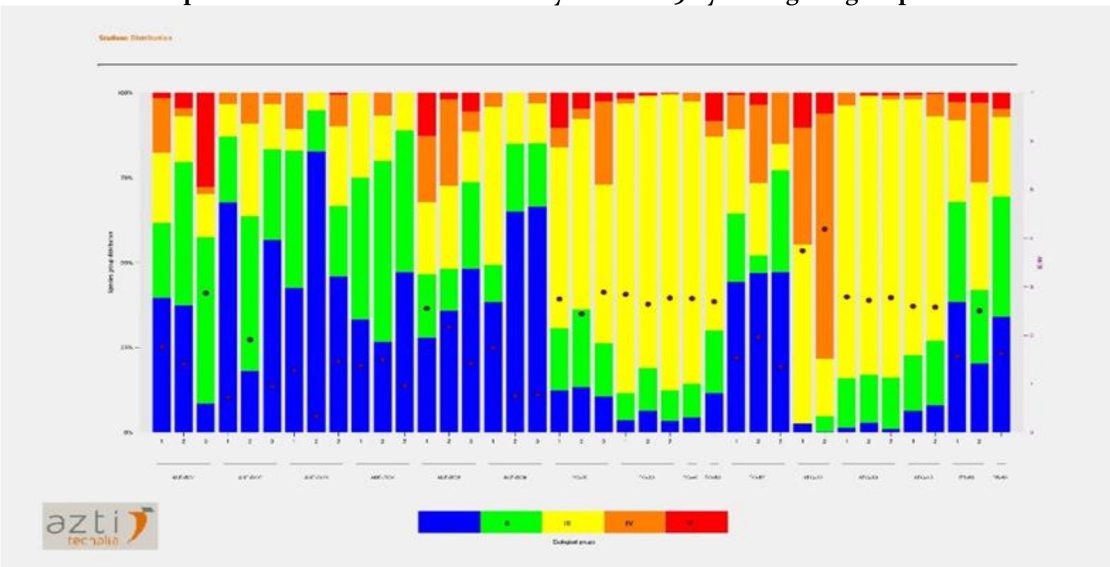
Figure II.79 The main types of biotic communities in the circalitoral and circalitoral sedimentary habitats of the sea in 2019 according to the similarity of Bray-Curtis



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

The ecological status of macrozoobentos in large physical habitats was assessed by applying the M-AMBI*(n) index (Sigovini et al., 2013; Todoriva et al, 2018; Abaza et al, 2018).
The distribution of macrozoobental species by ecological groups in the analyzed stations is as follows: in the circuit muds characterized by the community Abra-Spisula-Acanthocardia and Melinna-Nephtys, generally tolerant species tolerant to high concentrations of organic matter in sediments, except St. Gheorghe 20 m, where most of the species are opportunistic (figure II.88). The proportion of species sensitive to concentrations of organic substance in sediments increased with depth, the largest proportions of susceptible species being found at depths greater than 67 m, in mixed sediments in the broad circalitoral, dominated by the Community of Modiolula – Terebelllides. Also in this community there is a high proportion of indifferent species at concentrations of organic matter, while the proportions of opportunistic species are the smallest.
For infralittoral sedimentary habitats, samples were taken from the Perișor-Periteașca and Portița area, from depths of 3 and 5 m, but a smaller Van Veen was used for the collection, which did not allow comparing the results with those obtained in previous years. The fact that by processing these samples it was found that in the respective stations the ecological status of zoobenthos is good (M-AMBI * (n), respectively EQRM-AMBI * (n)> 0.68), it was not possible to characterize the ecological status of the whole habitat of infralittoral sands, due to the small number of stations performed. The same is true for the southern area, the samples being collected from Mangalia (2 m) and Vama Veche (4 m), where the zoobental communities were dominated by about the same species (bivalve Lentidium mediterraneum and polychaetes), except for the amphipod Ampelisca diadema , which dominates the sandy habitats in the north of the area.

Figure II.80 Distribution of species identified in stations analysed in 2019 by ecological groups



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

For the bental community on the circalitoral muds with depths between 20 and 30 m, in the northern area the threshold values for good ecological status have not yet been established, so the defined threshold value of the M-AMBI index * (n) was used for the circalitoral muds in waters of variable salinity (Abaza et al., 2016) (Table II.36).

Table II.36 Ecological status of the circalitoral muds in the north of the Romanian continental shelf in the period 2014-2019

HABITAT	STAȚII	ADÂNCIME	VAL. PRAG	2014	2015	2016	2017	2018	2019
MÂLURI CIRCALITORALE DIN NORDUL PLATFORMEI CONTINENTALE	SULINA	20M	M-AMBI*(n) ≥ 0.61 EQR≥0.68	0.63	0.63	0.76		0.74	
	MILA 9	20M		0.93	0.78			0.76	
	MILA 9	30M		0.68		0.68			
	SF. GH.	20M		0.86	0.74	0.72		0.76	
	SF. GH.	30M		0.74	0.66	0.66		0.83	0.89
	PORTITA	20M		0.90	0.78	0.70	0.99	0.99	1.13
	PORTITA	30M		0.58	0.50	0.54	0.23	0.47	0.99

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

As can be seen in Table II.36, in the period 2014-2019 most stations on the circalitoral muds in the north of the continental shelf, characterized by the community of organisms described above, are in good ecological condition, with the exception of Portita 30 m station, which in 2019 alone was in good ecological condition. In 2019 there is a trend to improve the ecological status, although for this year there is currently only a few data from this community.

As far as the deep mussels community is concerned, in 2019 it was not analysed in all stations, with priority being given, as mentioned above, to the collection of more data from large-range circalitoral habitats. That is why, in 2019, circalitoral muds characterized by the presence of biogenic reefs of *Mytilus galloprovincialis* was only caught in 4 stations. Of these, one (Gate 40 m) was in poor ecological condition (Table II.37).

Table II.37 Ecological status of circalitoral muds with biogenic reefs of Mytilus galloprovincialis in the period 2014-2019

HABITAT	STAȚII	AD.	VAL. PRAG	2014	2015	2016	2017	2018	2019
MÂLURI CIRCALITORALE CU RECIFI BIOGENI DE *MYTILUS GALLOPROVINCIALIS*	SULINA	30M	M-AMBI*(n) ≥ 0.68 EQR≥0.68	0.60	0.85			0.59	
	SF. GHE	40M			0.82	0.68		0.94	0.76
	PORTITA	40M							0.57
	PORTITA	50M		0.86	0.71	0.49	0.91	0.8	0.77
	PORTITA	57M		0.81	0.53	0.74	0.85	0.81	1.09
	CAZ. MAM.	30M		0.76	0.58	0.62		0.68	
	ECT3	36M		0.52	0.69	0.73	0.98	0.81	
	ECT4	47M		0.74	0.60	0.93	0.86	0.79	
	ECT5	53M		0.76	0.69	0.72	0.87	0.76	
	COST.	30M				0.66		0.69	
	MANGALIA	39M		0.62	0.61	0.70	0.77	0.67	
	MANGALIA	53M					0.97	0.72	

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

In the depth range analysed, the value of the M-AMBI*(n) index exceeded in all cases the threshold value resulting from the analysis of the data collected over the last 5 years (2014-2018), the trend being clearly positive (Table II.38).

Table II.38 Ecological status of mixed and muddy sediment habitats in the wide ring road with Modiolula and Terebellides in the period 2014-2019

HABITAT	STAȚII	ADÂNCIME	VAL. PRAG	2014	2015	2016	2017	2018	2019
SEDIMENTE MIXTE ȘI MÂLOASE DIN CIRCALITORALUL DE LARG CU *MODIOLULA ȘI TEREBELLIDES*	PORTITA	70M	M-AMBI*(n) ≥ 0.64 EQR≥0.68		0.72	0.95	0.86	0.63	
	PORTITA	76M							0.99
	PORTITA	106M							0.96
	PERIBOINA	60M							0.87
	VADU	77M							0.96
	VADU	106M							0.95
	ECT5	57M		0.69	0.63	0.63	0.84		
	ECT6	72M				0.93	0.97	0.84	
	ECT7	90M			0.74	0.69	0.72	0.55	
	COSTINEȘTI	67M							1.41
	COSTINEȘTI	101M							1.13
	MANGALIA	57M		0.87	0.84	0.75			
	MANGALIA	70M				0.99		0.84	
	MANGALIA	100M			0.76	0.86		0.66	

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

Conclusions:

The supervision of bental communities in 2019 highlighted the following:

1. 114 macrozoobental species were identified in the 16 stations monitored at depths between 20 and 106 m.
2. The greatest diversity of species was found in the muddy and mixed offshore habitats, where 103 species were identified, while in the circalitoral muds 45 macrozoobental species were identified.
3. The standardized M-AMBI multimetric index (M-AMBI * (n)) applied to the densities of benthic species showed in 2019 a good ecological status of the circular muds from the north of the continental shelf, at depths of 20-30 m and of muddy and mixed habitats from the offshore circuit of marine transitional waters (57-106 m) and a poor state of the circalitoral mudslides with Mytilus, a condition found in previous years.
4. Applying the “one out all out” (OOAO) principle, it results that the circular muds with biogenic reefs of Mytilus galloprovincialis are in a bad ecological state (not good).
5. Compared to previous years, only in the case of the deep mussels there is no tendency to improve the ecological status, whereas in the case of other types of circalitoral habitats, a clear trend of improvement is observed in 2019.

LIVING MARINE RESOURCES

Biodiversity is important for the future sustainable development of marine natural resources, which include fish species (Dulvy et al., 2000; Hilborn et al., 2003). By adhering to international agreements, states must manage their natural resources in ways that conserve both resources and biodiversity (Hiddink et al., 2007). One of the main objectives in the management and conservation of marine and coastal ecosystems is to preserve the composition of species and the natural abundance of the fish community. Studies carried out to analyze the composition of the ihthiofaune in recent years have shown a slight increase in the number of species observed at the Romanian Black Sea coast. Thus, in 2017 the presence of 36 species was reported, in 2018 43 species were identified, and in 2019 44 species (Table II.39).

Table II.39 Systematic distribution of species from the ichthyofauna, 2017-2019

Family	Species	Popular name
Acipenseridae	*Acipenser gueldenstaedti colchicus*	nisetru
	Acipenser stellatus	păstrugă
	Huso huso	morun
Atherinidae	*Atherina hepsetus*	aterina mare
Belonidae	*Belone belone euxini*	zărgan
Blenniidae	*Coryphoblennius galerita*	cocoșel de mare
Callionymidae	*Callionymus pusillus*	șoricel de mare
Carangidae	*Trachurus mediterraneus ponticus*	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 euxinus*	bacaliar
	Gaidropsarus mediterraneus	galea
Gasterosteidae	*Gasterosteus aculeatus*	ghidrin
Gobiidae	*Neogobius melanostomus*	strunghil
	Mesogobius batrachocephalus	hanus
	Gobius niger	guvid negru
	Pomatoschistus microps leopardinus	guvid de nisip
Mugilidae	*Mugil cephalus*	laban
	Liza aurata	chefal auriu
Mullidae	*Mullus barbatus*	barbun
Ophididae	*Ophidion rochei*	cordeluță
Pleuronectidae	*Platichthys flesus*	cambulă
Pomatomidae	*Pomatomus saltatrix*	lufar
Rajidae	*Raja clavata*	vulpe de mare
	Dasyatis pastinaca	pisică de mare
Sciaenidae	*Umbrina cirrosa*	milacop
	Sciaena umbra	corb de mare
Scombridae	*Sarda sarda*	pălămidă
Scophthalmidae	*Psetta maxima*	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: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The predominant, constant species were: anchovy (Engraulis encrasicolus), horse mackerel (Trachurus mediterraneus ponticus), plaice (Mullus barbatus), sprat (Sprattus sprattus) and atherina (Atherina hepsetus), with slight variations from month to month.

The main factor threatening the biodiversity of marine fish globally is fishing (Dulvy et al., 2003; Garcia et al., 2006), and in any fishing activity there are also by-catch/secondary catches (accidental capture of species not intended to be caught) (Figure II.81).

Figura II.81 Speciile by-catch în capturile de la talian, 2019 (foto INCDM)

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Unwanted capture can be a problem both ecologically and economically. Accidental catches may contribute to overfishing; may also change the availability of prey (food), affecting the marine ecosystem and fishing productivity.
Information on by-catches shall contribute to an understanding of the impact of specific fishing activities on the various vulnerable species concerned. Once collected, this data could indicate which fishing gear is most harmful to a particular species. This information may, in turn, be useful for the application of appropriate measures to reduce the impact of fisheries on these species, while reducing the impact on fisheries of species of economic interest (FAO, 2019).
In 2020, by Order No. 488/2020 on the approval of the List of Endangered Marine Species on the Romanian Black Sea Coast for the Protection and Conservation of The Black Sea Coast, 17 species of fish for protective measures were targeted (Table II.40).

Table II.40 Fish species included in the List of Endangered Marine Species

Source: National Environmental Guard

VERTEBRATA - CLASS PISCES	
***Acipenser gueldenstaedtii* (Brandt & Ratzeburg, 1833)**	**CR**
***Acipenser stellatus* (Pallas, 1711)**	**CR**
***Acipenser sturio* (Linnaeus, 1758)**	**CR**
***Anguilla anguilla* (Linnaeus, 1758)**	**CR**
***Chelidonichthys lucerna* (Linnaeus, 1758)**	**VU**
***Dasyatis pastinaca* (Linnaeus, 1758)**	**NT**
***Gaidropsarus mediterraneus* (Linnaeus, 1758)**	**NE**
***Gobius niger* (Linnaeus,1758)**	**NE**
***Hippocampus guttulatus* Cuvier, 1829**	**VU**
***Huso huso* (Linnaeus, 1758)**	**CR**
***Platichthys flesus* (Linnaeus, 1758)**	**NT**
***Pegusa nasuta* (Pallas,1814)**	**NE**
***Raja clavata* (Linnaeus, 1758)**	**NT**

Salmo labrax **(Pallas, 1814)**	**VU**
Sciaena umbra **(Linnaeus, 1758)**	**NT**
Squalus acanthias **(Linnaeus,1758)**	**NT**
Syngnathus **spp.**	**DD**

Legend*: Missing (EX); Critically threatened (CR); Threatened (EN); Vulnerable (VU); Almost Threatened (NT); Low-risk (LC); Insufficient data (DD); Unrated (NE)*

As regards the presence of vulnerable species in catches, the majority of species in the red list were identified in isolation between 2017 and 2019. Two species of fish of Community interest, *Arosa immaculata and Arosa tanaica*, have also been identified. It should be noted that the percentage of by-catch species observed represented less than 2% of the total catch of the target species for all tools analysed.

The structure and function of fish communities can be considered as good indicators of the ecological status of marine ecosystems. Standardised techniques are therefore needed for long-term assessment and the development of predictions/forecasts on the size and productive capacity of fish populations, as well as continuous control of their health, in a broader context.

Source: National Environmental Guard

Eutrophication indicators

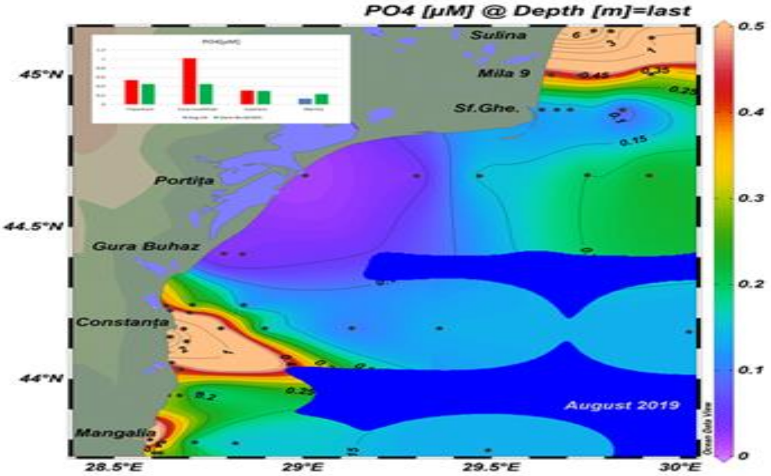
Nutrients

RO 21
Indicator code Romania: RO 21 EEA indicator code: CIS 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 N / P ratio at sea, concentration levels (low, moderate, high) and trends of oxidized nitrogen in winter time (nitrate + nitrogen) and the concentration of soluble orthophosphates (expressed in micromol / L) in the Black Sea water.

Nutrients, the main cause of eutrophication, were investigated in 2019, by analyzing samples (N = 126) taken from the water column (0–90 m) in a single oceanographic expedition, undertaken in summer in August, on the monitoring network consisting of 42 stations covering the typologies included in the Water Framework Directive (WFD - transitional marine and coastal waters) and the areas evaluated in the Marine Strategy Framework Directive (WSSD - marine waters). As only one expedition is discussed, the analysis for establishing the state of the marine environment for the whole year 2019 is considered irrelevant.

Phosphate concentrations, $(PO_4)^{3-}$, recorded in the water column, values between 0.01 and 10.55 µM (mean 0.31 µM, median 0.08 µM, standard deviation 0.21 µM). The highest values were found on the surface, in the Danube Mouth area (Sulina profile, 10 m isobath), in Constanța Sud 5m station (9.86 µM) but also in Mangalia 5m station (1.10 µM). Thus, against the background of a low river flow (below the multiannual average of August), the significant impact of anthropogenic discharges from the most populated areas is observed. In August 2019, it is observed that the good ecological status is not reached in the transitional and coastal waters (figure II.82).

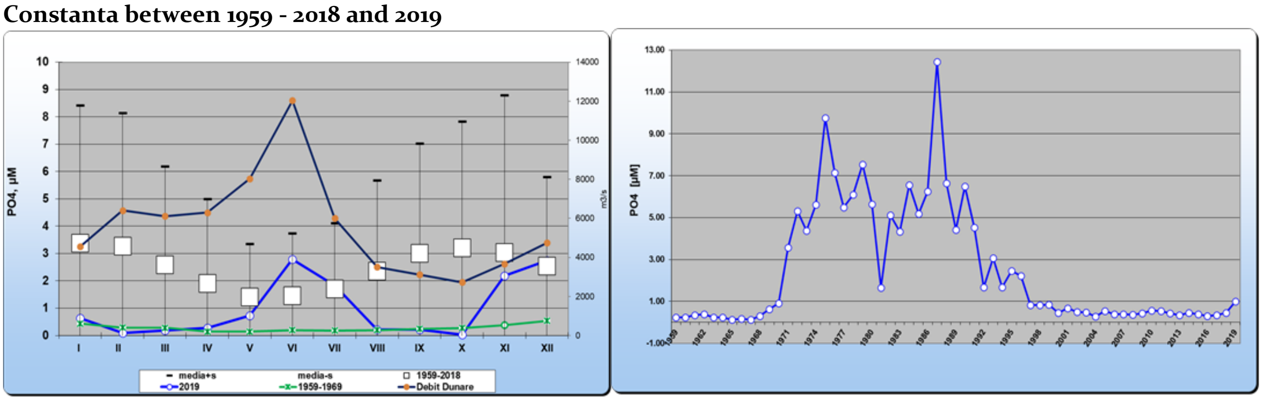
Figure II.82 Spatial variability of phosphate concentrations in the waters of the Romanian Black Sea coast and the comparative situation with the target values for achieving good ecological status, august 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In the long run, there is a situation that has not been encountered in recent years. The monthly averages of 2019 are significantly comparable (t test, 95% confidence interval, p = 0.8119, t = 0.2409, df = 22, Dev.St. difference = 0.315) with the multiannual ones, 1959-2018 , due to the values recorded in 2019, significantly higher than those of the reference period 1959-1969. The maximum monthly average in June is observed (corresponding to the very high flows of the Danube) as well as very high values in November and December (periods characterized by agitation of water bodies) (figure II.83 a).

Figure II.83 Comparative situation of multiannual (a) and annual monthly (b) seawater phosphate concentrations in Constanta between 1959 - 2018 and 2019



(a) (b)

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In the period 1959-2018, the average annual values of phosphate concentrations ranged between 0.13 µM (1967) and 12.44 µM (1987) and their decrease was observed starting with 1987 (figure II.83 b). The average value in 2019, 0.99 µM, exceeds the range characteristic of the reference period of the '60s (multiannual average 1959-1969 0.28 µM ± 0.14 µM) being even slightly higher than the levels of the late' 90s . For 2019, it is observed that the good condition is not reached due to the high concentrations in July, November and December (figure II.83 a).

Inorganic forms of nitrogen (**nitrates, nitrites and ammonium**) recorded heterogeneous values along the entire Romanian Black Sea coast, exceeding the proposed value as a target for assessing good ecological status in August 2019, especially in coastal and marine waters (table II.41).

Table II.41 Descriptive statistics on the concentrations of inorganic forms of nitrogen in the surface waters of the Black Sea - August, 2019

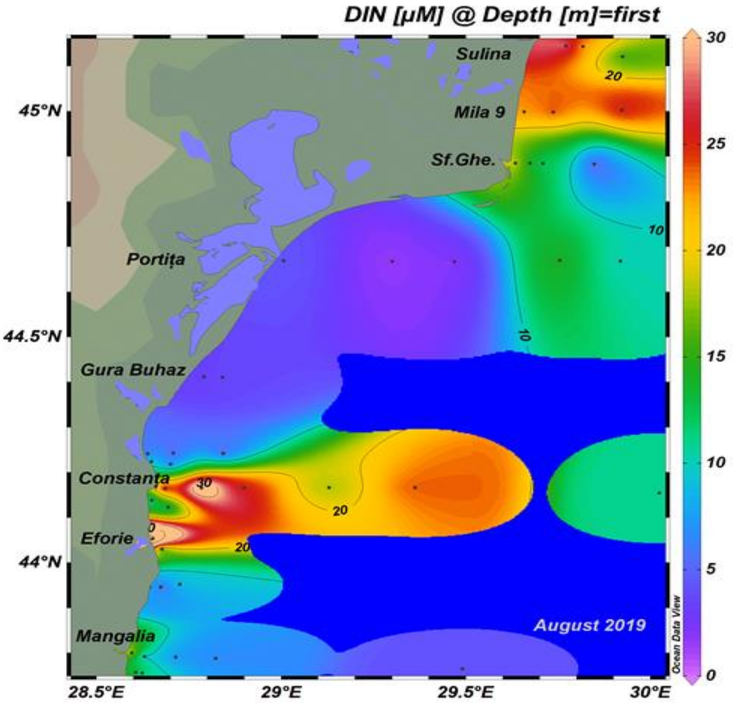
N=42	Transitional (N=8)				Coastal(N=18)				Marine (N=16)			
	Min.	Max.	Media	75%	Min.	Max.	Media	75%	Min.	Max.	Media	75%
NO_3, μM	2,60	31,98	14,05	18,65	0,69	69,23	9,24	9,76	0,96	9,85	4,37	6,50
NO_2, μM	0,06	10,51	3,07	9,33	0,07	9,64	1,37	0,67	0,02	5,63	1,01	1,17
NH_4, μM	0,14	18,75	3,16	1,33	0,37	30,90	3,83	1,24	0,38	23,45	6,38	11,43
$\Sigma N_{anorganic}$ (DIN), μM	1,69	32,51	20,28	25,97	1,65	70,12	14,44	19,53*	1,84	26,47	11,76	16,23
Target Value GES, DIN μM				37,50				13,50				10,50

* Values exceed the proposed target value for achieving good ecological status

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The maximum concentration of inorganic nitrogen was recorded at the Eforie station 5 m. Comparative analysis of hot-season inorganic nitrogen concentrations in surface waters and target values (proposed GHGs) shows failure to achieve good condition in marine transient waters as well as a major risk to coastal and marine waters (Figure II.84).

Figure II.84 Spatial variability of inorganic nitrogen concentrations (DIN-sum of nitrates, nitrites and ammonium) in waters of the Romanian Black Sea coast, August 2019

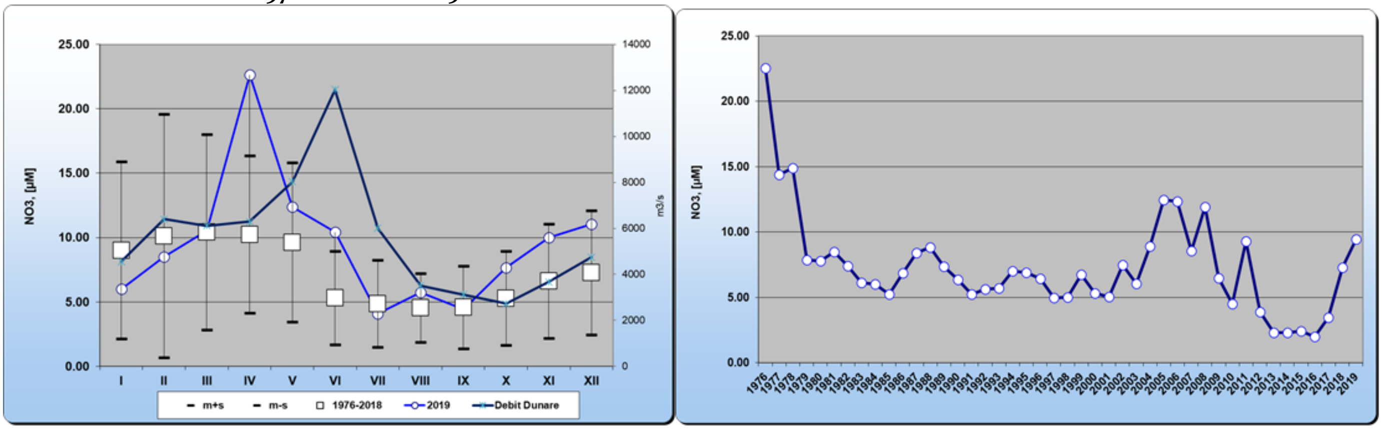


Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Trends in evolution

Nitrates - Multiannual monthly averages 1976-2018 and monthly averages from 2019 are comparable (test t, 95% confidence interval, p = 0.1928, t = 1.3435, df = 22, Dev.St. of the difference = 1.592) due to the rather high concentrations in 2019 (figure II.85 a). In the long term (annual averages 1976-2019), it is observed the achievement, in 2019, of the annual average of 9.45 μM (figure II.85.b).

Figure II.85 Comparative situation of multiannual monthly averages (a) and annual (b) of seawater nitrate concentrations in Constanta between 1976-2018 and 2019

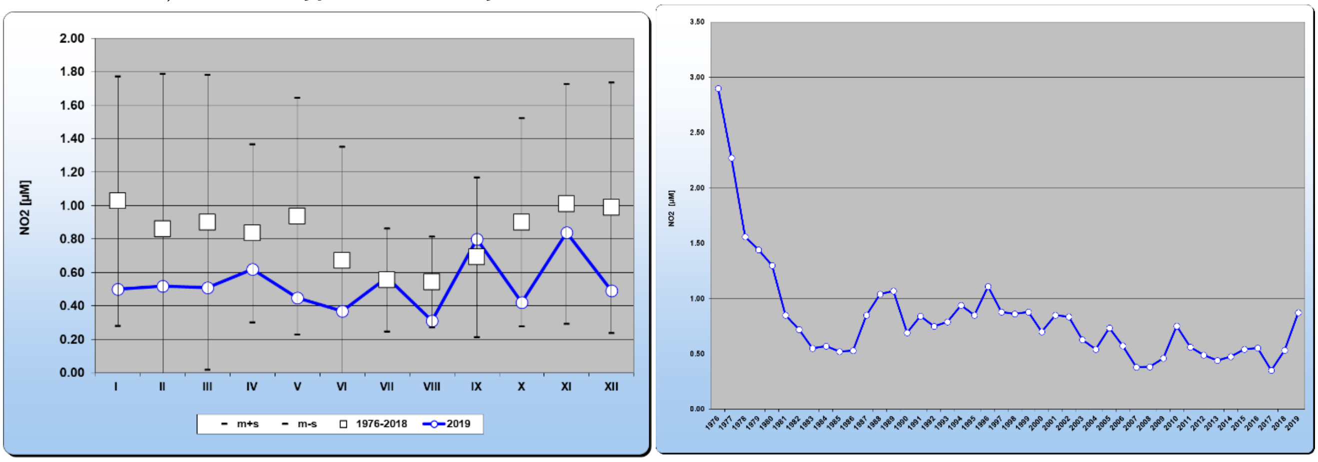


(a) (b)

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Nitrogen - Multiannual monthly averages 1976-2018 and monthly averages from 2019 differ significantly (test t, 95% confidence interval, p = 0.0003, t = 4.3300, df = 22, Dev.St. of the difference = 0.068) as a result of lower concentrations in 2018 (figure II.86 a). In the long term (1976-2019), the average of 0.87 µM is reached in 2019 (figure II.86 b).

Figura II.86 Comparative situation of multiannual (a) and annual (b) monthly averages of nitrogen concentrations in seawater in Constanța between 1976-2018 and 2019

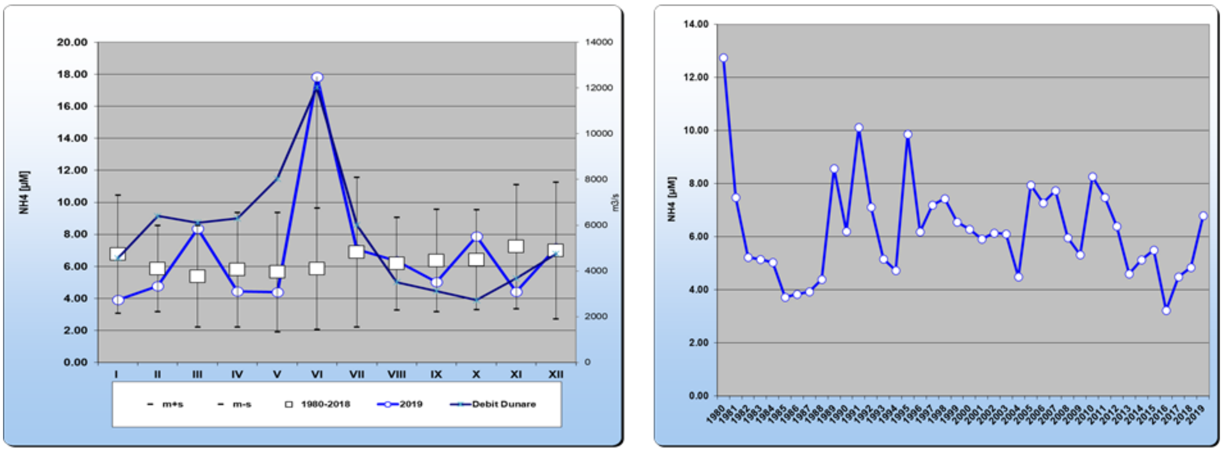


(a) (b)

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Ammonium - Multiannual monthly averages 1980-2018 and monthly averages from 2019 do not differ significantly (t test, 95% confidence interval, p = 0.6476, t = 0.4634, df = 22, Dev.St. of the difference = 1.109) as a result of comparable concentrations in 2018 (Figure II.95 a). In the long term (1980-2019), the average annual concentration of 6.80 µM is observed in 2019 (figure II.87 b). The average of June (17.84 µM) is an extreme and coincides with a flow of the Danube about 4 times higher than normal (figure II.95 a). The annual average (6.80 µM) falls within the range of variability of the area (figure II.87 b).

Figure II.87 Comparative situation of the multiannual monthly averages (a) and of December (b) of the ammonium concentrations in the sea water in Constanța between 1980-2018 and 2019

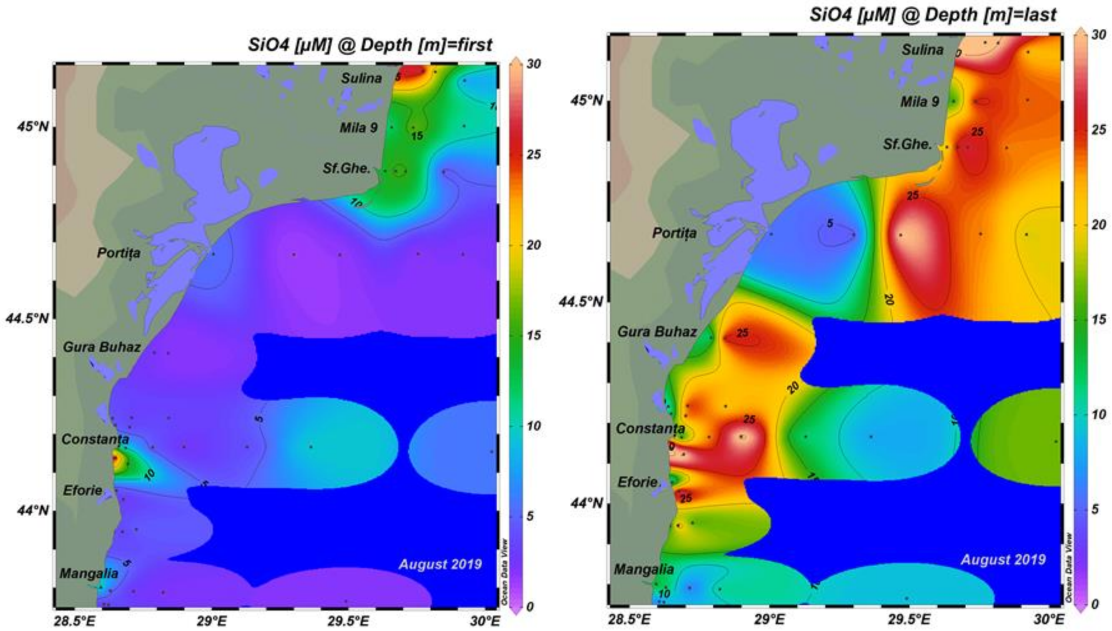


(a) **(b)**

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Silicates (SiO_4) 4-- had concentrations in the range of 1.2 - 38.9 µM (mean 11.7 µM, median 7.1 µM, standard deviation 10.7 µM). The higher values are due either to the river input and the port area (Constanța Sud 5 m) (figure II.88 a) or to the accumulations at the water-sediment interface in the hot season in which the thermocline and the stratification of water masses predominate (figure II.88 b).

Figure II.88 Spatial variability of silicate concentrations in the waters of the Romanian Black Sea coast, surface (a) and bottom (b), August 2019

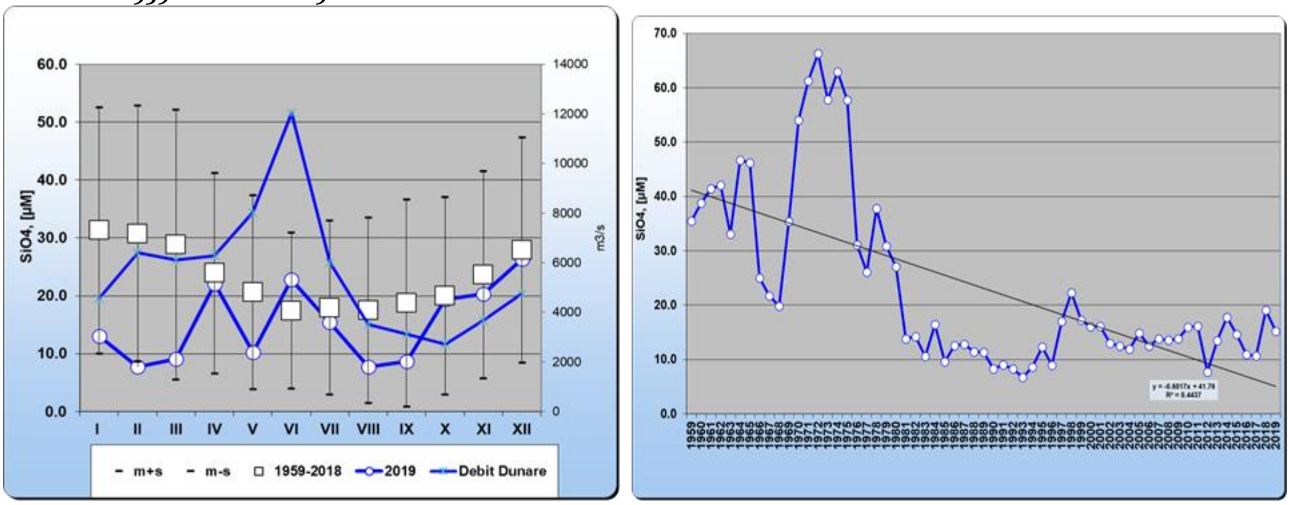


(a) **(b)**

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In Constanta, the monthly averages in 2019 are significantly lower than the multiannual averages 1959-2018 (t test, 95% confidence interval, p=0.0037, t=3.2440, df=22, Dev.St. of difference=2.463) (Figure II.89 a). The average annual concentrations of seawater silicates in Constanta fall within the range of 6.7 µM (1993) to 66.3 µM (1972) and averaged 15.2 µM in 2019, representing 43% compared to the 1959-1969 reference period (35.1 µM) (Figure II.89 b).

FigureII.89 Comparative situation of multiannual (a) and annual monthly (b) concentrations of silicates in seawater in Constanta between 1959-2018 and 2019



(a) (b)

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Chlorophyll a

RO 23

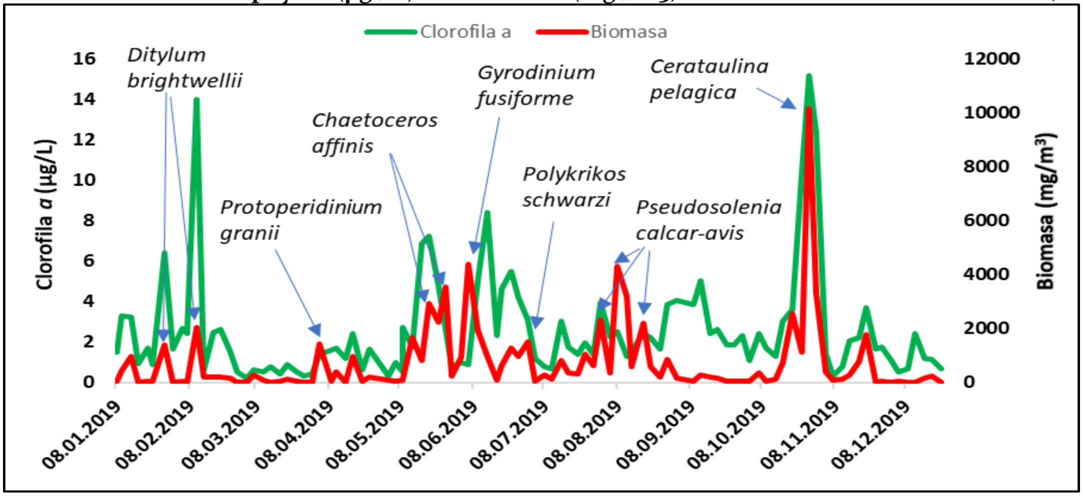
Indicator code Romania: RO23
EEA indicator code: CIS 23

TITLE: CHLOROPHYLL A OF TRANSITIONAL, COASTAL AND MARINE WATERS

DEFINITION: The indicator describes: average annual concentrations in summer (expressed in micrograms / L), classification of concentration levels (low, moderate, high), trends in average surface concentrations in summer 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. In summer, when primary production is limited to nutrients only, chlorophyll a concentration is linked to nutrient stock.

The seasonal distribution of chlorophyll *a* showed the highest values at the end of the winter season (in February) and in the autumn season (in October) (figure II.90). The concentration of chlorophyll *a* varied between 0.54 and 14.01 µg / L (in February), and respectively 1.08 and 15.18 µg / L (in October). In the winter season, high values of biomass were observed due to the development of the diatoms *Ditylum brightwellii* and *Skeletonema ladoum*, species characteristic of the cold season. The autumn season was characterized by the presence of species with significant biomass, such as: the diatoms *Cerataulina pelagica*, *Leptocylindrus danicus*, *Proboscia alata*, *Chaetoceros affinis, Chaetoceros curvisetus* and *Pseudo-nitzschia delicatissima*, and the dinoflagellates *Protya granumini and Prony*.

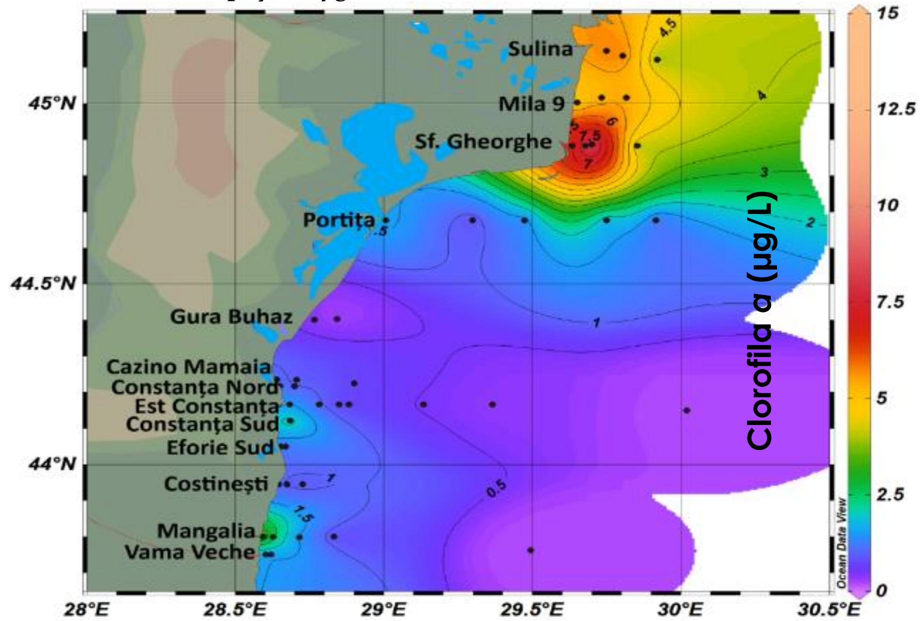
Figure II.90 Seasonal variation of chlorophyll *a* (µg / L) and biomass (mg / m3) in the shallow waters of Mamaia, in 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Analyzing the distribution of chlorophyll a in the water column (figure II.91), it can be seen that in August 2019 the maximum values were recorded in the surface horizon (0 m). The highest concentrations of chlorophyll a were observed in waters with variable salinity (Sfantu Gheorghe 20m - 10.59 µg / L, Sulina 20m - 7.50 µg / L, Sulina 20 m - 6.14 µg / L and Mila 9 20 m - 4.52 µg / L) and in coastal waters (Mangalia 1 - 9.05 µg / L and Constanța Sud 20 m - 4.91 µg / L). In marine waters, chlorophyll a concentrations were generally lower, except for the values recorded in the case of Sfantu Gheorghe station 30 m.

Figure II.91 Spatial distribution of chlorophyll *a* (µg / L) in the waters of the Romanian Black Sea sector in August 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

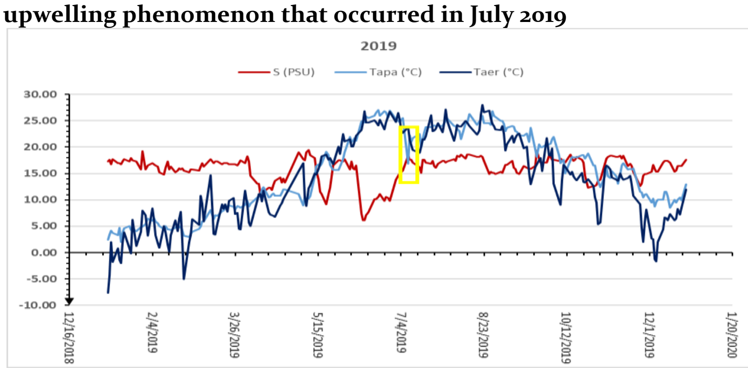
Impact of climate change on the marine and coastal environment

Temperature

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

Coastal area. Seawater temperature, as the first parameter of climate influence, showed an important variability in the active layer in 2019 due to changes in the thermal balance and dynamics of the air masses at the large-atmosphere interface (Figure II.92) in the eastern Black Sea basin area. From the analysis of the data recorded at Mamaia - Constanta station (N=228) it is noted that in the Romanian black sea 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, but also to the climatic peculiarities of 2019, declared alongside 2016 as "the warmest in the history of meteorological measurements".

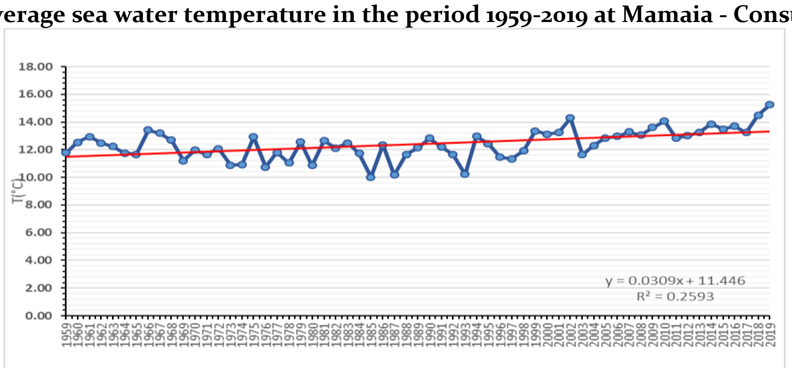
Figure II.92 Daily evolution of air temperature, sea water temperature and salinity at Constanta station in 2019 (INCDM data) - marked in yellow, an upwelling phenomenon that occurred in July 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

The maximum daily temperature measured, of 27°C, was recorded on 20 June due to the high influence of the Danube freshwater pen, in conjunction with the evolution of air temperature (102). Compared to the reference period of the last 60 years, 2019 can be characterized as a particular year from a thermal point of view, with a significant trend of increasing positive temperature differences compared to the multiannual average in the surface layer (Figure II.93).

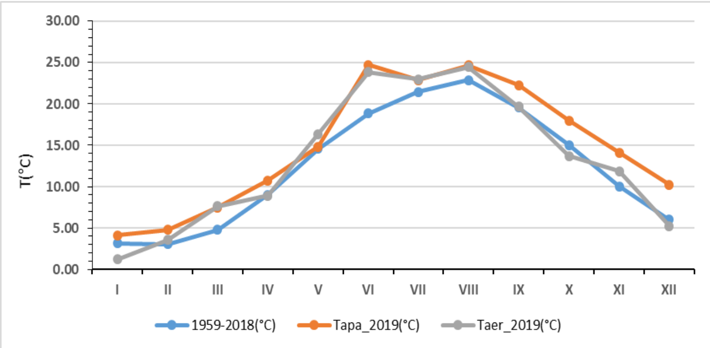
Figure II.93 Multiannual average sea water temperature in the period 1959-2019 at Mamaia - Constanta station



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Average seawater temperatures recorded in 2019 in Constanta exceeded almost the entire multiannual averages, represented as a "tyre" included in the comparative graph (Figure II.94), where only May was within normal limits. Thus, the average seawater temperature in Constanta in 2019 (Average water 2019 = 15.27°C), compared to the average of the last 60 years of the period analysed, was 2.88°C higher (Tapă $_{\text{mediu 1959 – 2018}}$ = 12,39°C).

Figure II.94 Average monthly temperatures (2019) - multiannual monthly averages (1959-2018) at Mamaia - Constanta station

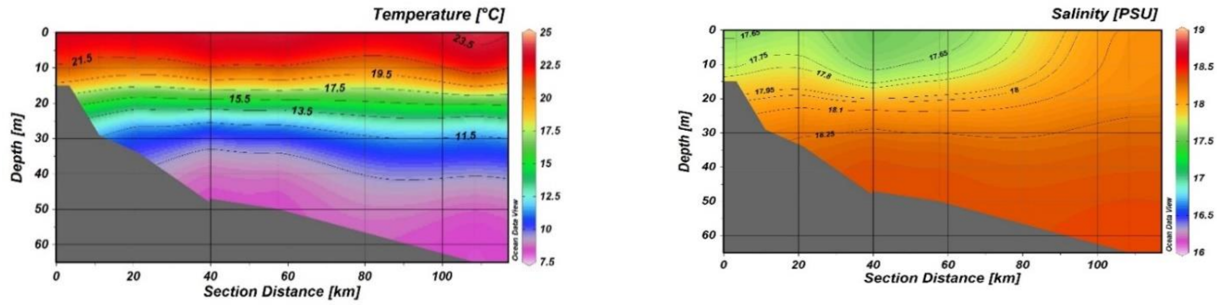


Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

Wide area

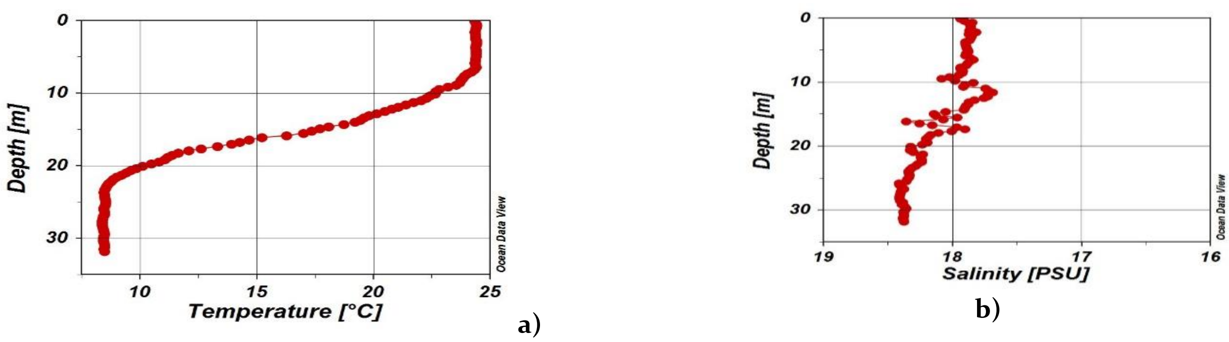
During the warm season, for the Romanian continental shelf, the waters are layered on density levels, the top layer being separated from cold waters by an intermediate layer (SIR), inflection (seasonal thermocline) that defines density gradients between the two layers, preventing their mixing (Figures II.95 a,b, and II.96 a and b).

Figure II.95 Temperature (a) and salinity (b) profiles made in ODV, based on data collected on August 6, 2019, on the East-Constanța transect



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

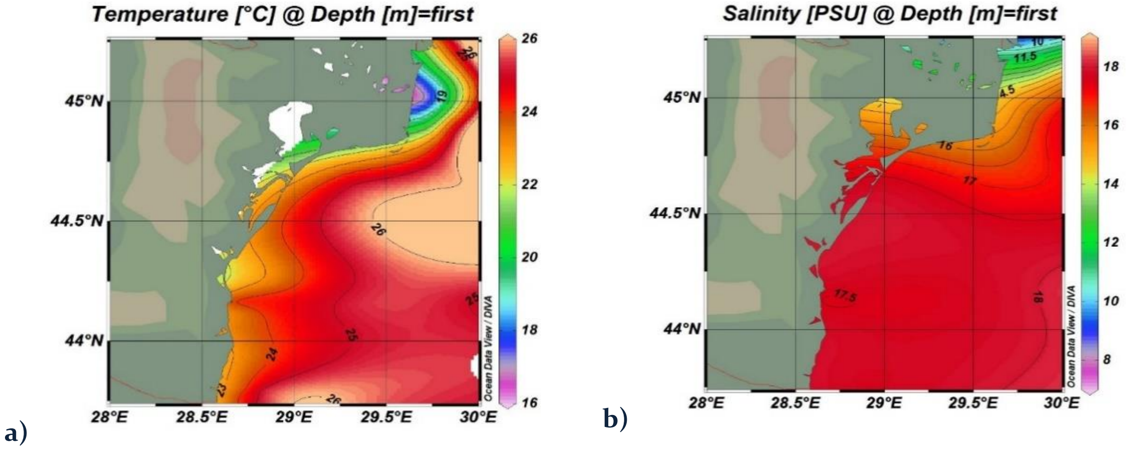
Figure II.96 (a) and (b) CTD profiles at East-Constanta station 4 (depth 32m)



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

For the summer season, the recorded situation illustrates the operation of the Ekman Pump, whose magnitude and spatial distribution depend on the direction and intensity of the wind in the western Black Sea basin.
This phenomenon is highlighted by the distribution curves of the two main hydrophysical parameters (temperature and salinity). The Ekman pump is a phenomenon that manifests itself on the scale of the Black Sea basin, and which involves the different movement of water bodies in the vicinity of the shore from the sea, under the effect of the action of wind and Coriolis force.

Figure II.97 Horizontal distribution of temperature (a), and salinity (b) at the surface (0.00-1 m) along the Romanian continental shelf, 6÷12 August 2019



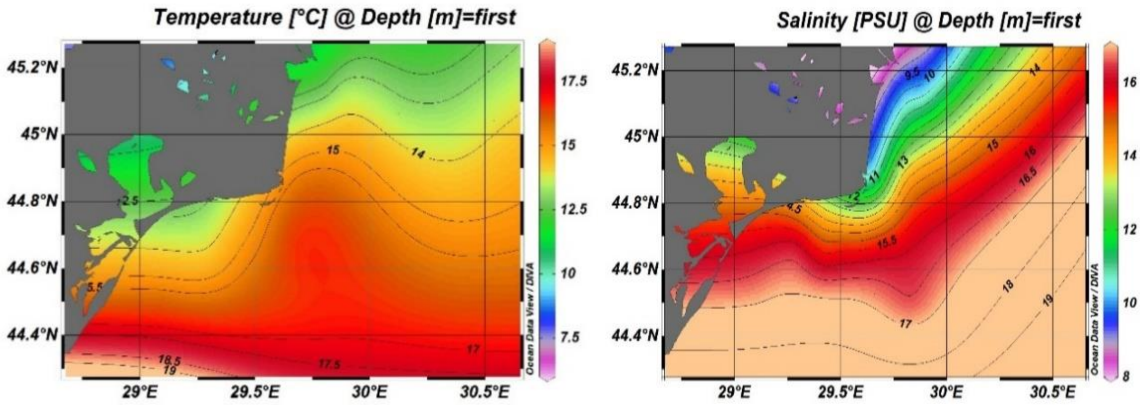
Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

Thus, during the **summer period**, the temperature distribution is homogeneous on the surface (Figure 97 a) with gradually lower values from coast to sea, ranging from 22.9 to 25.8°C. Maximum values for the surface layer were recorded at the Constanta 6 (70m) and near the Canionul Viteaz (90m) (Figure 97 b).

Danube mouths area

Measurements carried out during the spring period of 2019 during a monitoring expedition included in a cross-border collaborative research project have enabled the analysis of stratification processes, which are very active in this area, as well as the study of the influence of the Danube freshwater feathers at regional level. Thus, the influence of land, the general orientation of the shoreline and the action of the south wind is also illustrated by the north-east-facing topography of isotherms (a) and isohalines (b).

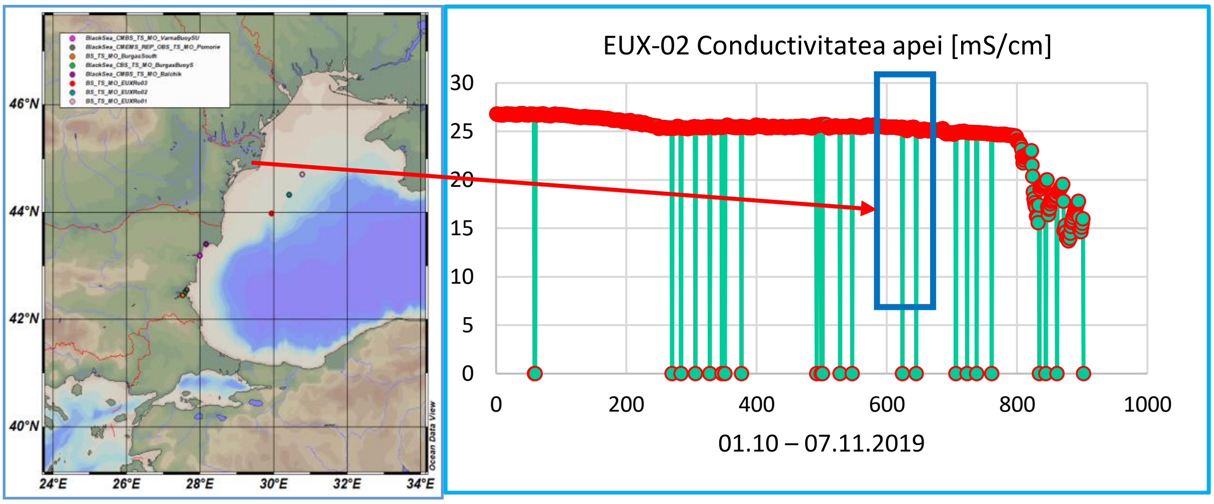
Figure II.98 Horizontal surface distribution of temperature (a) and salinity (b) in the Danube mouths area in May 2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

A notable, similar event in terms of variability of hydrophysical conductivity and salinity parameters in the Danube mouths area occurred in autumn 2019. The data recorded in the offshore area of the Enso-EUXIN/EUX-2 buoy, belonging to the MarineGeoHazard tsunami warning system, were obtained by the goodwill of GeoEcoMar. The graphic representation of these data reveals the phenomenon of the dynamics of surface water masses, thus highlighting spatial variability, i.e. the offshore expansion (approximately 60 MM of shore), of the Danube freshwater blackout.

Figure II.99 Recording of the conductivity of marine water in the offshore area of the Danube mouths, for 06.11.2019



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Between 5 and 7 November, due to the predominance of wind intensity (41 km/h on 04.11.2019, decreasing to 28 km/h and 20 km/h respectively over the next two days) from the direction S and SSV and subsequently V-SV, a rapid decrease in conductivity was recorded in the EUX-2 buoy, in linear interdependence with the salt content of marine water, from 25 mS/cm to 13.6 mS/cm.

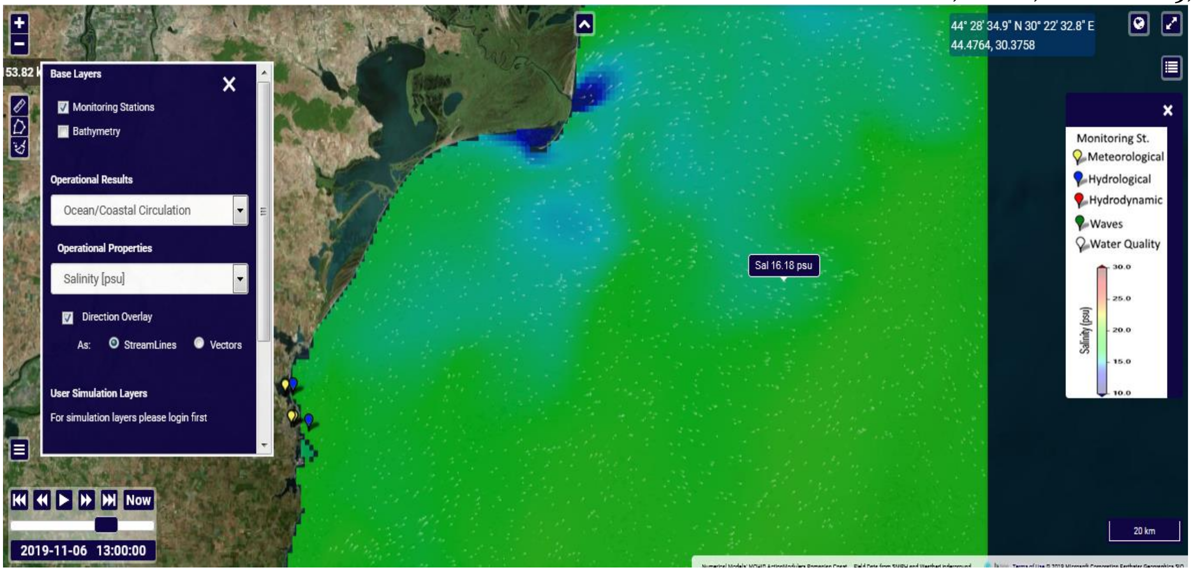
Also, the satellite images provided by the Santinel 3A_OL satellite belonging to the European Space Agency (ESA) on November 5, confirm the NE orientation of the freshwater feather at the mouth of the Danube, as well as the movement of an atmospheric / cloudy front in the same direction..

Figure II.100 Sentinel 3 satellite image on 05.11.2019 (S3A_OL_1_EFR_20191105T080553)

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

In addition, the in-situ values also confirm the results of the MOHID (http://iswim.rmri.ro) forecast model, run with wind data provided operationally by the European Remote Sea Monitoring Service (Copernicus Marine Environment Monitoring Service).

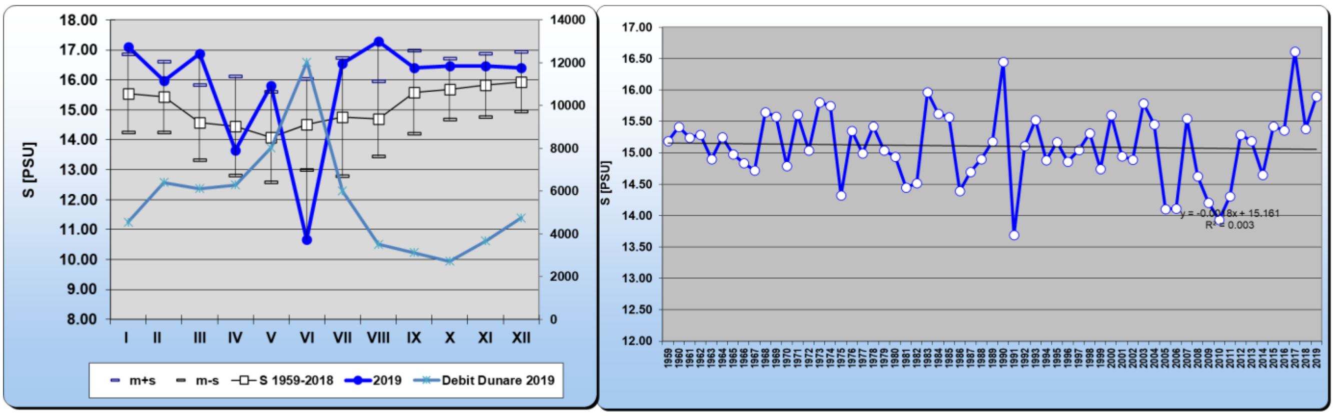
Figure II.101 Results obtained on numerical model for the wide area of the Danube mouths 16,18 PSU, on 06.11.2019, 13:00



Source: *NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA*

In the long run, the monthly averages of salinity in 2019 are comparable to those in the period 1959-2018 (*t test, 95% confidence interval, p = 0.2255, t = 1.247, df = 22, dev.st. of the difference = 0.569*). In 2019, the absolute minimum of salinity in Constanța was 6.16 PSU (June 10, under the influence of the Danube whose flow reached its maximum in June) and the absolute maximum 19.47 PSU (May 9) (figure II.102 a). The annual average of 2019 (15.80 PSU) falls within the variability regime of the studied area (figure II.102 b).

Figure II.102 Comparative situation of multiannual monthly averages (a) and annual (b) of sea water salinity in Constanta between 1959-2018 and 2019



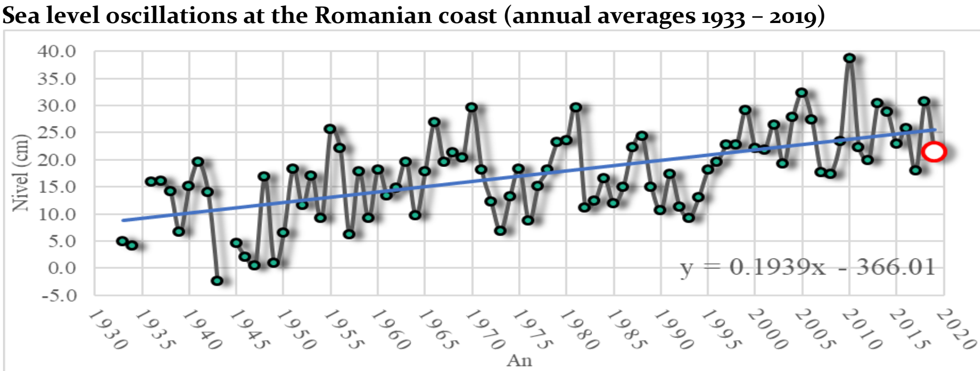
Source: *NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA*

Sea level

RO 50
Indicator code Romania: RO 50 EEA indicator code: CLIM 12
TITLE: INCREASING SEA LEVEL AT GLOBAL, EUROPEAN AND NATIONAL LEVEL
DEFINITION: The indicator reflects the change of the average sea level, the absolute evolution of the sea level using satellite data.

In the case of variations in the level of the Romanian coast the predominant factors are meteorological and hydrological ones since the tide, governed by astronomical factors, is too small to be taken into account. The graph below shows the ott-type largegraph records from the Port of Constanta (Figure II.103).

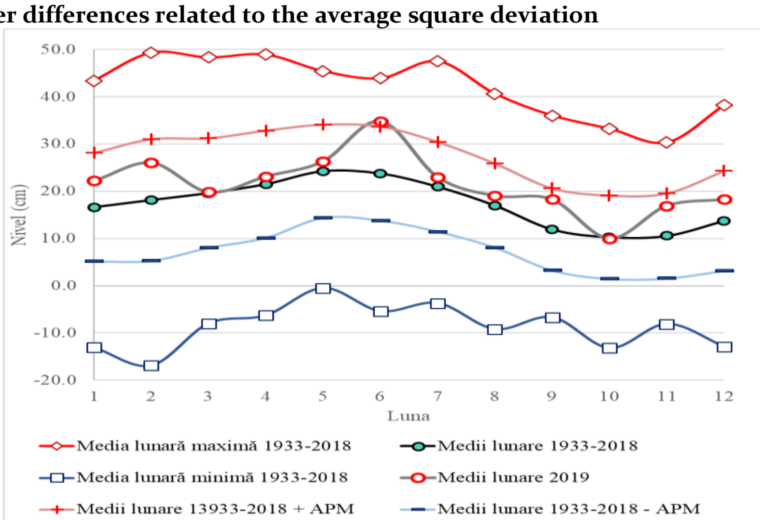
FigureII.103 Black Sea level oscillations at the Romanian coast (annual averages 1933 – 2019)



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Figure II.104 illustrates how average sea level values change along the data set by month. These changes may vary depending on the season. Analyzing the monthly average for 2019, compared to the upper square mean deviation, one can see how in June the average value exceeds this limit. The rest of the average values fall to the upper limit of the average square deviation. The average values for March and October 2019 are very close to the multiannual average, thus contributing to a smaller variation in the multiannual average for these months.

Figure II.104 Monthly, maximum and minimum averages for the period 1933 – 2018 together with the monthly average of 2019 and the upper and lower differences related to the average square deviation



Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

THE SITUATION CONCERNING THE MARINE FISHERY FUND

RO 32
Indicator code Romania: RO32 EEA indicator code: CSI 32
TITLE: STATE OF MARINE FISH STOCKS DIVERSITY OF SPECIES
DEFINITION: The indicator refers at the estimated quantity of fish for the main species of fish in the Romanian Black Sea sector. The indicator monitors the proportion of fish stocks in excess of the total number of commercial stocks, by fishing areas in the Romanian Black Sea sector.

The state of marine fish stocks

The diversity of the Ihtioahouna on the Romanian coast has undergone permanent changes both qualitatively and quantitatively. These changes have occurred as a result of changes in environmental conditions but also due to inadequate management of fisheries. Some of these changes have had a major impact on both pelagic and bental fish populations, affecting common and rare species, brood and adults, fish populations of commercial or non-commercial value, thus generating over time the disappearance of fish populations and very rarely the introduction of new species.

From a qualitative and quantitative point of view, the fish samples collected from the talians located along the Romanian coast from Vadu to Vama Veche and from the two expeditions with the beach net were analyzed. The samples collected from talians were taken between May and October, twice a month, being analyzed in the ichthyology laboratory. The net expeditions were made in August in the northern part of the Romanian coast and in Bath Mamaia in October, being fired six times during each expedition to depths between 0.5 - 5 m. From a qualitative point of view, the following families and fish species appeared frequently on the Romanian coast (table II.42).

Table II.42 Qualitative structure of the ichthyofauna biodiversity on the Romanian coast

Family	Species	Popular name
Atherinidae	*Atherina hepsetus*	aterina
Blenniidae	*Coryphoblennius galerita*	cocoșel de mare
Belonidae	*Belone belone euxini*	zargan
Callionymidae	*Calliumymus pusillus*	șoricel de mare
Clupeidae	*Sprattus sprattus*	șprot
	Alosa immaculata	scrumbia de Dunăre
	Alosa tanaica	rizeafcă
	Clupeonella cultriventris	gingirica
Carangidae	*Trachurus mediterraneus ponticus*	stavrid
Engraulidae	*Engraulis encrasicolus*	hamsia
Gadidae	*Merlangius merlangus euxinus*	bacaliar
	Gaidropsarus mediterraneus	galea
Gobiidae	*Neogobius melanostomus*	strunghil
	Mesogobius batrachocephalus	hanus
	Gobius niger	guvid negru
	Neogobius fluviatilis	guvid de baltă
	Pomatoschistus microps leopardinus	guvid de nisip
Gasterosteidae	*Gasterosteus aculeatus*	ghidrin
Ophididae	*Ophidion rochei*	cordeluță
Mullidae	*Mullus barbatus*	barbun roșu
Mugilidae	*Mugil cephalus*	laban
Pleuronectidae	*Platichthys flesus*	cambulă
Rajidae	*Raja clavata*	vulpea de mare

	Dasyatis pastinaca	pisica de mare
Sciaenidae	*Sciaena umbra*	corb de mare
	Umbrina cirrosa	milacop
Sciaenidae	*Sarda sarda*	pălămidă
Scophthalmidae	*Psetta maxima*	calcan
Serranidae	*Serranus cabrilla*	biban de mare
Syngnathinae	*Syngnathus variegaus*	ac de mare
	Syngnathus typhle	ac de mare
	Hippocampus guttulatus	căluț de mare
Squalidae	*Squalus acanthias*	rechin
Trachinidae	*Trachinus draco*	drac de mare
Triglidae	*Trigala lucerna*	rândunica de mare

Source: Ministry of Agriculture and Rural Development

Indicators for living marine resources

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

- ***the northern sector*** (approximately 158 km in length) stretching between the secondary delta of the Chilia arm and Constanta, composed mainly of alluvial sediments;
- ***the southern sector*** (approx. 85 km in length) stretching between Constanta and Vama Veche, characterized by high-, active cliff headlands separated by wide areas with 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 and 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. Shallow waters, less than 20 m, from the northern part are included in the perimeter of the Danube Delta Biosphere Reserve.

Industrial fishing activity in 2019 was carried out in two ways:

- ***fishing with active gear***, carried out by coastal trawler vessels at depths of more than 20 m;
- ***fixed-gear fishing***, carried out along the coast, in 12 fishing points, situated between Sulina-Vama Veche, at a shallow depth of 2-11 m/taliens, but also at depths of 20-60 m/set and longlines.

The following trends have been reported:

► Evolution of *status indicators*:

◊ **biomass of stocks** for the main fish species (Table II.49) indicates:

- the biomass of the ***sprat*** population was estimated at about **124,000** tons, almost three times higher than that obtained in the previous year and close in value to that obtained in 2016;
- the biomass of the ***cod*** population has been estimated at about **20,000** tons, a constant value in the last three years;
- the biomass of the ***turbot*** population was estimated at about **2,000** tons, equal to the estimates from 2018;
- the biomass of the ***shark*** population was estimated at about **2,000 tons**, close to the estimated values in the period 2014 - 2017;
- the biomass of the ***rapana*** population was estimated at about **15,000 tons**, lower by 15%, compared to the previous year's assessment.

Table II.43 Value of stocks (tonnes) for the main fish species in the Romanian Black Sea sector

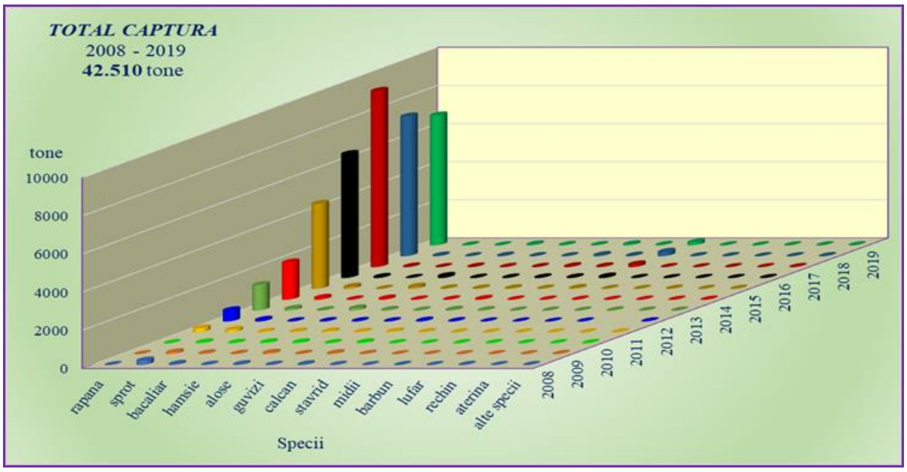
Species	2014	2015	2016	2017	2018	2019
Sprat	60.000	48.903	114.653	23.269	42.599	123.350
Cod	5.550	7.112	6.928	20.911	23.171	19.951
Gobies	300	300	300	300	300	300
Turbot	298	999	2.117	1.523	2.065	2.748
Shark	1.520	1.657	1,550	1.223	5.556	2.065
Rapana	**13.000**	**13.000**	**14.000**	**17.500**	**17.500**	15.000

Source: Ministry of Agriculture and Rural Development

The legalization of beam trawl fishing for rapana in July 2013 led to the development of a specialized fishery of the species, with a substantial increase in landings from one year to another (a maximum of 9,244 tons / 2017), which led to a decrease in stock pressure for turbot and sprat, regulated and monitored species, closely monitored by the European Commission. The decrease in the pressure on the two stocks was reflected in the evaluations performed in 2018.

◊ **the population structure** indicates, as in previous years, the presence in catches of a larger number of species (over 20), of which the basic were both small species (sprat, anchovy, cod, horse mackerel, gobies) and and larger ones (turbot and Danube mackerel). Dominance in catches returned mainly to the species *Sprattus sprattus* - sprat (62.29 - 78.85%), followed by traditional species: *Engraulis encrasicolus* - anchovy (1.6-10.42%), *Merlangius merlangus euxinus* - cod (2.86-6.4%), *Gobiidae* - gobies (3.5-4.6%), *Psetta maeotica* - turbot (1.8-12.9%), *Trachurus mediterraneus ponticus* - horse mackerel. (0.6- 1.73%), *Squalus acanthias* - shark (0.1-2.08%), *Mugidae* - laban (0.1-1.2%), *Alosae* - alose (0.9–2.72%) and others species (0.55 - 3.0%), and in the last six years, catches of molluscs have increased significantly, by collecting in large quantities rapana (*Rapana venosa*) and mussels (*Mytilus galloprovincialis*).
The main species in the catches of 2019 were: rapana - 6.815 t; Mussels (158 t); Anchovy (47 t), sprat (9 t); horse mackerel (17.60 t); Turbot (53,68 t) and barbun 4 t) (figura II.105). Along with these species, the catches also showed: atheros (2,0 t), blue fish (0,94 t), grey mullet (1,06 t), gobies (10,97 t), knout goby (0,35 t), Danube mackerel (19,66 t), blue fish (0,53 t), needlefish (4,56 t), vatos (0,18 t), pelamid (0,53 t) and Stingray (1,0 t).

Figure II.105 Structure of catches (t) of the main fish species fished in the Romanian marine sector, in the period 2008 – 2019



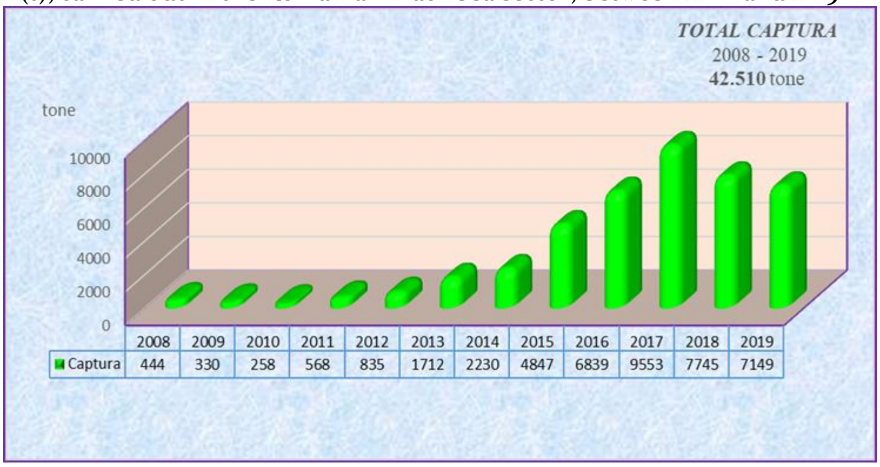
Source: Ministry of Agriculture and Rural Development

► ***Evolution of pressure indicators***
◊ ***fishing effort*** continues the trend of reduction reported since 2000. Thus, in 2019, in active fishing activated **4 vessels of class 24-40 m**, using in fishing: 8 beam trawls, 150 turbot nets and 1 hydraulic dredger, **1 vessel of class (18-24 m)**, using: 2 beam trawls and 200 turbot nets, respectively **21 vessels of class 12-18 m**, using: 44 beam trawls, 1,770 turbot nets, 50 mackerel nets and 4 pelagic trawls. In the stationary fishing, with fixed gear, practiced along the Romanian coast, a number of **112 boats** were activated, respectively **14 boats (under 6 m)** and **98 boats (6-12 m)**, being used: 1 pelagic trawl, 31 talians, 14 beam trawls, 85 cages for 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 fishing efficiency, which fluctuated from one year to the next, was mainly due to both the reduction in fishing effort (decrease in the number of coastal trawlers and, by implication, of the personnel engaged in fishing activity), and the influence of hydroclimatic conditions on fish populations, as well as the increase in production costs and the lack of a market for.
In the period 2005 - 2013, the total level of catches fluctuated, ranging between 1,940 tons / 2005 and 1,390 t / 2006, 435 t / 2007, 177 t / 2008, 331 t / 2009 and 258 t / 2010, respectively, increasing light 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.106).

The increase in the level of catches over the last six years was not due to the ihtiofauna, but to the increased interest of economic operators for manual harvesting and beam trawling of the species rappana (Rapana venosa), whose share in the total catch achieved at the Romanian coast increased from one year to the next, from about 65% in 2012 to 98.6% in 2017, from the total catch made at the Romanian Black Sea coast.

Figure II.106 Total catch (t), carried out in the Romanian Black Sea sector, between 2008 and 2019



Source: Ministry of Agriculture and Rural Development

►

Evolution of impact indicators

◊***the percentage of species whose stocks are outside the safe limits*** was close to that of previous years, being almost 90 %. Exceeding safety limits is not only due to exploitation in the Romanian marine sector, most fish species having a cross-border distribution, which requires regional management;

◊ ***the percentage of complementary species in Romanian catches*** continues to remain at a level similar to that of recent years, being 20%;

◊***changes in the structure by size classes (length, weight, age***) compared to previous years, in 2019, with the exception of the sprat, where there is a rejuvenation of the rudders, due to a very good addition, to the other species occurring in the catches, the biological parameters have remained almost the same.

◊ CPUE (catch per fishing effort unit), resulting in fishing in the Romanian seaside area:

- with fixed tools:

a. ***boats < 6 m:***

- ***talian***: 1,934.0 kg / talian: 1,934.00 kg / month, respectively 64.90 kg / day and 63.62 kg / hour, at a fishing effort by 5 talians, 5 months, 149 days, 152 hours and a catch of **9,670.50 kg**;

- ***turbot net:*** 449.0 kg / boat, 13.82 kg / net; 449.0 kg / month; 149.67 kg / day; 28.97 kg / hour, at an effort obtained by 2 boats, 65 nets, 2 months, 6 days, 31 hours and a catch of **898.0 kg**;

- ***mackerel net:*** 1,748.0 kg / boat, 110.98 kg / net; 2,330.67 kg / month; 107.57.69 kg / day; 42.89 kg / hour; at an effort of 4 boats, 63 nets, 3 months, 65 days, 163 hours and a catch of **6,992.0 kg**;

- ***manual collection of the rapana:*** 13,873.14 kg / boat, 24,278.00 kg / diver; 3,884.48 kg / month; 310.26 kg / day; 70.07 kg / hour, at an effort obtained by 7 boats, 4 people, 25 months, 313 days, 1386 hours and a catch of **97,112 kg**;

- ***rapana harvesting cages:*** 157.0 kg / boat; 2.62 kg / cage; 157.0 kg / month; 39.25 kg / day; 10.47 kg / hour; at an effort of 1 boat, 60 cages, 1 month, 4 days, 15 hours and a catch of **157.0 kg**.

b. ***boats 6 - 12 m:***

- ***talian***: 1,841.48 kg / boat, 1,841.48 kg / talian: 638.38 kg / month, respectively 61.94 kg / day, 56.79 kg / hour at a fishing effort of 26 boats, 26 talians, 75 months, 773 days , 843 hours and a catch of **47,878.60 kg**;

- ***turbot net:*** 1,010.97 kg / boat; 19.93 kg / setca; 326.46 kg / month; 175.08 kg / day; 36.61 kg / hour, at an effort of 31 boats, 1,572 nets, 96 months, 179 days, 856 hours and a catch of **31,340 kg**;

- ***mackerel net:*** 243.00 kg / boat; 23.92 kg / setca; 144.28 kg / month; 27.73 kg / day; 13.78 kg / hour; at an effort of 38 boats, 386 nets, 64 months, 333 days, 670 hours and a catch of **9,234 kg**;

- ***gobies net:*** 323.74 kg / boat; 34.34 kg / netca; 283.27 kg / month; 55.27 kg / day; 18.42 kg / hour; at an effort of 7 boats, 66 nets, 8 months, 41 days, 123 hours and a catch of **2,266.20 kg**;

- ***gobies longlines:*** 71.25 kg / boat, 31.666 kg / longline; 285.00 kg / month; 16,521 kg / day; 14.25 kg / hour, at an effort obtained by 16 boats, 36 longlines, 4 months, 69 days, 80 hours and a catch of **1,140 kg**;
- ***beach net:*** 293.0 kg / boat; 146.50 kg / net; 73.25 kg / month; 29.3 kg / day; 24.42 kg / hour, at an effort made by 1 boat, 2 nets, 4 months, 10 days, 12 hours and a catch of **293 kg**;
- ***beam trawl:*** 72,292, 81 kg / boat; 56,801.0 kg / beam trawl; 14,726.18 kg / month; 1,906.98 kg / day; 202.087 kg / trawl, 205.853 kg / hour; at an effort obtained by: 11 boats, 14 trawlers, 54 months, 417 days, 3,935 trawls, 3,863 hours and a catch of **795,214 kg**;
- ***manual collection of the rapana:*** 61,086.66 kg / boat; 9,366,621 kg / man; 12,324.50 kg / month; 2,226,613 kg / day; 488.863 kg / hour; at an effort of 23 boats, 150 people, 114 months, 631 days, 2,874 hours and a catch of **1,404,993.24 kg**;
- ***rapana harvesting cages:*** 205 kg / boat; 8.20 kg / cage; 205 kg / month; 205 kg / day; 51.25 kg / hour; at an effort of 1 boat, 25 cages, 1 month, 1 day, 4 hours and a catch of **205 kg**;
- ***volts:*** 169.22 kg / boat; 74.29 kg / volt; 152.30 kg / month; 14.931 kg / day; 3,024 kg / hour, at an effort of 18 boats, 41 laps, 20 months, 204 days, 1007 hours and a catch of **3,046 kg**;
- ***mounts:*** 28,133 kg / boat; 16.23 kg / caper; 21.1 kg / month; 10.05 kg / day; 1.9 kg / hour, at an effort of 15 boats, 26 sailors, 20 months, 42 days, 215 hours and a catch of **422 kg**.
- ***pelagic trawl:*** 152.0 kg / vessel, 152.0 kg / pelagic trawl; 76.0 kg / month; 76.0 kg / day; 30.4 kg / trawl, 21.714 kg / hour, at an effort of 1 vessel, 1 pelagic trawl, 2 months, 2 days, 5 trawls, 7 hours and a catch of **152 kg**.

c. *boats 12 - 18 m:*

- ***beam trawl:*** 162,111 t / ship; 77,371 t / beam trawl; 33,375 t / month; 3,108 t / day; 0.317 t / trawl, 0.317 t / h, at an effort obtained by: 21 vessels, 44 beam trawl, 102 months, 1,095 days, 10,713 trawls, 10,713 hours and a catch of **3,404,346 kg**;
- ***pelagic trawl:*** 0.209 t / vessel, 0.157 t / pelagic trawl; 0.157 t / month; 0.063 tg / day; 0.019 t / trawl, 0.019 t / h, at an effort of 3 vessels, 4 pelagic trawls, 4 months, 10 days, 33 trawls, 33 hours and a catch of **629 kg**;
- ***turbot nets:*** 1,757 t / ship; 0.011 t / net; 7,028 t / month; 0.284 t / day; 0.051 t / hour, at an effort of 12 vessels, 1770 nets, 3 months, 74 days, 410 hours and a catch of **21,086 t;**
- ***mackerel nets:*** 1,402 t / vessel; 0.028 t / net; 0.267 t / month; 0.200 t / day; 0.058 t / hour, at an effort of 1 vessel, 50 gillnets, 3 months, 7 days, 24 hours and a catch of **1,402 tons**.

d. *boats 18 - 24 m:*

- ***beam trawl:*** 187,494 t / ship, 93,747 t / beam trawl; 31,249 t / month; 2.79 t / day; 0.245 t / trawl, 0.245 t / h, at an effort obtained by a vessel, 2 beam trawl, 6 months, 67 days, 765 trawls, 765 hours and a catch of **187,494 tons**;
- ***turbot nets:*** 0.836 t / vessel; 0.004 t / net; 0.287 t / month; 0.019 t / day; 0.043 t / hour, at an effort of 1 vessel, 200 gillnets, 3 months, 45 days, 20 hours and a catch of **863 kg**.

e. *boats 24 - 40 m:*

- ***urbot nets:*** 260.0 kg / vessel; 1,733 kg / net; 130.0 kg / month; 26.0 kg / day; 8.12 kg / hour, at an effort of 1 vessel, 150 gillnets, 1 month, 10 days, 32 hours and a catch of **260 kg**;
- ***beam trawl:*** 270,886 t / ship; 135,443 t / beam trawl; 40,131 t / month; 3,576 t / day; 0.381 t / trawl, 0.381 t / h, at an effort obtained by: 4 vessels, 8 trawlers, 27 months, 303 days, 2841 trawls, 2841 hours and a catch of **1,083,542 t**;
- ***hydraulic dredger***: 1,639 t / ship; 1,639 t / dredger; 1,639 t / month; 0.819 t / day; t / trawl, 0.08 t / hour, at an effort obtained by: 1 vessel, 1 dredger, 1 month, 2 days, 21 trawls, 7 hours and a catch of **1,639.0 t.**

Source: Ministry of Agriculture and Rural Development

Measures to solve critical problems

► at national level

- preserving the biological diversity of marine ecosystems and protecting endangered species;
- the use of selective fishing tools and techniques - non-destructive, cost-effective, that 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;
- tackling rigorous actions to combat illegal fishing.

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

ANTHROPIC PRESSURES ON THE MARINE AND COASTAL ENVIRONMENT

RO 33

Indicator code Romania: RO33
EEA indicator code: CIS 33

TITLE: PRODUCTION OF AQUACULTURE

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

In 2019, no marine aquaculture farm operated on the Romanian coast, as a result of the discharges of nutrients into the environment and, therefore, the pressure exerted by this activity were null and void.
Following the numerous interventions made by INCDM (through the Aquaculture Demonstration Center) in 2019, with the support of GFCM, in addition to the National Sanitary-Veterinary Authority (ANSVSA), which is the Competent Authority on issues in Romania, the Sanitary-Veterinary Departments Constanța and Tulcea , The National Agency for Fisheries and Aquaculture (ANPA), the Ministry of Environment, Waters and Forests (MMAP), as well as the Institute of Diagnosis and Animal Health (IDSA), *”The Interministerial agreement for the classification of areas for the production and relocation of live bivalve molluscs*" was launched.

INCDM thus elaborated, 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* ”, essential framework document, mandatory according to the provisions of the Guide for the application of Regulation 854/2004, which was sent to ANSVSA, in order to effectively start the sampling and subsequent classification procedures, for which only that Authority is accredited.
During the *"Shore Survey*", a second mandatory document in the microbiological classification process, the team of the Aquaculture Center of INCDM confirmed through field expeditions the existence and condition of potential sources of contamination previously identified in the mentioned Documentary Survey.

Figure II.107Meeting on the classification of production and harvesting areas of live bivalve molluscs, 31.10.2019, ANSVSA Bucharest headquarters (left); Meeting for the effective start of the classification of production and harvesting areas of live bivalve molluscs, 6.03.2020, headquarters of DSVSA Constanta (right)

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA” CONSTANȚA

All these results have been made available to ANSVSA which, as a Competent Authority, will carry out the microbiological classification of the production and relocation zones of live bivalve molluscs in the Romanian Black Sea sector. We can say today that this process is actually under way, thus ensuring that economic operators have access to Romania's live marine resources (invertebrates) by establishing the appropriate legislative framework, in line with the current requirements of the European Union.

Fishing fleet capacity

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

The management of fishing capacity aims to strike a sustainable balance between fleet fishing capacity and fishing opportunities over time. Thus, the **CPUE** (capture per fishing effort unit) resulting in fishing in the Romanian coastal area was carried out by:

a. *boats < 6 m:*

- ***talian***: 1,934.0 kg / talian: 1,934.00 kg / month, respectively 64.90 kg / day and 63.62 kg / hour, at a fishing effort by 5 talians, 5 months, 149 days, 152 hours and a catch of **9,670.50 kg**;
- ***turbot net:*** 449.0 kg / boat, 13.82 kg / net; 449.0 kg / month; 149.67 kg / day; 28.97 kg / hour, at an effort obtained by 2 boats, 65 nets, 2 months, 6 days, 31 hours and a catch of **898.0 kg**;
- ***mackerel net:*** 1,748.0 kg / boat, 110.98 kg / net; 2,330.67 kg / month; 107.57.69 kg / day; 42.89 kg / hour; at an effort of 4 boats, 63 nets, 3 months, 65 days, 163 hours and a catch of **6,992.0 kg**;
- ***manual collection of the rapana:*** 13,873.14 kg / boat, 24,278.00 kg / diver; 3,884.48 kg / month; 310.26 kg / day; 70.07 kg / hour, at an effort obtained by 7 boats, 4 people, 25 months, 313 days, 1386 hours and a catch of **97,112 kg**;
- ***rapana harvesting cages:*** 157.0 kg / boat; 2.62 kg / cage; 157.0 kg / month; 39.25 kg / day; 10.47 kg / hour; at an effort of 1 boat, 60 cages, 1 month, 4 days, 15 hours and a catch of **157.0 kg**.

b. *boats 6 - 12 m:*

- ***talian***: 1,841.48 kg / boat, 1,841.48 kg / talian: 638.38 kg / month, respectively 61.94 kg / day, 56.79 kg / hour at a fishing effort of 26 boats, 26 talians, 75 months, 773 days , 843 hours and a catch of **47,878.60 kg**;
- ***turbot net:*** 1,010.97 kg / boat; 19.93 kg / setca; 326.46 kg / month; 175.08 kg / day; 36.61 kg / hour, at an effort of 31 boats, 1,572 nets, 96 months, 179 days, 856 hours and a catch of **31,340 kg**;
- ***mackerel net:*** 243.00 kg / boat; 23.92 kg / setca; 144.28 kg / month; 27.73 kg / day; 13.78 kg / hour; at an effort of 38 boats, 386 nets, 64 months, 333 days, 670 hours and a catch of **9,234 kg**;
- ***gobies net:*** 323.74 kg / boat; 34.34 kg / netca; 283.27 kg / month; 55.27 kg / day; 18.42 kg / hour; at an effort of 7 boats, 66 nets, 8 months, 41 days, 123 hours and a catch of **2,266.20 kg**;
- ***gobies longlines:*** 71.25 kg / boat, 31.666 kg / longline; 285.00 kg / month; 16,521 kg / day; 14.25 kg / hour, at an effort obtained by 16 boats, 36 longlines, 4 months, 69 days, 80 hours and a catch of **1,140 kg**;
- ***beach net:*** 293.0 kg / boat; 146.50 kg / net; 73.25 kg / month; 29.3 kg / day; 24.42 kg / hour, at an effort made by 1 boat, 2 nets, 4 months, 10 days, 12 hours and a catch of **293 kg**;
- ***beam trawl:*** 72,292, 81 kg / boat; 56,801.0 kg / beam trawl; 14,726.18 kg / month; 1,906.98 kg / day; 202.087 kg / trawl, 205.853 kg / hour; at an effort obtained by: 11 boats, 14 trawlers, 54 months, 417 days, 3,935 trawls, 3,863 hours and a catch of **795,214 kg**;
- ***manual collection of the rapana:*** 61,086.66 kg / boat; 9,366,621 kg / man; 12,324.50 kg / month; 2,226,613 kg / day; 488.863 kg / hour; at an effort of 23 boats, 150 people, 114 months, 631 days, 2,874 hours and a catch of **1,404,993.24 kg**;
- ***rapana harvesting cages:*** 205 kg / boat; 8.20 kg / cage; 205 kg / month; 205 kg / day; 51.25 kg / hour; at an effort of 1 boat, 25 cages, 1 month, 1 day, 4 hours and a catch of **205 kg**;
- ***volts:*** 169.22 kg / boat; 74.29 kg / volt; 152.30 kg / month; 14.931 kg / day; 3,024 kg / hour, at an effort of 18 boats, 41 laps, 20 months, 204 days, 1007 hours and a catch of **3,046 kg**;
- ***mounts:*** 28,133 kg / boat; 16.23 kg / caper; 21.1 kg / month; 10.05 kg / day; 1.9 kg / hour, at an effort of 15 boats, 26 sailors, 20 months, 42 days, 215 hours and a catch of **422 kg**.
- ***pelagic trawl:*** 152.0 kg / vessel, 152.0 kg / pelagic trawl; 76.0 kg / month; 76.0 kg / day; 30.4 kg / trawl, 21.714 kg / hour, at an effort of 1 vessel, 1

pelagic trawl, 2 months, 2 days, 5 trawls, 7 hours and a catch of **152 kg**.

c. *boats 12 - 18 m:*

- ***beam trawl:*** 162,111 t / ship; 77,371 t / beam trawl; 33,375 t / month; 3,108 t / day; 0.317 t / trawl, 0.317 t / h, at an effort obtained by: 21 vessels, 44 beam trawl, 102 months, 1,095 days, 10,713 trawls, 10,713 hours and a catch of **3,404,346 kg**;
- ***pelagic trawl:*** 0.209 t / vessel, 0.157 t / pelagic trawl; 0.157 t / month; 0.063 tg / day; 0.019 t / trawl, 0.019 t / h, at an effort of 3 vessels, 4 pelagic trawls, 4 months, 10 days, 33 trawls, 33 hours and a catch of **629 kg**;
- ***turbot nets:*** 1,757 t / ship; 0.011 t / net; 7,028 t / month; 0.284 t / day; 0.051 t / hour, at an effort of 12 vessels, 1770 nets, 3 months, 74 days, 410 hours and a catch of **21,086 t;**
- ***mackerel nets:*** 1,402 t / vessel; 0.028 t / net; 0.267 t / month; 0.200 t / day; 0.058 t / hour, at an effort of 1 vessel, 50 gillnets, 3 months, 7 days, 24 hours and a catch of **1,402 tons**.

d. *boats 18 - 24 m:*

- ***beam trawl:*** 187,494 t / ship, 93,747 t / beam trawl; 31,249 t / month; 2.79 t / day; 0.245 t / trawl, 0.245 t / h, at an effort obtained by a vessel, 2 beam trawl, 6 months, 67 days, 765 trawls, 765 hours and a catch of **187,494 tons**;
- ***turbot nets:*** 0.836 t / vessel; 0.004 t / net; 0.287 t / month; 0.019 t / day; 0.043 t / hour, at an effort of 1 vessel, 200 gillnets, 3 months, 45 days, 20 hours and a catch of **863 kg**.

e. *boats 24 - 40 m:*

- ***urbot nets:*** 260.0 kg / vessel; 1,733 kg / net; 130.0 kg / month; 26.0 kg / day; 8.12 kg / hour, at an effort of 1 vessel, 150 gillnets, 1 month, 10 days, 32 hours and a catch of **260 kg**;
- ***beam trawl:*** 270,886 t / ship; 135,443 t / beam trawl; 40,131 t / month; 3,576 t / day; 0.381 t / trawl, 0.381 t / h, at an effort obtained by: 4 vessels, 8 trawlers, 27 months, 303 days, 2841 trawls, 2841 hours and a catch of **1,083,542 t**;
- ***hydraulic dredger***: 1,639 t / ship; 1,639 t / dredger; 1,639 t / month; 0.819 t / day; t / trawl, 0.08 t / hour, at an effort obtained by: 1 vessel, 1 dredger, 1 month, 2 days, 21 trawls, 7 hours and a catch of **1,639.0 t**.

Tabelul II.44 Total BOATS / VESSELS active in 2019

Length classes boats/ships	Total active boats/ships	Fishing technique	Medium length (m)	Medium age (ani)	Total GT	Total kW	No. of people
< 6 m	14	PG	5,16	13,86	11,41	97,91	32
6-12 m	64	PG	7,67	23,6	104,68	640,18	146
6-12 m	34	PMP	8,43	14,8	152,97	792,86	116
12 - 18 m	21	PMP	14,75	8,71	688,34	3.219,13	92
18-24 m	1	PMP	20,2	20	70	184,00	4
> 24 m	4	PMP	25,75	27,75	476	1.217,25	22
TOTAL	**138**		**1282,69**	**2521,55**	**1503,4**	**6.151,33**	**412**

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

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Table II.45 Total number of INACTIVE BOATS/VESSELS in 2019

Length classes boats/ships	Total active boats/ships	Medium length (m)	Medium age	Total GT	Total kW
< 6 m	3	5,11	20,67	1,46	0
6-12 m	20	7,95	18,9	35,99	11,77
12-18 m	1	14,25	17	18,91	72,13
TOTAL	**24**	**188,58**	**457,01**	**56,36**	**83,9**

Source: NATIONAL INSTITUTE OF MARINE RESEARCH-DEVELOPMENT „GRIGORE ANTIPA" CONSTANȚA

Port and transport activities

In 2019, the sea ports (Constanța, Constanta Sud-Agigea, Midia and Mangalia) had a total traffic of 66,603,292 tonnes of goods (an increase of 8% compared to 2018). According to the INS, traffic increased continuously between 2009 and 2019 by ~37% (Figure II.108), part of the freight traffic being pollution risk products: oil and petroleum products, chemicals, ores, chemicals derived from coal and tar (Figure II.109).

Figure II.108 Total port traffic (1970 – 2019, seaports)

Data Source: Maritime Ports Administration

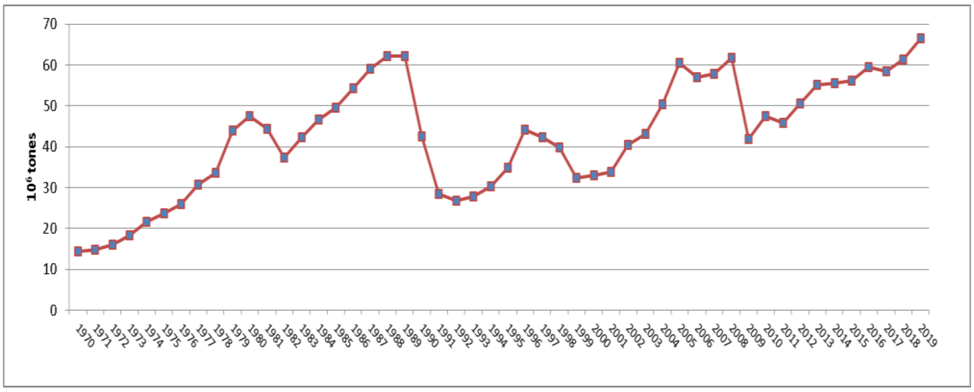
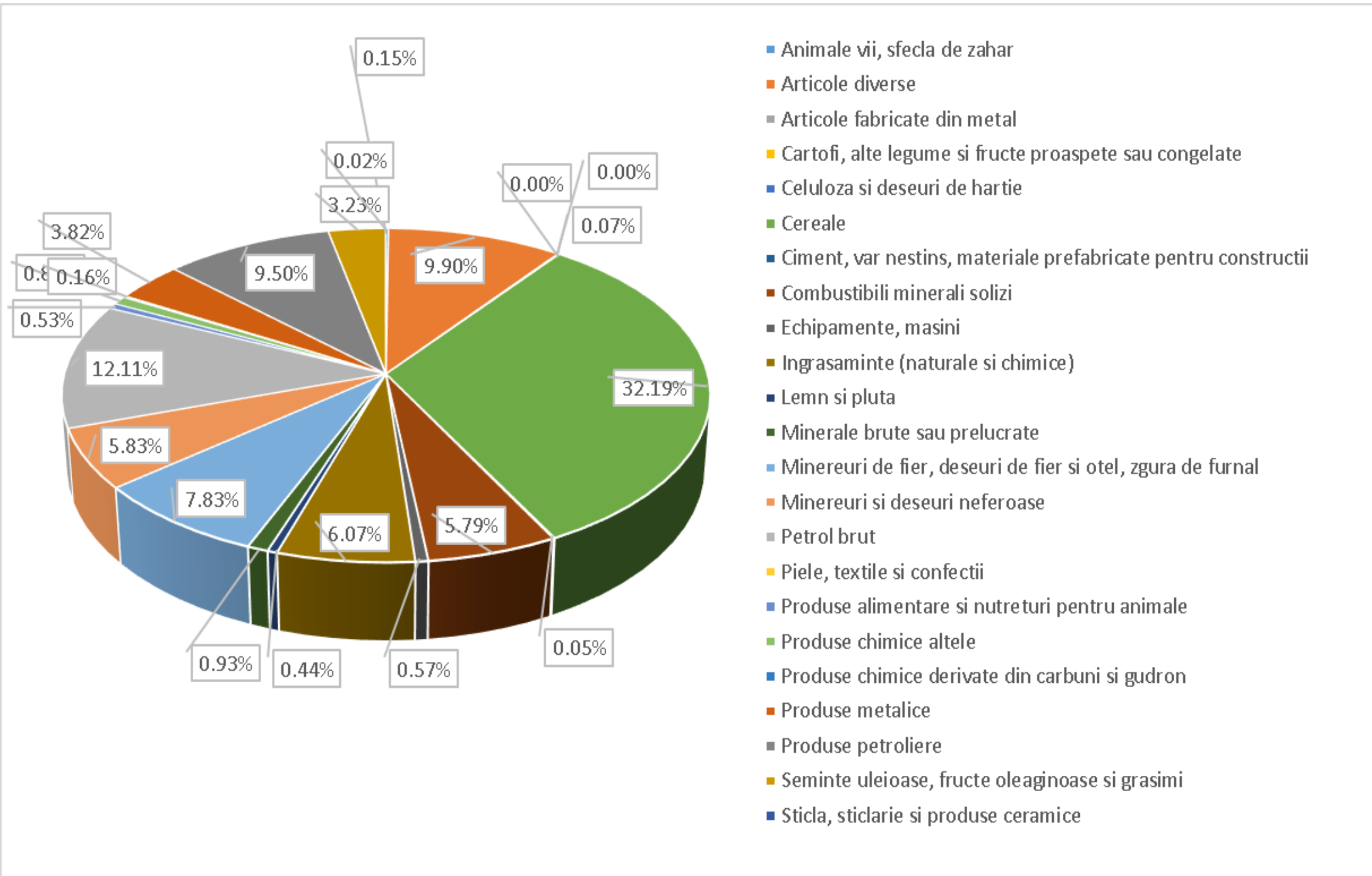


Figure II.109 Freight traffic, seaports, 2019

Data Source: Maritime Ports Administration



The maritime transport sector poses risks at both the coast and the marine environment, i.e.:

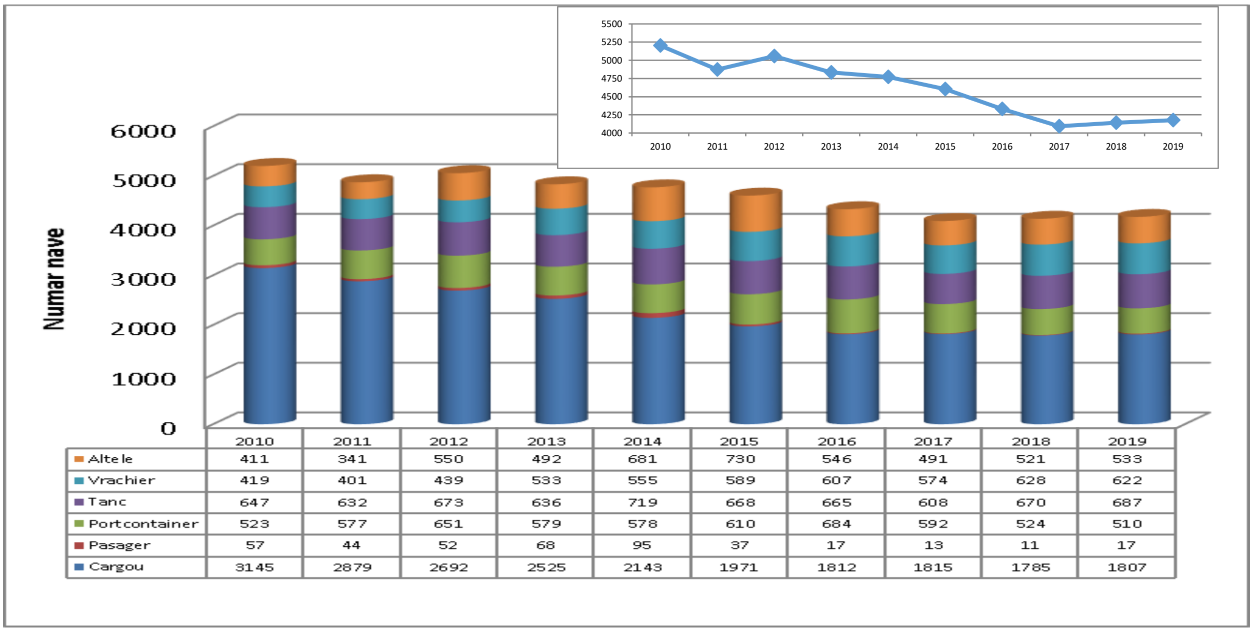
- Permanent and temporary physical disturbances of the substrate (digs, port enclosures/constructions, anchorage areas, dredging and dredging material storage), changes in hydrological conditions;

- Coastal erosion/intervention in sediment dynamics at regional level;
- Introduction of substances, waste and energy (hydrocarbons, nutrients, organic materials, waste, noise);
- Ecosystem imbalance by introducing alien species through ballast waters;
- Loss of endangered habitats/species;
- Uncontrolled development of port-related industrial activities (discharges, accidental pollution, tank washing).

Maritime traffic is concentrated in the southern coast and at the mouths of the Danube, the routes being to the main ports of the Black Sea, in particular to Istanbul and the Bosphorus (density of more than 1200 routes / 0.4 kmp / year) and is generally represented by ships type bulkcarrier, tank and container (Figure II.110 and Figure II.111).

Figure II. 110 Port traffic by ship type, 2010-2019, seaports

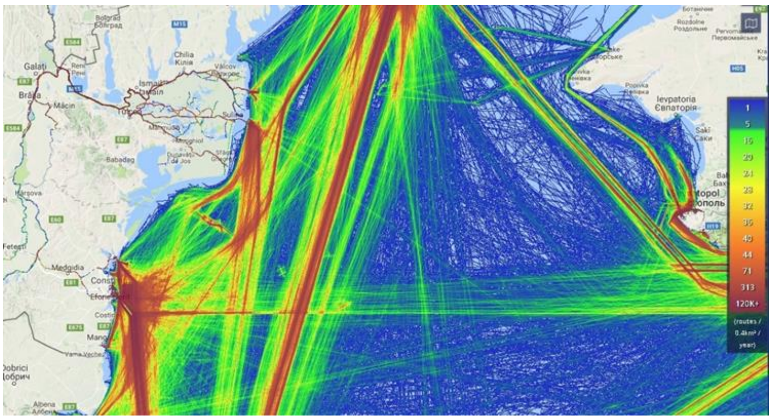
Data Source: Maritime Ports Administration



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Altele	411	341	550	492	681	730	546	491	521	533
Vrachier	419	401	439	533	555	589	607	574	628	622
Tanc	647	632	673	636	719	668	665	608	670	687
Portcontainer	523	577	651	579	578	610	684	592	524	510
Pasager	57	44	52	68	95	37	17	13	11	17
Cargou	3145	2879	2692	2525	2143	1971	1812	1815	1785	1807

Figure II.111 Maritime traffic intensity 2018

Data Source: Marine traffic



DISTRIBUTION OF LAND BY QUALITY CLASSES

The quality of agricultural land is given both by soil fertility and by 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 rating mark (class I - 81-100 points, class V - 1-20 points). The quality classes of the lands give their suitability for agricultural uses.

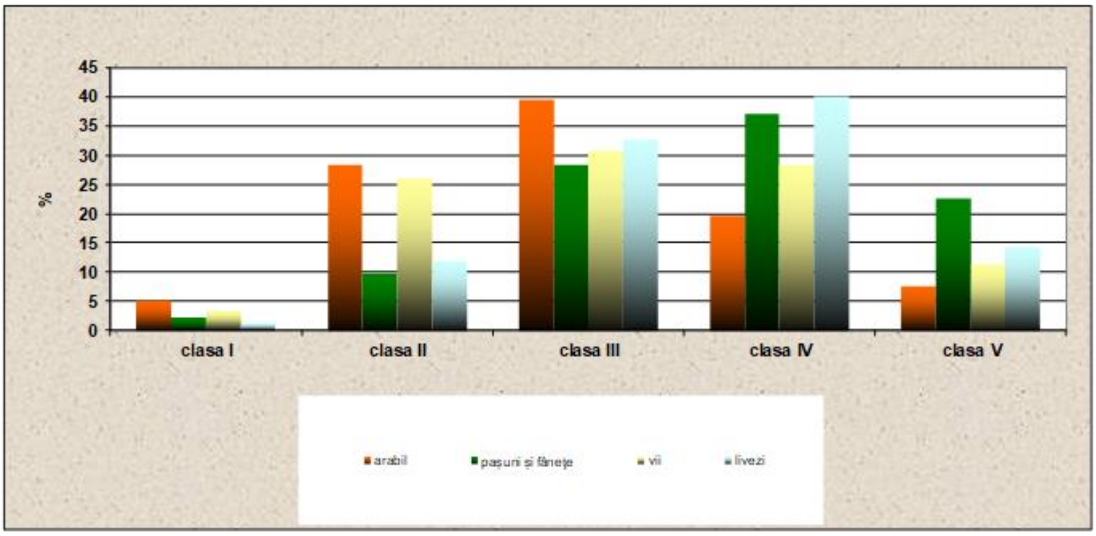
Table III.1 and Figure III.1 show the classification of agricultural land in quality classes according to the average credit rating by country, without the application of pedo-amelioration measures.

Table III.1 Classification of agricultural lands in quality classes according to the credit rating on the country in 2019[1]

Use	Total Carded Area		Of which by quality classes:				
	ha	% of Total Agricultural	Class I ha % of Total Use	Class II ha % of Total Use	Class III ha % of Total Use	Class IV ha % of Total Use	Class V ha % of Total Use
Arable	9311286.86	64.05	483897.05 5.20	2635759.46 28.31	3675143.97 39.47	1821236.06 19.56	695250.32 7.47
Pastures + Hayfields	4732189.34	32.55	102412.19 2.16	462841.89 9.78	1340633.18 28.33	1756803.20 37.12	1069498.88 22.60
Vineyards	251255.2	1,73	9002.39 3.25	65071.89 25.90	77563.85 30.87	71309.73 28.33	28307.34 11.27
Orchards	243738.49	1.68	2933.57 1.20	28807.89 11.82	79686.91 32.69	97590.46 40.04	24719.66 14.24
Total Agricultural	14538469.89(*)	100					

1) Source : I.C.P.A.
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 rating mark by country ***(ha /% of total use)*** **in 2019**



Source: I.C.P.A.

LAND AFFECTED BY VARIOUS LIMITING FACTORS

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

From the inventory carried out by ICPA, in collaboration with 37 OSPA units, but also with other research units, in the period 1994-1998 carried out at the level of 41 counties, on about 12 million ha of agricultural lands, of which on approximately 7.5 million ha of arable land (about 80% of the arable land), the quality of the soil has been affected to a greater or lesser extent by one or more restrictions.

Table III.2 The surface of agricultural lands affected by various limiting factors (restrictions) of productive capacity

Name of the limiting factor (restrictive)	**Affected area[1] thousands ha**	
	Total	**Arable**
Drought	7100	
Periodic excess of soil moisture	3781	
Water erosion of soil	6300	2100
Landslides	702	
Erosion of the soil through the wind	378	273
Excessive skeleton from the surface of the soil	300	52
Soil salinization	614	
of which with high alkalinity	223	135
Secondary compaction of soil due to improper work ("talpa plugului")	6500	6500
Primary compaction of soil	2060	2060
Formation of crust	2300	2300
Small reserve - extremely low humus in the soil	7485	4525
Strong and moderate acidity	3424	1867
Providing low and very low mobile phosphorus	6330	3401
Providing low and very low mobile potassium	787	312
Providing low nitrogen	5110	3061
Mine trace elements (zinc)	1500	1500
Physical-chemical and chemical soil pollution, of which:	900	
- pollution with substances carried by the wind	363	
- soil damage through various excavations	24	
Land cover with waste and solid residues	18	

Source: I.C.P.A. The same surface may be affected by one or more restrictive factors

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

General Process Name	Code	General situation of soils in Romania affected by different processes					
		poor	mode rate	strong	very strong	exces sive	Total
I. Processes of diverse soil pollution caused by industrial and agricultural activities	**1.** Pollution by day - to - day excavation (mining, quarrying, etc.)	2	16	255	519	23640	**24432**
	2. Deposits, waste dumps, tailings ponds, flood tailings, garbage dumps, etc.	247	63	236	320	5773	**6639**
	3. Inorganic wastes and residues (minerals, inorganic materials including metals, salts, acids, bases) from industry (including mining and quarrying)	10	217	207	50	360	**844**
	4. Airborne substances	215737	99494	29436	18030	1615	**364348**
	5. Radioactive matters	-	500	-	-	66	**566**
	6. Organic waste and residues from the light food industries and other industries	13	19	12	17	287	**348**
	7. Wastes, agricultural and forestry residues	37	65	90	642	306	**1140**
	8. Animal manure	2883	993	363	265	469	**4973**
	9. Human manure		689	11		33	**733**
	17. Pesticides	1058	650	224	77	67	**2076**
	18. Contaminants pathogens	-	505	-	-	117	**617**
	19. Saltwater (from oil extraction)	952	497	408	205	592	**2654**
	20. Petroleum products	-	473	248	5	25	**751**
	TOTAL I	**220939**	**104176**	**31490**	**20130**	**33350**	**410121**
II. Soils affected by slope processes and other processes	**10.** Surface erosion, deep, slides	944.763	1.013.854	749420	454150	210729	**3372916**
	15. Primary and / or secondary compaction	543371	544556	251268	125555	88526	**1553276**
	16. Pollution by sediment produced by erosion (clogging)	4088	2389	4808	1178	836	**13299**
	TOTAL II	**1492222**	**1560799**	**1005496**	**580883**	**300091**	**4939491**
III. Natural and / or anthropogenic affected soils	**11.** High salinity soils (salt and / or alkaline)	264163	80639	52488	36867	50678	**484835**
	12. Acidic soils	1766295	1926886	716794	186023	18132	**4614130**
	13. Excess water	640738	1075063	420208	199479	185785	**2521273**
	14. Excess or shortage of nutrients and organic matter	8358147	11604450	7549319	3306533	1373196	**32191645**
	TOTAL III	**11029343**	**14687038**	**8738809**	**3728902**	**1627791**	**39811883**
	Total General	**12742504**	**16352013**	**9775795**	**4329915**	**1961232**	**45161495[2)]**

Source: National Institute for Research and Development for Pedology, Agrochemistry and Environmental Protection (I.C.P.A.) and County Offices for Pedological and Agrochemical Studies (O.J.S.P.A.)

2) The same surface can be affected by several processes

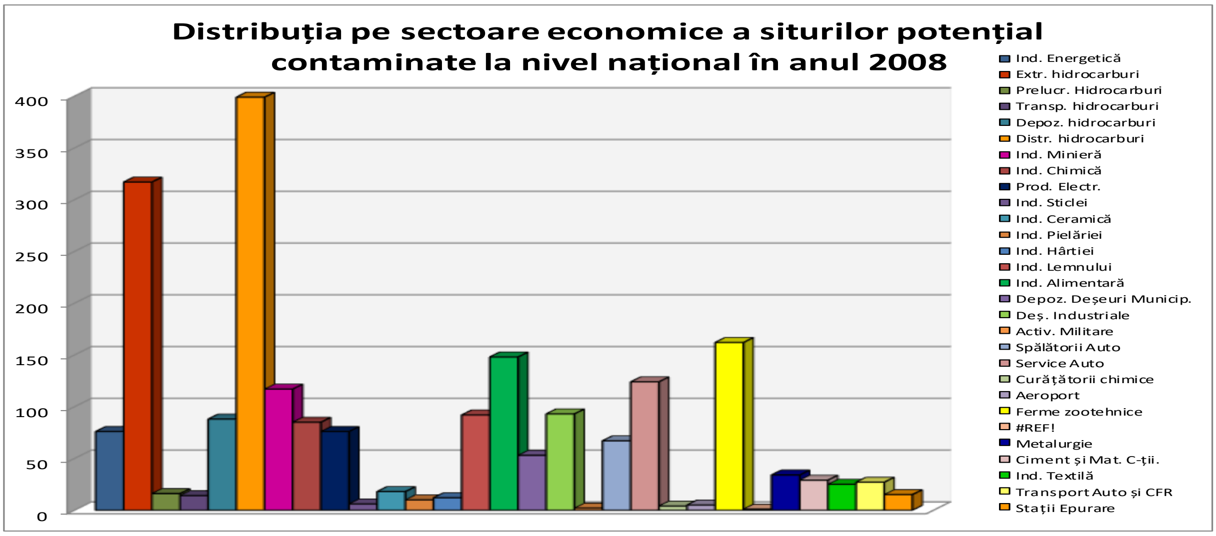
SITES CONTAMINATED BY ANTHROPIC ACTIVITIES

RO 15
Romania indicator code: RO 15 EEA indicator code: CSI 15
TITLE: The progress made in managing 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 contaminants on human health and the environment. A preliminary national inventory of potentially contaminated sites was prepared at the level of 2008 based on the answers to the questionnaires provided for in Annexes 1 and 2 of HG 1408/2007 on the methods of investigating and evaluating soil and subsoil pollution. According to this inventory in Romania, there were 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, electrotechnics and electronics, glass, ceramics, textiles and leather, cellulose and paper, wood, cement, machine building, food, military activities, specific land transport activities, airports , specific agricultural and zootechnical activities) (figure III.2).

Figure III.2 Distribution by economic sectors of the potentially contaminated sites at national level in 2008

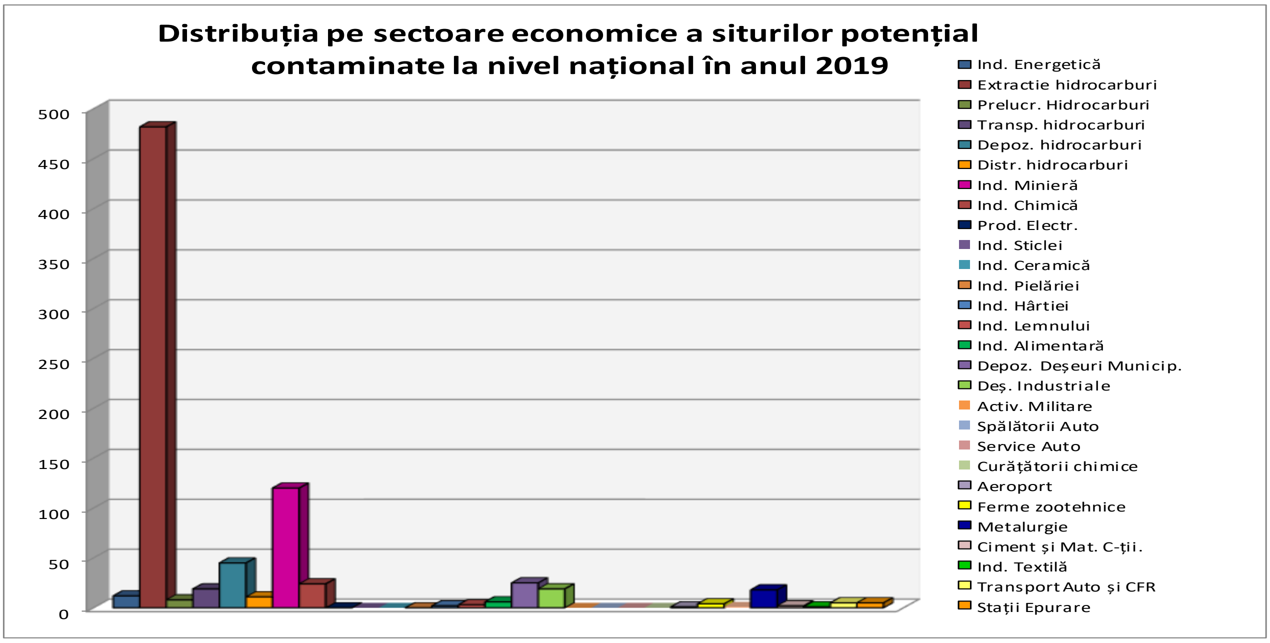


Source: NEPA

In 2015 it was published in the Official Gazette, HG no. 683/2015, approving the National Strategy and the National Plan for the Management of Contaminated Sites in Romania, based on the national inventory updated by the National Agency for Environmental Protection.

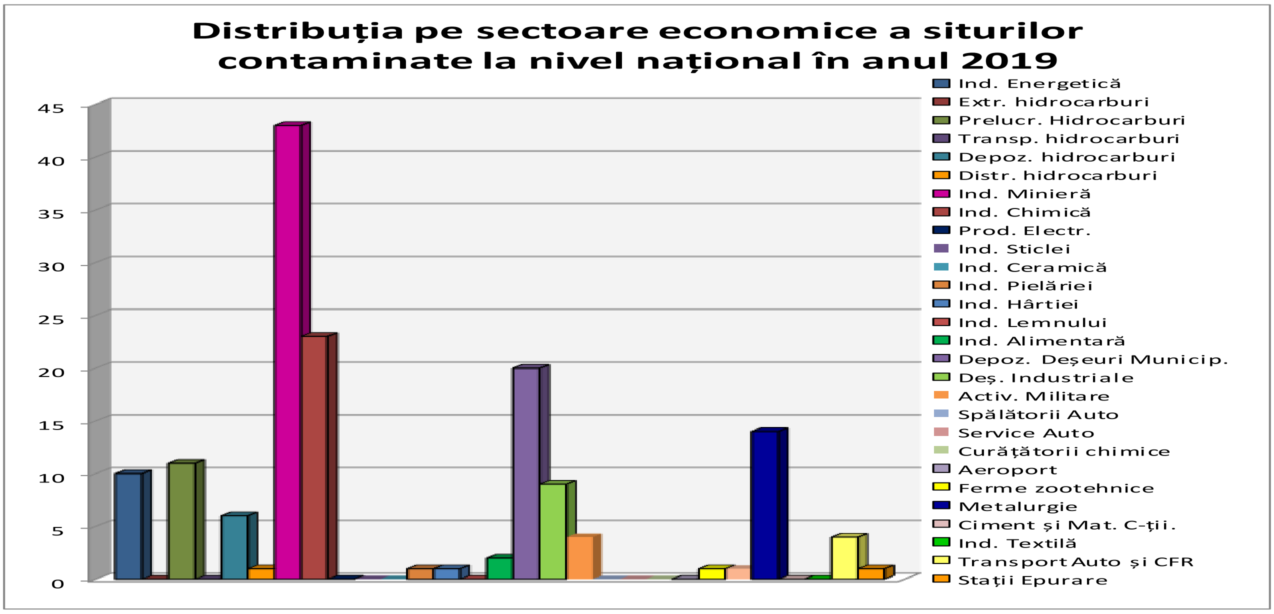
The synthetic situation at the level of 2019 of the sites on which anthropic activities with soil impact have been / are carried out, based on the information communicated by the subordinated and centralized institutions at national level, is graphically represented in figures III.3 and III. 4.

Figure III.3 Distribution by economic sectors of potentially contaminated sites at national level - may 2019



Source: NEPA

Figure III.4 Distribution by economic sectors of the contaminated sites at national level - may 2019



Source: NEPA

National inventory of potentially contaminated and contaminated sites that was the basis of the HG no. 683/2015 is in a continuous numerical dynamic so that the total number of sites, for some fields of activity, is expected to increase as a result of the investigation of the former industrial platforms, of the areas where agricultural activities were carried out, the lands on which they have hazardous waste deposits have been

placed after their closure and post-closure monitoring, transport, etc., and for other areas of activity, by implementing measures to minimize the impact on the environment, so that the number of sites can decrease.
EEA Indicator: CSI 015 – The progress registered in the management of contaminated sites (may 2019). Thus, there is a decrease in the number of contaminated sites, as a result of remediation work in the oil industry, the mining industry and in terms of the sites destined for the storage of household waste in counties such as: Bihor, Caraș Severin, Giurgiu, Ialomița, Maramureș, Suceava, Teleorman, Timiș, Vâlcea, Mureș Mehedinți, Galati, Neamț, Alba.

Accidental pollution

In 2019, 158 environmental incidents were reported throughout the country (figure III.5). For the period 2012-2019, the distribution by main environmental factors of environmental incidents is shown in Table III.4.

Table III.4 Distribution of the main environmental factors of environmental incidents

Environmental factors / Years	2012	2013	2014	2015	2016	2017	2018	2019
Air	115	27	24	34	24	38	44	47
Water	46	53	49	58	53	73	56	53
Water/Soil	3	3	5	10	3	5	11	8
Air/Soil	0	0	0	0	5	4	3	4
Air/Water	0	0	0	0	2	0	0	2
Soil	343	359	345	297	82	73	52	44

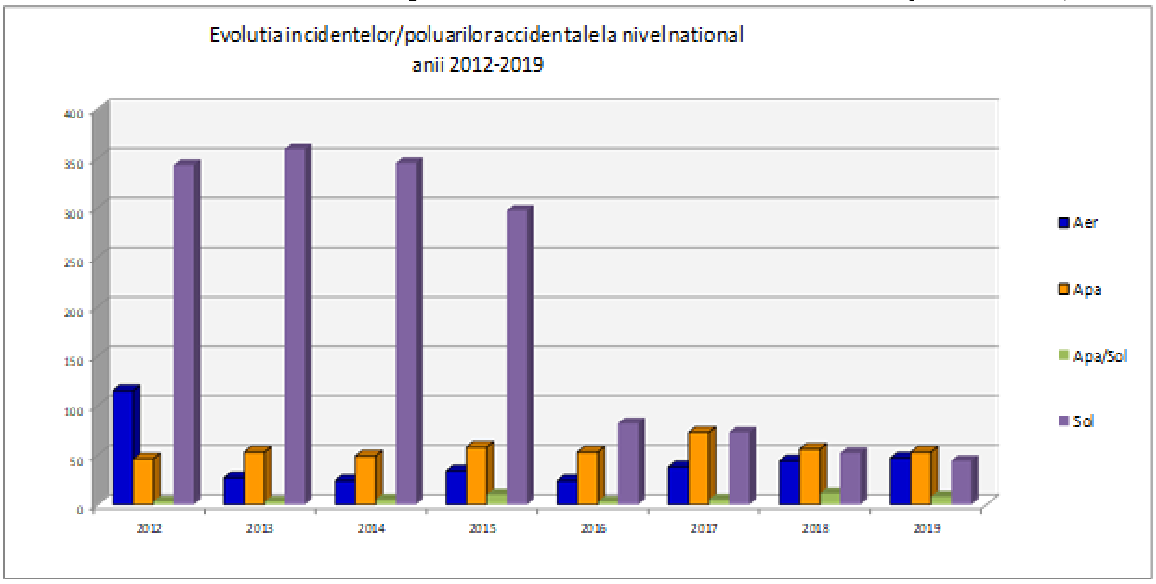
Source: NEPA

There is a decrease of 0.38% of events recorded in 2019 compared to 2018 (166 events). Compared to 2017 (197 events) and 2016 (173 events) and 2015 (396 events), the decrease is 19.8% 8.67% and 60, 10% respectively.
Over 80% of the environmental events recorded nationally in 2019 were caused by:

- 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 storage fires and industrial hall fires.

No major impact on environmental factors or human health was reported for the environmental events recorded in 2019.
The evolution of environmental incidents at national level for 2019 and the period 2014 - May 2019 as well as the evolution of pollution depending on the affected environmental factors is presented in Figure III.5.

Figure III.5 Evolution of incidents / accidental pollution / contamination at national level, years 2012-2019



Source: NEPA

THE USE AND CONSUMPTION OF FERTILIZERS

RO 25

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

TITLE: Gross balance of nutrients

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.

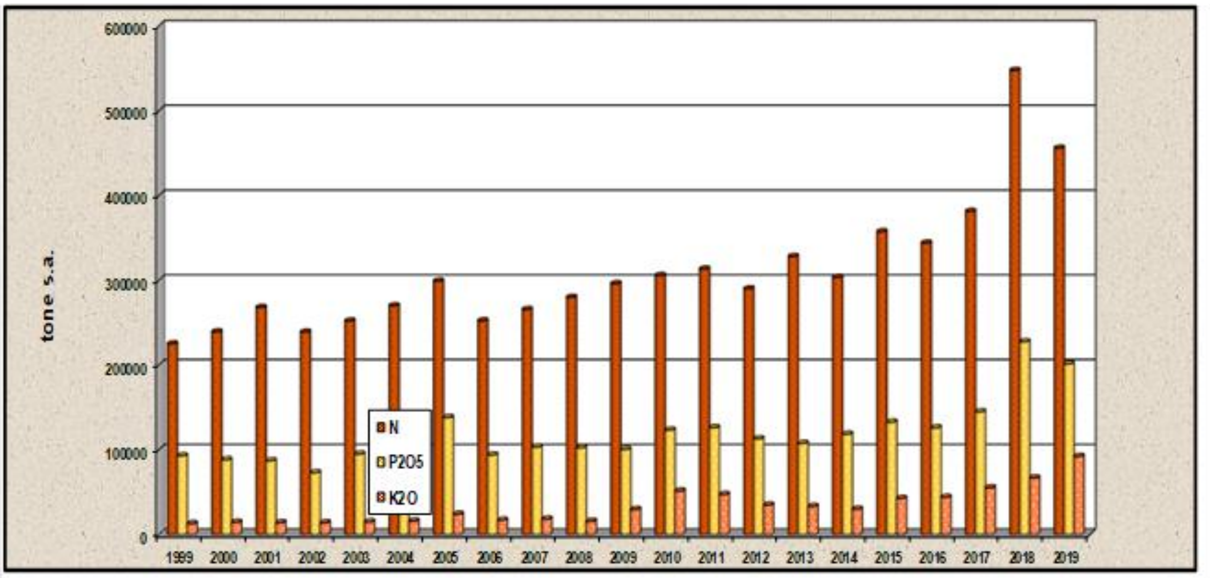
Table III.5 The use of chemical fertilizers in the agriculture of Romania between 1999-2019

Year	Chemical fertilizers used (tonnes of active substance)				$N+P_2O_5+K_2O$ (kg.ha^{-1})		Fertilized surface, ha
	N	P_2O_5	K_2O	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

Source : INS, MADR

Figure III.6 The use of chemical fertilizers in the agriculture of Romania between 1999-2019



Source: INS, MADR

The quantity of natural fertilisers (Table III.6) applied in 2019 compared to that used in 1999 is less than approx. 8 % and the area on which natural fertilisers were applied increased slightly compared to 1999 and 2018, and the average quantity applied in 2019 was 18.8 t/ha.

In 2019, only 8.69% of the cultivated area was fertilized with natural fertilizers, which, corroborated with mineral fertilization data, indicates that it is necessary to balance the nutritional balance of these lands to achieve safe and stable harvests.

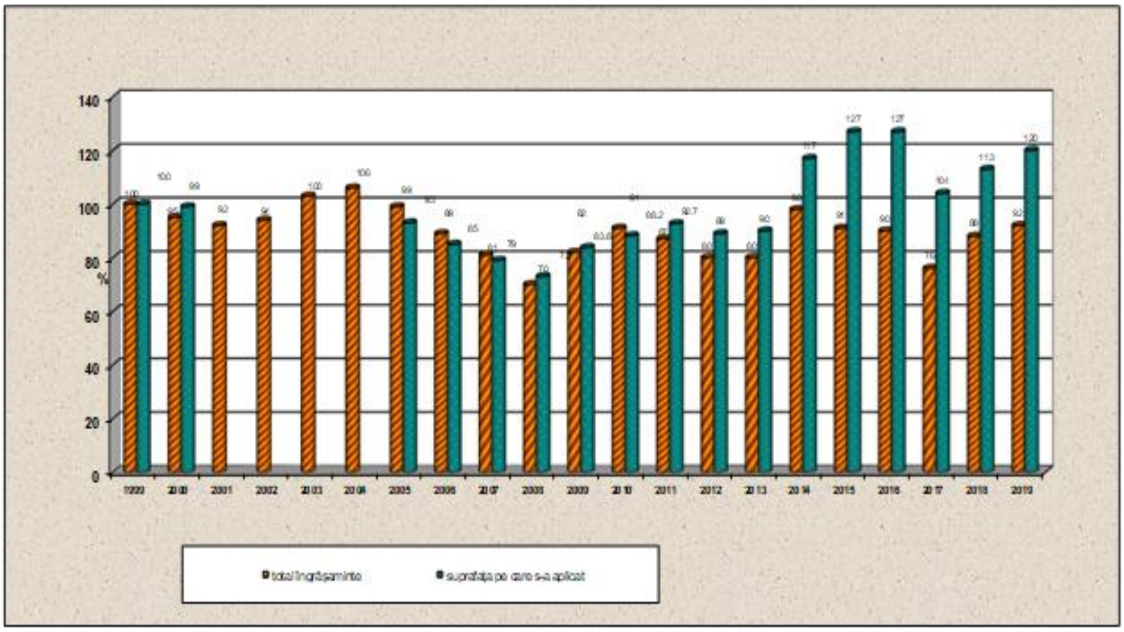
Table III.6 The quantity of natural fertilizers applied in the period 1999-2019[1]

Year	Total fertilizers		The surface on which it was applied		The share of the application area compared to the cultivable area	Medium quiatity on ha			
						to the applied surface		to 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	1.00	88
2019	15.323.344	92	816.713	120	8.69	18.8	76.6	1.05	93

Source: INS, MADR

Figure III.7 The quantity of natural fertilizers applied in the period 1999-2019



Source: INS, MADR

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 H.G. no. 135 of 12.03.2019, aims at protecting human health and the environment through objectives, measures and timetables.

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 during the period 2000-2019

Specification	2000	2005	2010	2011	2012	2013	2014	2015	2017	2018	2019
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***
Pesticide consumption											
Total (t. s.a.), 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*
- insecticides	1.343,05	9689147	2.061,336	993324	827801	822953	635076	716.308	1.001.430	613616	582.794

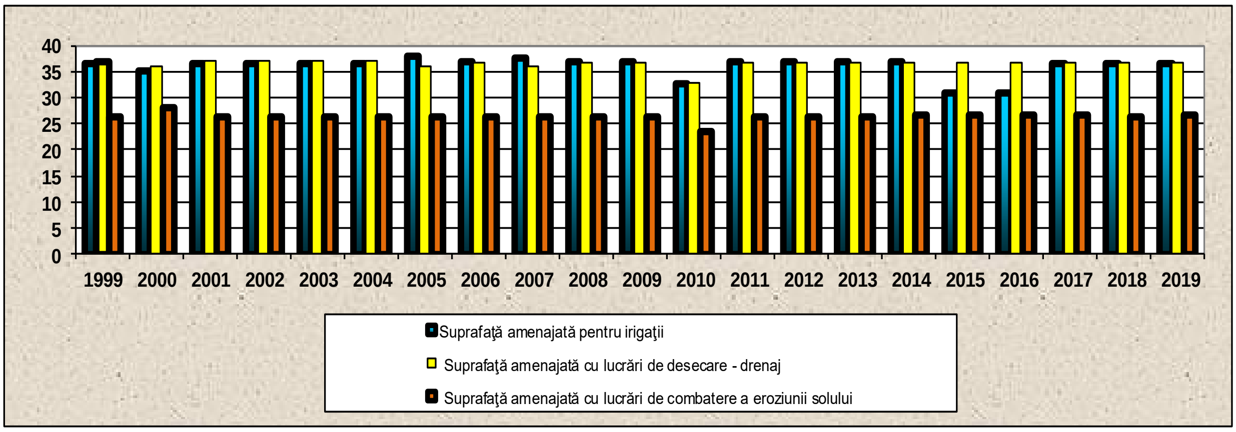
- fungicides	3.959,16	3.304,7896	2.066.323	1.989.229	1905005	1987348	2293286	2.246.188	2.282.330	1.860,468	1.711.491
- herbicides	3.039,43	2.513,254	3.418.235	3.600.382	3633268	3756077	3795431	3.645.541	3.575.547	2.563,425	3.052.255
Growth regulators	-	0,357	-	-	-	-	-	-	-	-	-
Various products	-	3128	-	-	-	-	-	-	-	-	-
Designated for 1 ha of arable land											
Total (kg s.a.)	0,89	0,72	0,80	0,70	0,68	0,865	0.72	0.7	0.73	0,54	0.567
- insecticides	0,14	0,10	0,22	0,11	0,09	0,108	0.07	0.076	0,106	0,069	0.062
- fungicides	0,42	0,35	0,22	0,21	0,20	0,262	0.244	0.239	0,243	0,198	0.182
- herbicides	0,33	0,27	0,36	0,38	0,39	0,495	0.404	0.388	0,381	0,273	0.323

**** research conducted by MADR*
Source: MADR, INS

EVOLUTION OF LAND IMPROVEMENT SURFACES

Climate change in recent years in Romania, reflected by changes in temperature and rainfall, affects a significant part of the country's agricultural area, especially in 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 heavy rainfall episodes, 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 lands (%) during the period 1999-2019



Source: INS, ANIF

SURFACE AREA FOR ECOLOGICAL AGRICULTURE

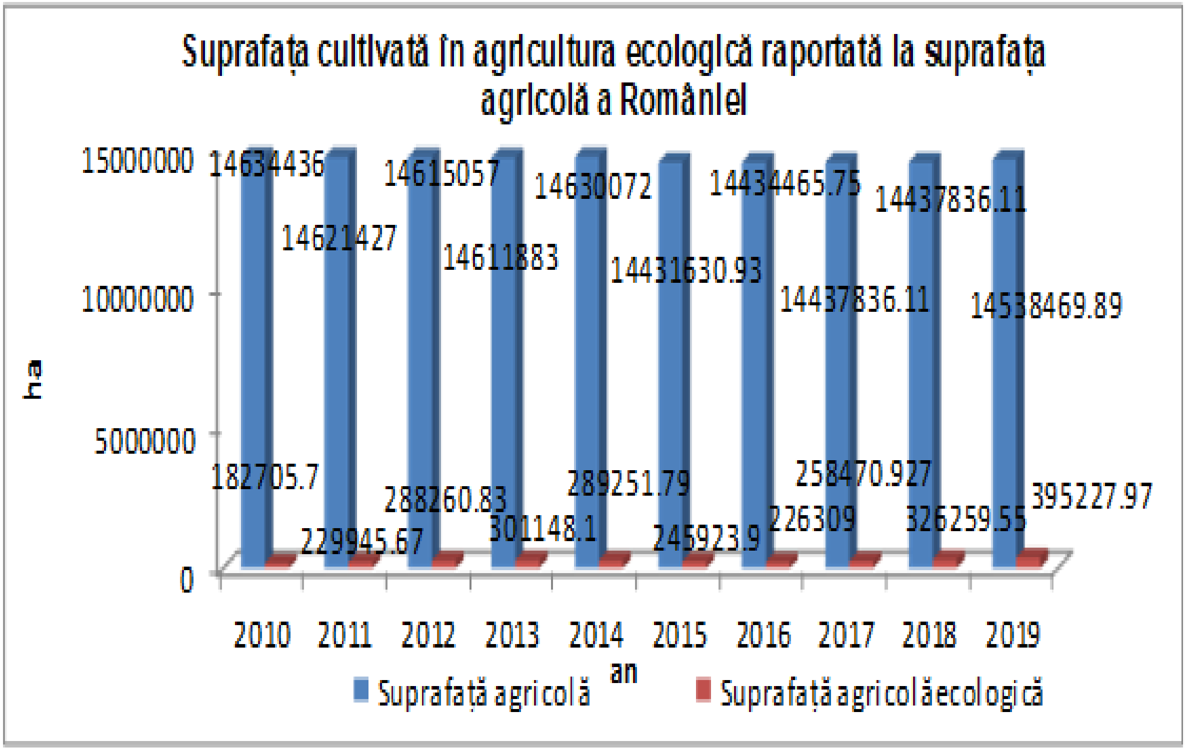
RO 26
Romania indicator code: RO 26 EEA indicator code: CSI 26
TITLE: Surface area for ecological agriculture
DEFINITION: The indicator quantifies the share of the area earmarked for organic farming (the sum of the current areas of organic farming and the areas undergoing conversion) as a proportion 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 improving the environment, by conserving soil, improving water quality, 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.

The Ministry of Agriculture and Rural Development (MADR) 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 area cultivated in organic farming related to the agricultural area of Romania



Source: MADR

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 area of arable land occupies 65.2% of the total agricultural area, 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.

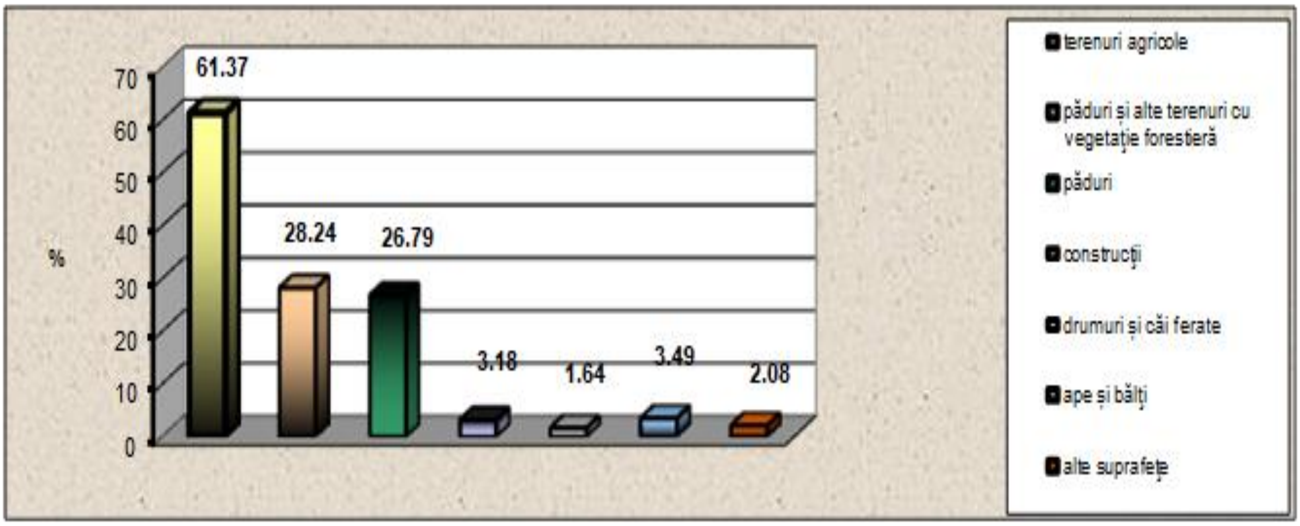
As a result of the increase of the demographic index, in the last 65 years the arable area per inhabitant has decreased from 0.707 ha in 1930 to 0.511 ha in 2014, practically the resources within this use being exhausted.

Table IV.1 The distribution of the land fund by categories of use in 20141)

Category of use	Area	
	thousands ha	%
Farmland	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**

1According 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).
2Unproductive land

Figure IV.1 The distribution of the land fund by categories of use in 2014



Source : Statistical Yearbook of Romania, year 2016

Table IV.2 Distribution of agricultural land by type of use in 2014

Category of use	Area	
	thousands ha	%
Total agricultural	**14.630,1**	**100**
Arable	9395.3	65.2
Pastures	3272.2	20.8
Haystacks	1556.3	11.1
Vineyards	209,4	1.5
Orchards	196.9	1.40
Of which private property	13699.7	93.64

1According 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).

Source : Statistical Yearbook of Romania, year 2016

THE IMPACT OF LAND USE CHANGE ON AGRICULTURAL LAND

Table IV.3 Distribution of the land fund by categories of use between 2010 and 2014

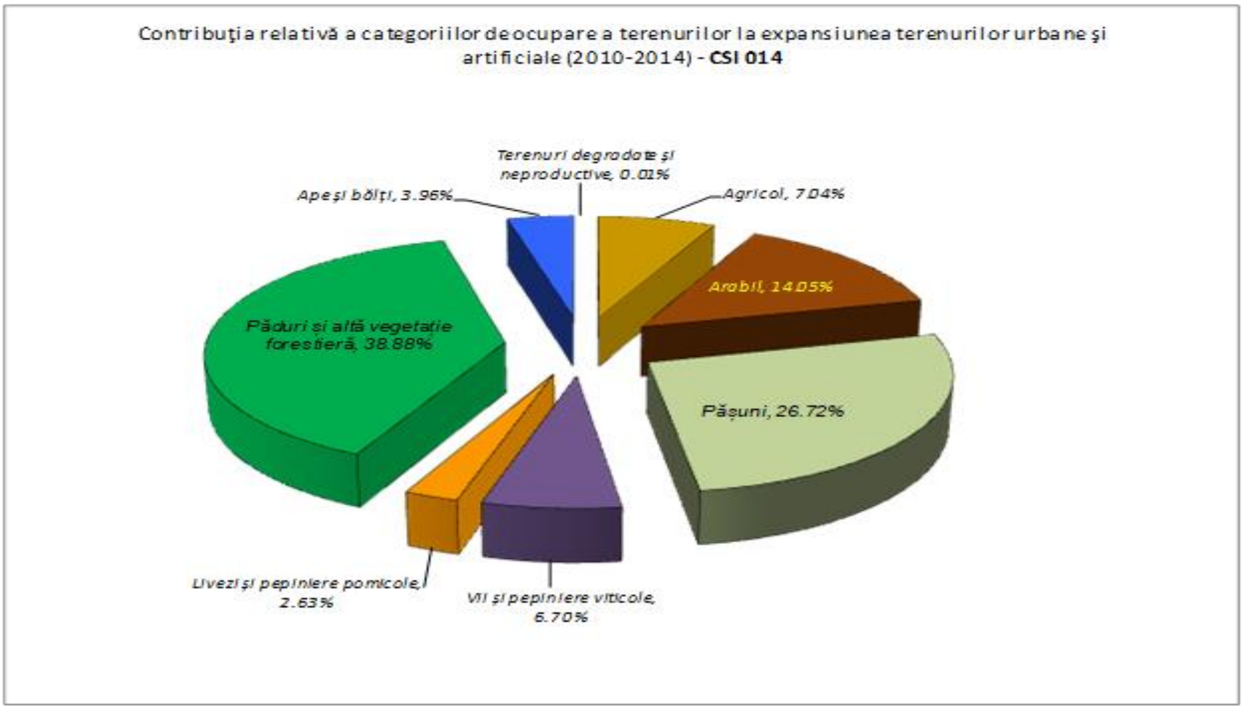
Use of land fund	Hectars per years				
	2010	2011	2012	2013	2014
Agricultural	14634436	14621427	14615057	14611883	14630072
Arable	9404008	9379489	9392262	9389254	9395303
Pastures	3288725	3279251	3270610	3273961	3272165
Haystacks	1529561	1554680	1544957	1541854	1556246
Wine vineyards and vineyard nurseries	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
Covered with water, puddles	833949	822202	836856	835997	831495
Covered with construction	728261	749386	752361	758303	758285
Communication routes and railways	388903	388194	388262	389895	389795
Degraded and unproductive land	495425	498722	499629	500937	495421

Source : INS , Baza de date TEMPO-Online

From the data processing, figure IV.3, there is an increase in pressure on the areas occupied by forests and pastures, due to the expansion of urban to the detriment of extra-urban which led to deforestation and reduction of hayfields adjacent to expanding localities as area. Also, the areas occupied by forests have been reduced by massive felling, over the capacity to restore forests.

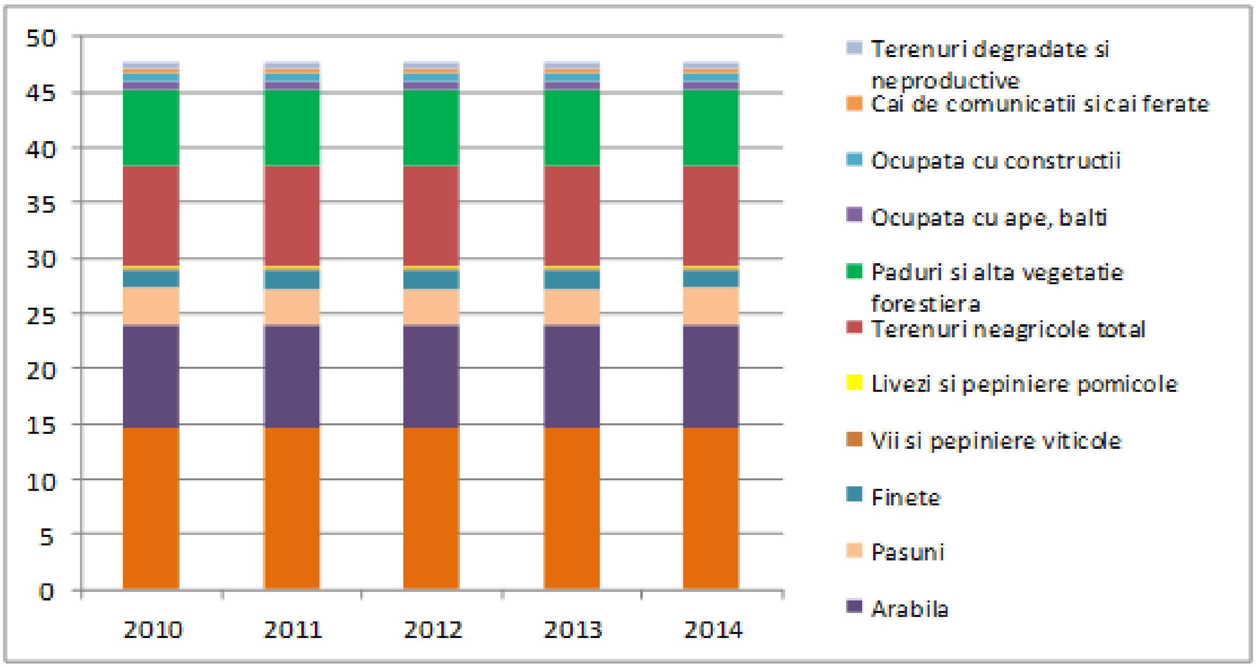
With regard to arable land, the pressure on it has increased as a result of the migration of labor from the agricultural sector to other Community countries but also due to the degradation and lack of investment in the irrigation system. In the vineyards and nurseries sector, the pressure has been exerted by the aging of vines and their non-replacement with young cultures.

Figure IV.3 The relative contribution of land use categories to the expansion of urban and artificial lands (2010-2014) - CIS 014



Source: INS, TEMPO-Online database

Figure IV.4 Distribution of land by categories of use in the interval 2010 – 2014



Source: INS, TEMPO-Online database

THE IMPACT OF LAND USE CHANGE ON HABITATS

RO 44
Indicator code Romania: 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, relying on land cover maps made by interpreting satellite images. The indicator is intended to address the issue of integrity of ecosystems by providing a "measure" of land disintegration across the whole of Romania.

Changing land use may cause habitat fragmentation and may affect the distribution of species that occupy a particular area.
Conversion of land to urban expansion, transport infrastructure development, industrial, agricultural and tourism development is the main cause of the fragmentation of natural and semi-natural habitats. At present, it is estimated that about 6.5% of the country's surface is intended for housing construction. Chaotic building, without respecting a coherent and consistent urbanism strategy, leads to the unusual use of areas for construction and their expansion to the detriment of natural ones.
Uncontrolled urban development and the transfer of rural population accompanied by the destruction of urban ecosystems (green areas, green spaces, tree felling, nesting, etc.) and insufficient measures for the proper collection and treatment of waste and water waste have a significant negative impact on biodiversity.

CHANGE OF POPULATION DENSITY

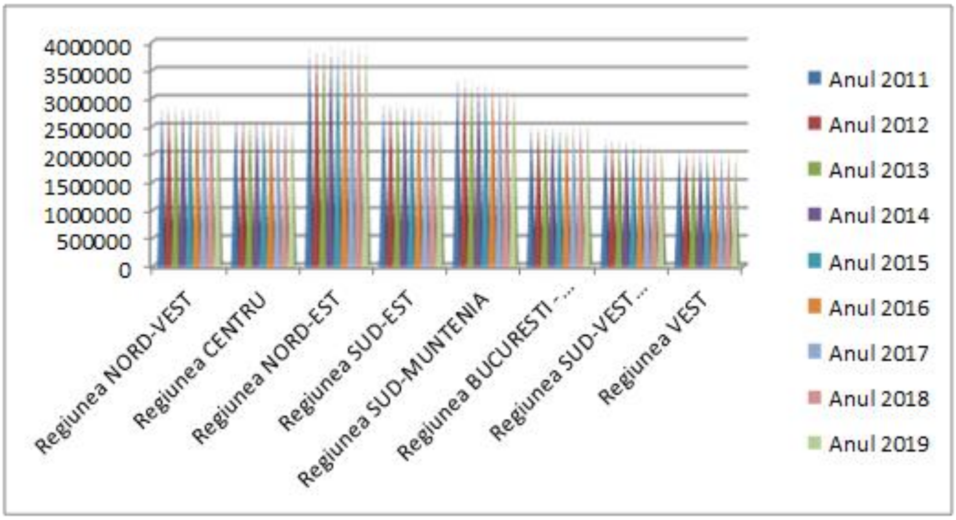
Table IV.4 Numerical distribution of the total population by development regions during the period 2011 – 2019

National population by development regions	2011	2012	2013	2014	2015	2016	2017	2018	2019
NORTH-WEST region	2850614	2847763	2844387	2841110	2838651	2836241	2836219	2835510	2833789
CENTER region	2648936	2646270	2643673	2641067	2638707	2636047	2634748	2633402	2631033
NORTH-EAST region	3883093	3879911	3885934	3899889	3918985	3929282	3939938	3958248	3979271
SOUTH-EAST region	2931355	2921160	2912373	2900677	2887747	2873851	2859897	2844235	2828048
SOUTH-MUNTENIA region	3353951	3337516	3320102	3300634	3282123	3262847	3242876	3219020	3194237
BUCHAREST - ILFOV region	2491806	2498698	2500564	2498984	2487485	2498318	2510877	2536859	2571442
SOUTH-WEST OLTENIA region	2277990	2264978	2251542	2237651	2223112	2207918	2194235	2179006	2163319

WEST region	2042854	2037445	2032403	2026166	2021443	2016294	2012053	2007273	2003368

Source: INS, TEMPO-Online database

Figure IV.5 Numerical distribution of the total population by development regions during the period 2011 - 2019



Source: INS, 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 live longer and more and more people live alone, creating a greater demand for housing.

Land occupancy

RO 14
Indicator code Romania: RO 14 EEA indicator code: CSI 14
TITLE: LAND OCCUPANCY
DEFINITION: The indicator shows the quantitative change in the occupation of agricultural, woodland, semi-natural and natural land by the expansion of urban and artificial land. Includes waterproofed construction and urban infrastructure areas as well as urban green spaces, sports and recreation complexes.

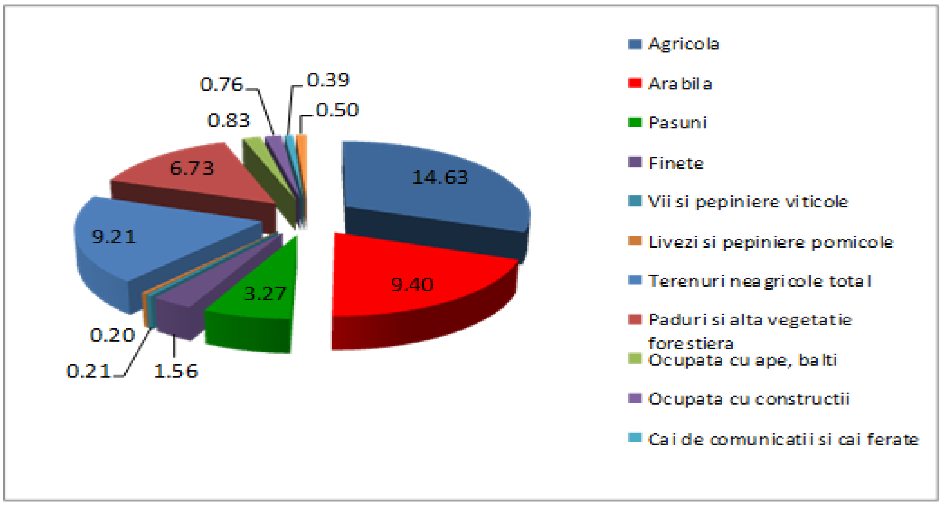
Table IV.5 Distribution of land in 2014 by categories of use

The surface of the land fund according to the mode of use	Hectares
Agricultural	14630072
Arable	9395303
Pastures	3272165
Haystacks	1556246
Wine vineyards and tree nurseries	209417

Orchards and nurseries	196941
Non-agricultural land, total	9208999
Forests and other forest vegetation	6734003
Covered with water, puddles	831495
Covered with construction	758285
Communications and railways	389795
Degraded and unproductive land	495421

Source: INS, TEMPO-Online database http://statistici.insse.ro/shop/index.jsp?page=tempo3&lang=ro&ind=AGR101A

Figure IV.6 Distribution of the land fund in 2014 by categories of use (data expressed in the graph in mil. Ha)



Source: INS

Land use through transport infrastructure

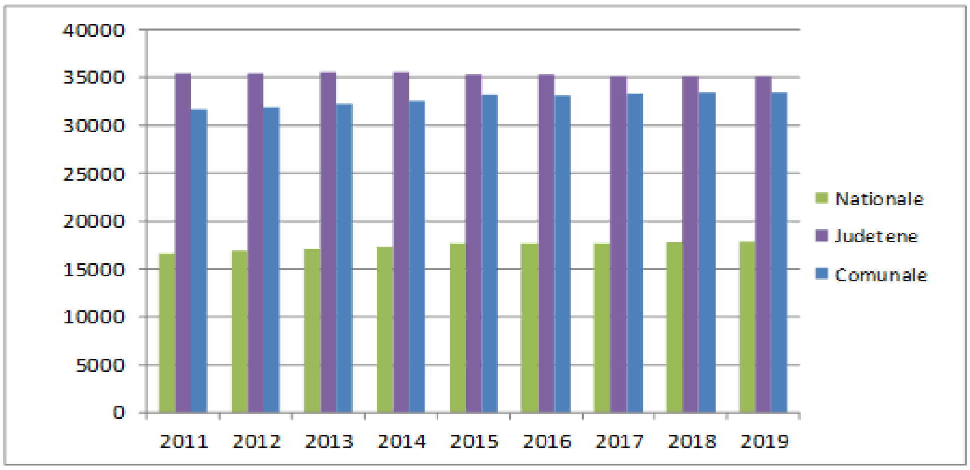
RO 68
Indicator code Romania: RO 68 EEA indicator code: TERM 08
TITLE: OCCUPANCY OF THE LAND BY TRANSPORT INFRASTRUCTURE
DEFINITION: The indicator shows the land occupied by the transport infrastructure.

Table IV.6 Road transport infrastructure in Romania between 2011 – 2019

Road categories	Length of kilometers per year								
	2011	2012	2013	2014	2015	2016	2017	2018	2019
National	16690	16887	17110	17272	17606	17612	17654	17740	17873
County	35374	35380	35587	35505	35316	35361	35149	35085	35083
Communal	31674	31918	32190	32585	33158	33107	33296	33409	33435

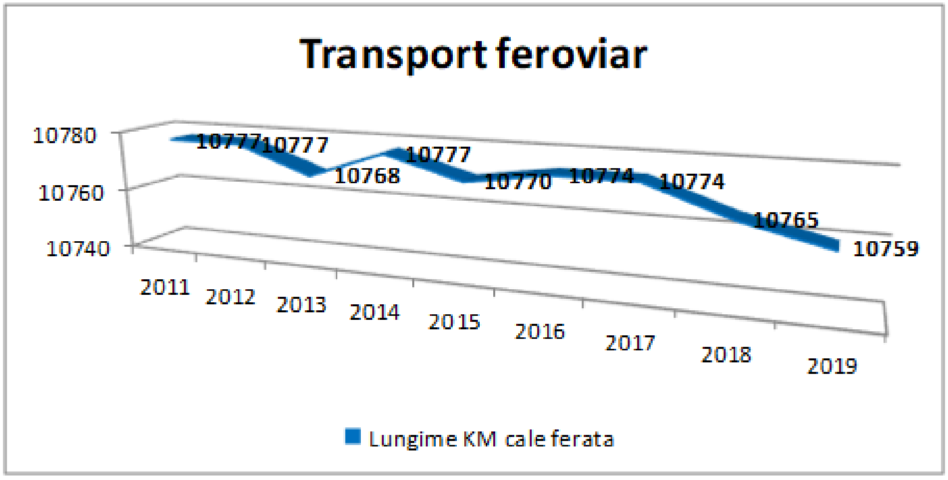
Source: INS, TEMPO-Online database

Figure IV.7 Road transport infrastructure in Romania between 2011 – 2019



Source: INS, TEMPO-Online database

Figure IV.8 Railway transport infrastructure in Romania between 2011 – 2019



Source : INS, TEMPO-Online database

TRENDS ON THE CONSERVATION OF ECOSYSTEMS AND HABITATS

RO 40
Indicator code Romania: 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 the habitats of European interest.

The indicator shows the evolution of the conservation status of European interest habitats (listed in Annex I of the Habitats Directive) and is based on the data collected / monitored in accordance with the reporting obligations under Article 17 of the Habitats Directive. The conservation status of species and habitats of community interest is assessed nationally and biogeographically, on a 3-tier scale, known as the "traffic light", as follows:

- **Favorable conservation status: green indicator** - any pressure or threat that influences the habitat is not significant and the habitat is viable in the long run;
- **Inappropriate unfavorable conservation status: orange indicator** - used for situations where a change in existing administration or policy is required, but the danger of disappearance is not so great;
- **Totally inadequate unfavorable conservation status: red indicator** - serious threats and pressures affecting habitat maintenance.

The "unfavorable" category was divided into two classes to allow reporting of further improvement or deterioration:

- U1 - Unfavorably inadequate
- U2 - Unfavorably bad.

For the definition of this indicator at national level, relevant are the data and information reported by Romania in the country report, in accordance with Article 17 of the Habitats Directive. 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* ".
The above-mentioned project is co-financed from the Cohesion Fund through the Large Infrastructure Operational Program 2014-2020 and falls into the categories of activities related to Priority Axis 4 - Environmental protection through biodiversity conservation measures, air quality monitoring and decontamination of historically polluted sites - Specific Objective (SO) 4.1 "*Increasing the protection and conservation of biodiversity through appropriate management measures and restoring degraded ecosystems*", namely the implementation of a Type C action - Actions to complement the level of knowledge of biodiversity and ecosystems (monitoring and assessment of species and habitats, knowledge of the pressure factors exerted on biodiversity)

The location area of the above-mentioned project covers the entire national territory, both inside and outside the protected natural areas.

This report presents the results of monitoring 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. The project was implemented in partnership with the Ministry of Environment, Waters and Forests - Biodiversity

Department and funded by the Sectoral Operational Program - Environment (SOP-Environment), priority axis 4.

In the process of assessing habitats of Community interest throughout the national territory, both inside and outside protected natural areas, according to Article 17 of the Habitats Directive, the following major habitat classes have been identified:

- coastal habitats with halophilic vegetation;
- coastal sand dunes and continental dunes;
- freshwater habitats;
- meadows and bushes in the temperate zone;
- natural and semi-natural grass formations;
- swamps and peat bogs;
- rocky habitats and caves;
- forests.

The number of habitats in Annex I of the Habitats Directive by biogeographic regions for which reports have been sent to the Commission, according to Article 17 is presented in the table below:

Table V.1. Number of habitats reported in accordance with Annex I of the Habitats Directive

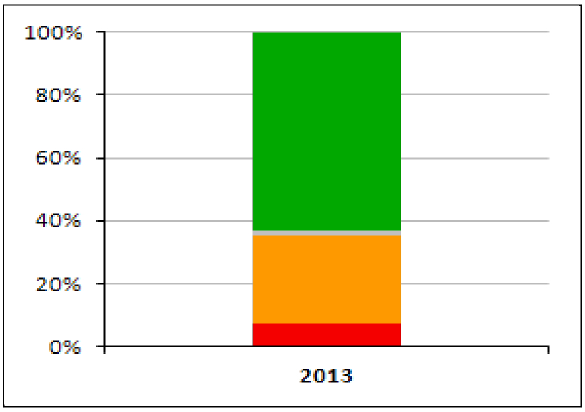
Bioregion	HABITATS	
	Annex I	
	Non-priority	Priority
Number of habitats in Romania	60	25
	85	
Alpine (ALP)	37	11
Black Sea Pontic (BLS)	18	3
Continental (CON)	34	17
Pannonian (PAN)	11	5
Stepic (STE)	18	6
Black Sea (MBLS)	6	

Source: ibis.anpm.ro and National Summary for Article 17 Romania – 2007-2012 by EC

For the RO40 indicator, the following charts regarding the conservation status of habitats at global level, by biogeographic regions or by habitat classes are relevant.

The overall assessment of the habitats of community interest in Romania is represented as a percentage in Figure V.1.

Figure V.1. Overall assessment of the conservation status of habitats



Source: ibis.anpm.ro and National Summary for Article 17 Romania – 2007-2012 by EC

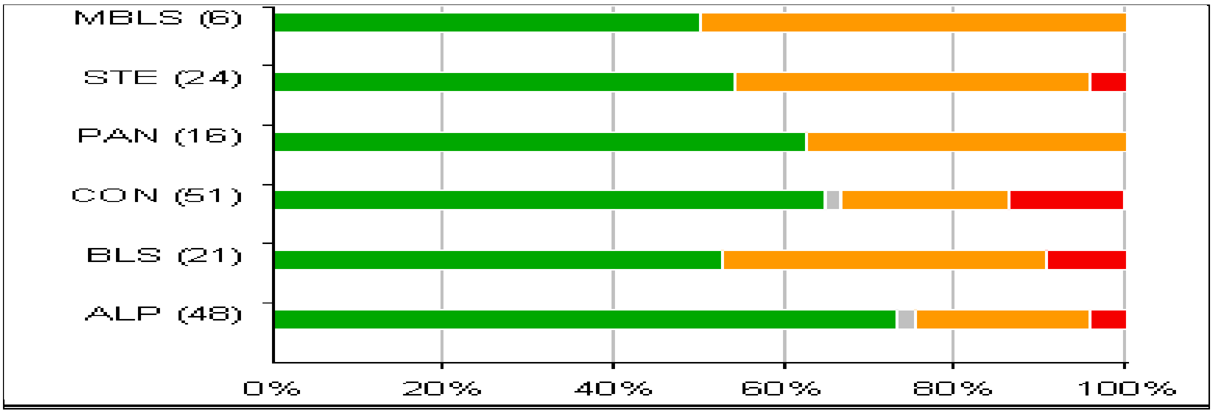
FV - Favorable
NA - Unreported
XX - Unknown

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 conservation status and about 7% of them were evaluated with "total unfavorable status".

The distribution by biogeographic regions of the conservation status of habitats of European interest in Romania is shown in Figure V.2.

Figure V.2. Conservation status of habitats of European interest in Romania by biogeographic regions, reporting period 2007-2012 (%)

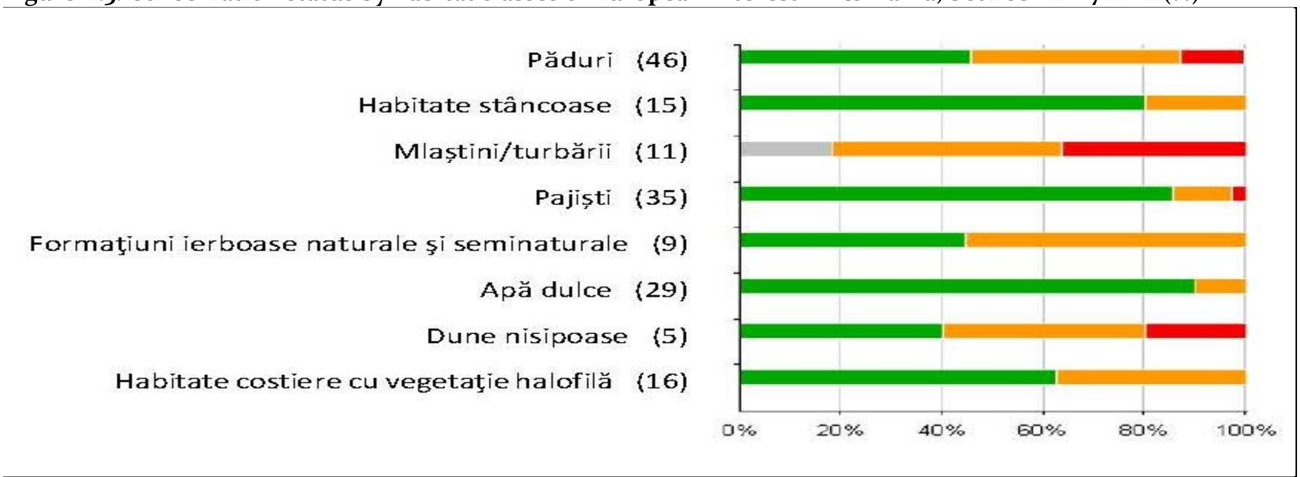


Source: ibis.anpm.ro and National Summary for Article 17 Romania – 2007-2012 EC

Note: *The number in each bracket corresponds to the number of assessments at each biogeographic region for the 2007-2012 reporting period.*

According to the data reported to the Commission, it is observed that in the alpine region most habitats are found whose conservation status is favorable, region followed by the biogeographic regions: continental, panonic, steppe and pontic.

Figure V.3. Conservation status by habitat classes of European interest in Romania, between 2007-2012 (%)



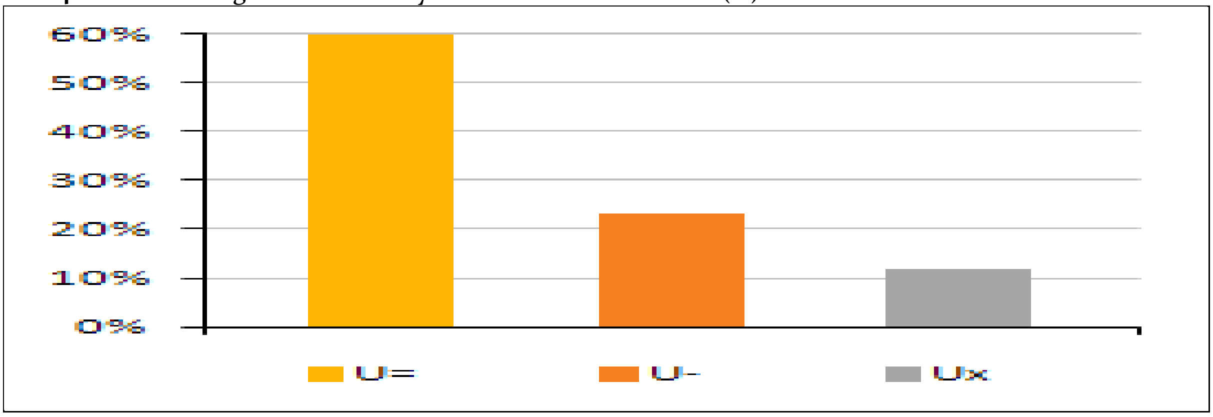
Source: ibis.anpm.ro and National Summary for Article 17 Romania – 2007-2012 by EC

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.

The improvement / deterioration trends for habitats with a poor conservation status (U1 and U2) are shown as a percentage in Figure V.4.

Figura V.4. Habitat - the general tendency of the conservation state (%)



Source: ibis.anpm.ro and National Summary for Article 17 Romania – 2007-2012 by EC

Source: ibis.anpm.ro şi National Summary for Article 17 Romania – 2007-2012 by EC

Note:
((U +) = unfavorable (inadequate or bad) with an improvement trend
(U=) = unfavorably stable
(U-) = unfavorable with a tendency to worsen
(Ux) = unfavorable with unknown tendency

TRENDS IN THE SITUATION OF PRIORITY SPECIES

RO 07
Indicator code Romania: 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 through monitoring obligations in accordance with Art. 11 of the Habitats Directive (92/43 / EEC).

Due to its geographical position, Romania has and contributes to Europe with a rich and unique biodiversity, in terms of wild flora and fauna species. In accordance with the provisions of the Habitats Directive, Romania has the obligation to ensure the conservation and restoration of wild flora and fauna species of Community interest, in a favorable state of conservation, in order to contribute to the maintenance of biodiversity.
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.

According to the Habitats Directive, "***priority species are species of Community interest which are endangered, except those whose natural range is marginal in the territory and which are neither endangered nor vulnerable in the Western Pale-arctic region and for the conservation of which the Community has a particular responsibility***".
The indicator 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 at national and biogeographical level and reported on a 3-level scale, coded differently by color, as mentioned for the RO40 indicator in section V.1.1.
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 monitoring carried out in 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 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* ", which aims at monitoring the species in the annexes of the Habitats Directive throughout the national territory, both inside and outside protected natural areas.
The project falls into the categories of activities related to Priority Axis 4 - Environmental protection through biodiversity conservation measures, air quality monitoring and decontamination of historically polluted sites - Specific Objective (SO) 4.1 "*Increasing the degree of protection and conservation of biodiversity through management measures and the restoration of degraded ecosystems*", namely the implementation of a Type C action - Actions to complement the level of knowledge of biodiversity and ecosystems (monitoring and assessment of species and habitats, knowledge of pressure factors on biodiversity.).

The location area of the above-mentioned project covers the entire national territory, both inside and outside the 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.

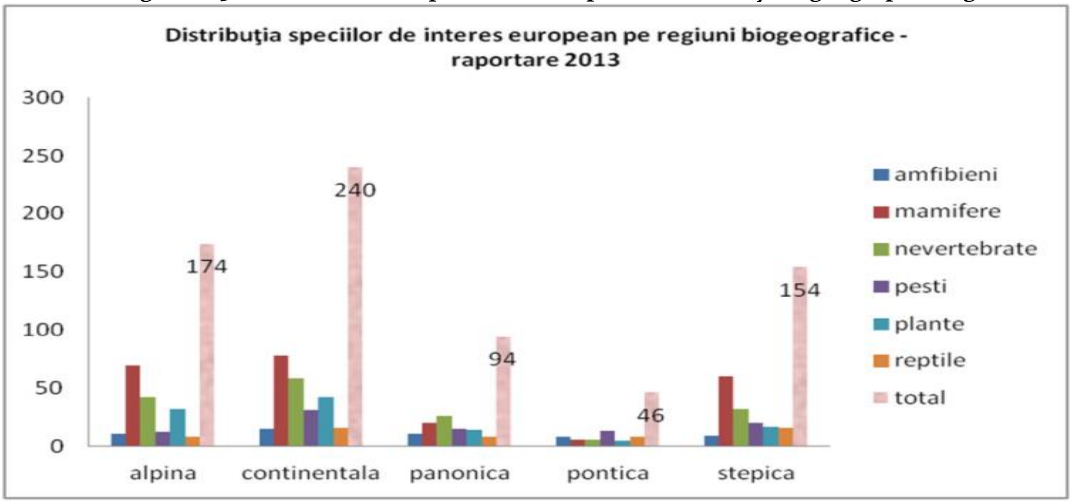
The number of species in each Annex of the Habitats Directive by biogeographic regions for which reports have been submitted to the Commission, in accordance with Article 17 of the Habitats Directive, is presented in the table below:

Table V.2. Number of species in the annexes of the Habitats Directive

Bioregion	SPECIES					
	Annex II		Annex IV		Annex V	
	Non-priority	Priority	Including those from Annex II	Without those from Annex II	Including those from Annex II	Without those from Annex II
Number of species in Romania	147	15	174	50	35	26
	162		174		35	
Alpine (ALP)	74	7	94	33	20	18
Black Sea Pontic (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.ro and National Summary for Article 17 Romania – 2007-2012 by EC

Figure V.5. Distribution of species of European interest by biogeographic regions

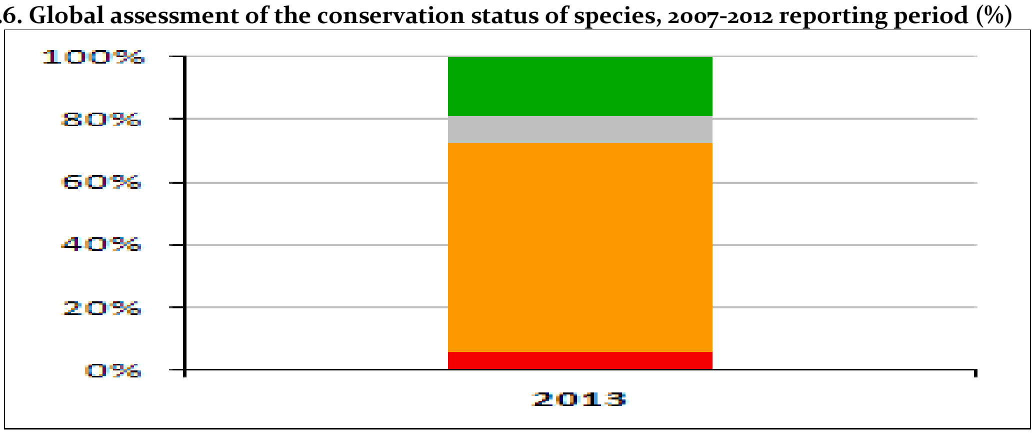


Source: ibis.anpm.ro şi National Summary for Article 17 Romania – 2007-2012 by EC

As can be seen, the biogeographic regions with the greatest richness of species of European interest are: continental, alpine and steppe.

At national level, the overall evaluation of the species of community interest is presented as a percentage in the graph below:

Figure V.6. Global assessment of the conservation status of species, 2007-2012 reporting period (%)

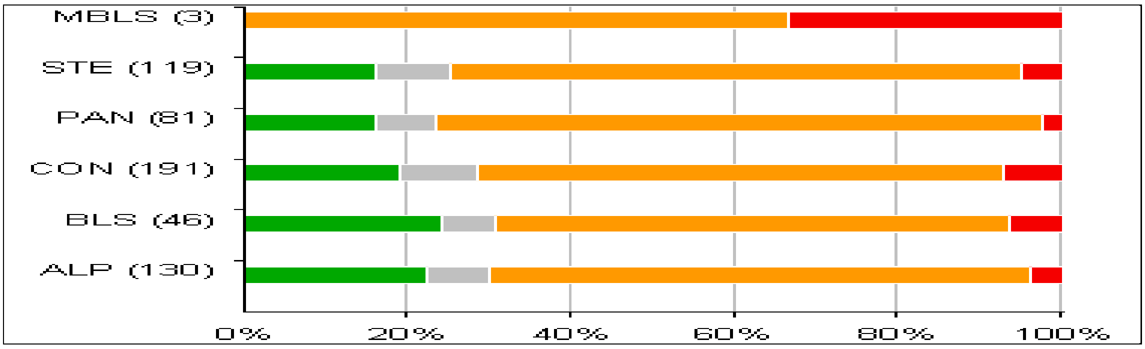


Source: ibis.anpm.ro and National Summary for Article 17 Romania – 2007-2012 by EC

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 of the evaluated species have an unfavorable conservation status, while 5% have a total unfavorable status. Thus, with a global value of 72% unfavorable conservation status for species of community interest, Romania is well above the European average (54% in EU-25 - SOER 2010). 18% of the evaluated species have a favorable status (compared to 17% of the EU average), and the percentage of non-evaluated species in Romania is lower compared to the EU average.

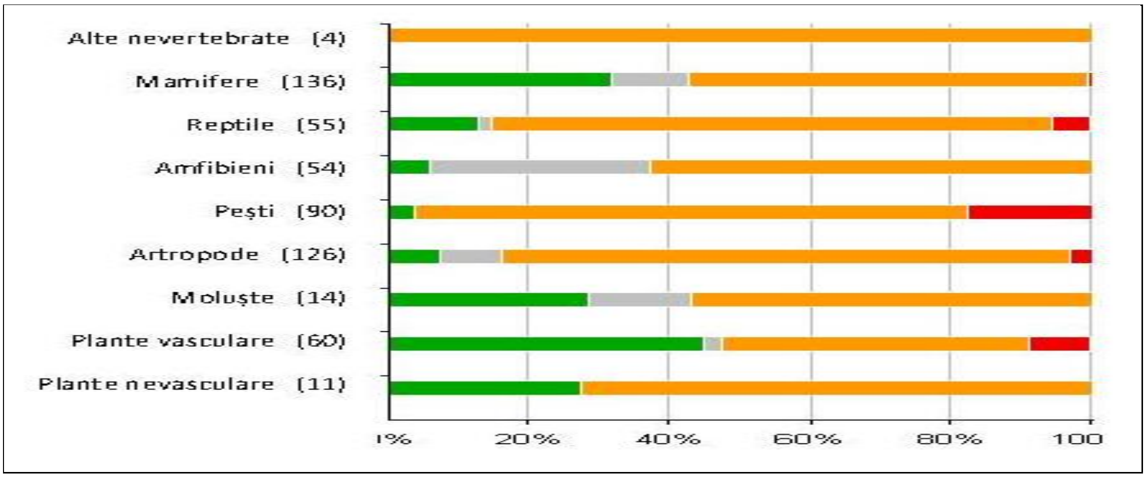
Figure V.7. Conservation status of species of European interest in Romania by biogeographic regions, reporting period 2007-2012 (%)



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 in the Black Sea region is alarming, as there is no favorable evaluation for any of the species evaluated and reported.

Figure V.8. Conservation status of the species of European interest in Romania by taxonomic groups, for the period 2007-2012 (%)



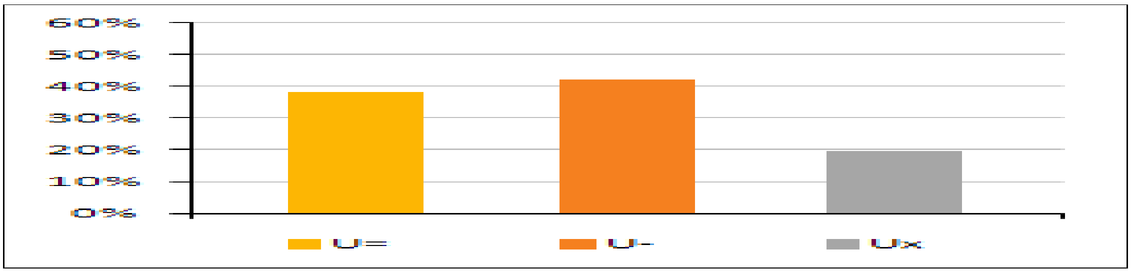
Source: ibis.anpm.ro and National Summaryfor Article 17 Romania – 2007-2012 by EC

Note: *The number in parentheses represents the number of bioregion assessments corresponding to the 2007-2012 reporting period*

From the data and information reported in 2013, it results that among the evaluated species, the fish show the weakest favorable conservation status, followed by amphibians and arthropods, then reptiles, mollusks, mammals and plants.

According to the reported data, the trends of improvement or deterioration for the species with an unfavorable conservation status (U1 and U2) are presented as a percentage on the graph below.

Figure V.9. Specii – General tendency of the conservation status of species of community interest (%)



Sursa:ibis.anpm.ro și National Summary for Article 17 Romania – 2007-2012 by EC

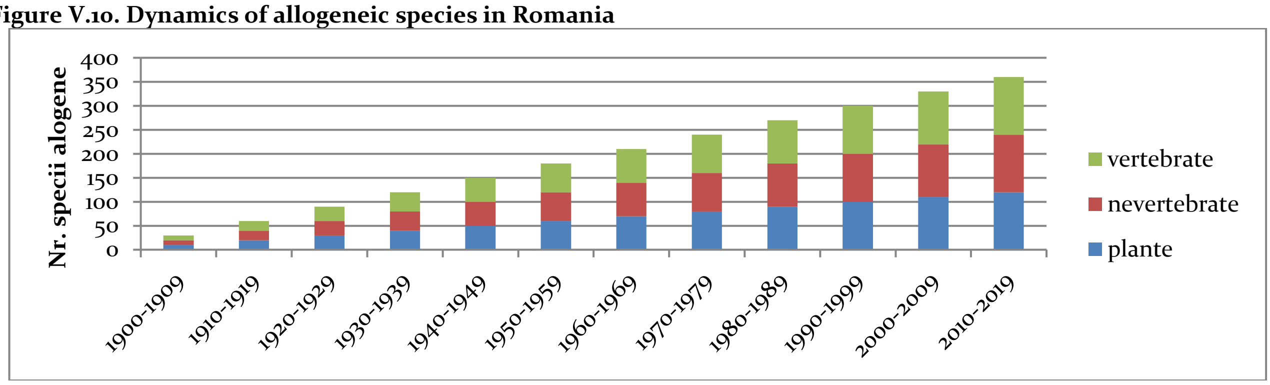
Note:
(U+) = unfavorable (inadequate or bad) with an improvement trend
(U=) = unfavorably stable
(U-) = unfavorable with a tendency to worsen
(Ux)= unfavorable with unknown tendency

INVASIVE SPECIES

RO 43
Indicator code Romania: RO 43 EEA indicator code: SEBI 010
TITLE: INVASIVE ALLOGENEIC SPECIES
DEFINITION: The indicator comprises two elements: "The total number of 1970 allogeneic species in Europe", showing the evolution of species that have the potential to become invasive allogeneic species, and "the most harmful invasive allogeneic species threatening biodiversity in Europe" a list of invasive species with negative impact demonstrated.

At European level, the European Union allocates significant sums of money annually to prevent the spread of invasive species and to repair the damage caused by them. The EU draws attention to current threats to biodiversity, with a major and irreversible impact, leading to habitat damage and larger-scale ecosystems, unbalancing species relations and even leading to the extinction of native species.
At the national level, invasive species have a major impact on biodiversity, posing a real threat to terrestrial and marine ecosystems.

Figure V.10. Dynamics of allogeneic species in Romania



Source: DAISIE

The current situation in Romania can be characterized as follows:

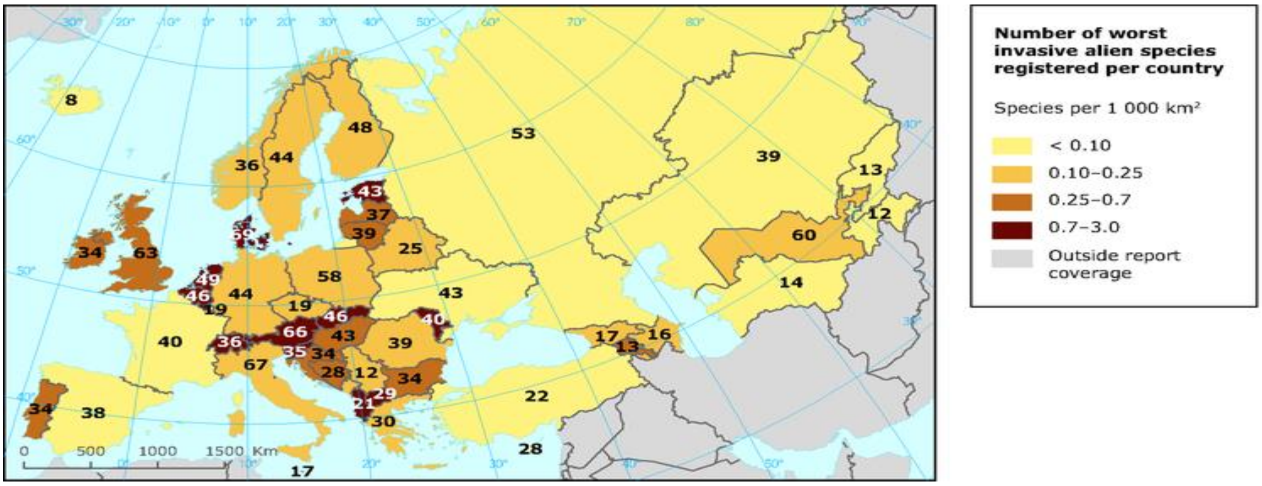
- a low level of awareness of the public opinion and consequently a civil society opposition to the interventions of the government administration;

- extremely low degree of accessibility of scientific information, especially in relation to species identification, risk analysis, etc;
- the absence of a priority approach to the actions regarding the control of invasive species;
- unintentional introduction of invasive species - often by mail - as inadequate inspection and quarantine measures;
- inadequate monitoring capacity;
- lack of effective emergency measures;
- poor coordination between government agencies, local authorities and local 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 being the European database DAISIE, realized by researchers, voluntarily.

While for most allogeneic species registered in Europe (*according to the project DAISIE - Delivering Allogeneic Invasive Species Inventories for Europe*) no major impacts have been identified *yet*, some are extremely invasive. Since 1950, at least one such species appears in each year and there are no signs that the rate would fall.

Figura V.11. Number of the most dangerous invasive species per country



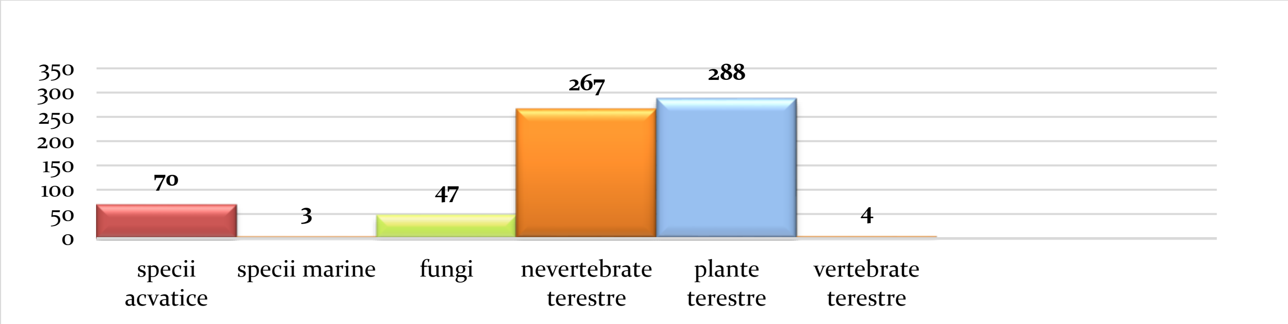
Sursa: DAISIE

In Romania, according to the data voluntarily registered by numerous experts in the application of DAISIE and of the information reported by some local environmental protection agencies, we find approximately 679 allogeneic species, of which 70 aquatic species, 3 marine species, 267 terrestrial invertebrates, 47 fungi, terrestrial vertebrates 288, terrestrial plants 4.

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 ambrosia weed control.

According to the legal competences, the environmental protection agencies carried out during 2019 information-awareness campaigns with the support of the media, addressed to the citizens / local public administrations regarding the provisions of Law no. 62/2018 on ragweed control.

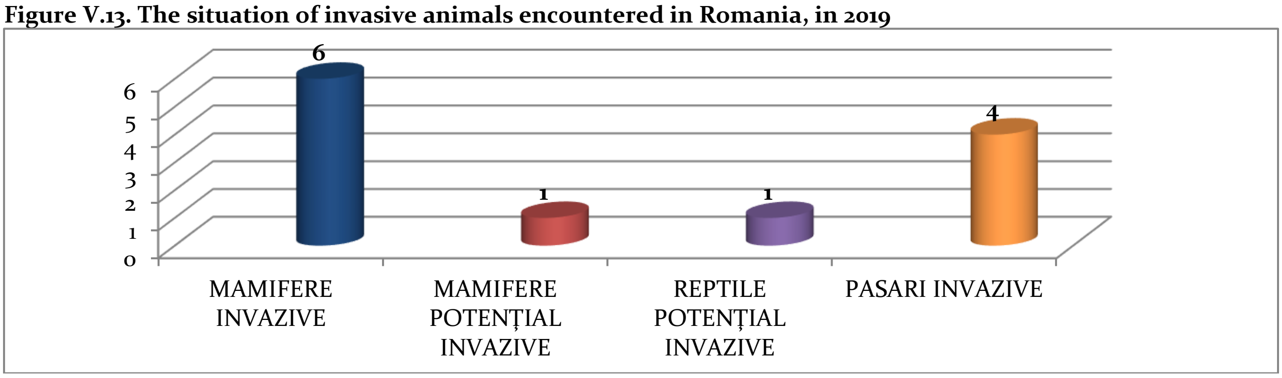
Figura V.12. Total number of allogeneic species per group in Romania, in 2019



Source: DAISIE& APM

The situation of invasive animals that threaten biodiversity in Romania - Figure V.13, makes a distinction of the most harmful invasive allogenic species in the country, on ecosystems and taxonomic groups, regarding their impact on national biodiversity and on the change of abundance or spread.

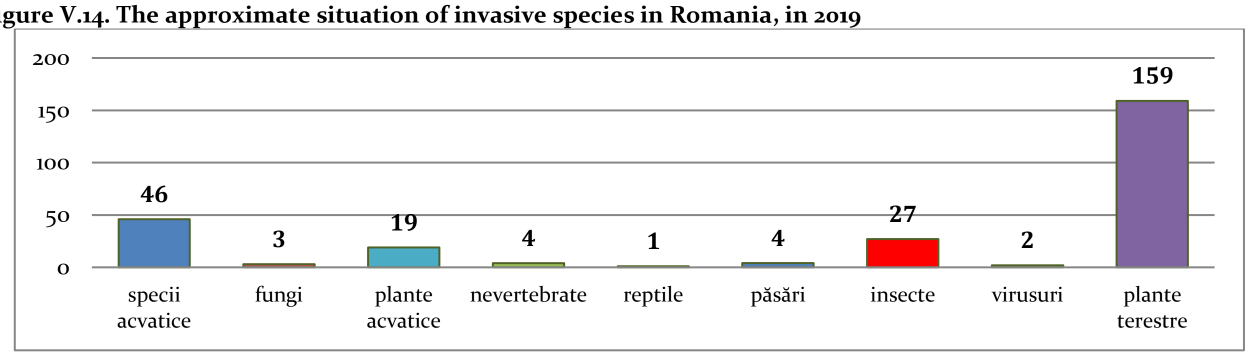
Figure V.13. The situation of invasive animals encountered in Romania, in 2019



Source: Environmental Protection Agencies

According to the data transmitted by some of the Environmental Protection Agencies, an approximate number of 265 invasive species has 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.14).

Figure V.14. The approximate situation of invasive species in Romania, in 2019



Source: Environmental Protection Agencies

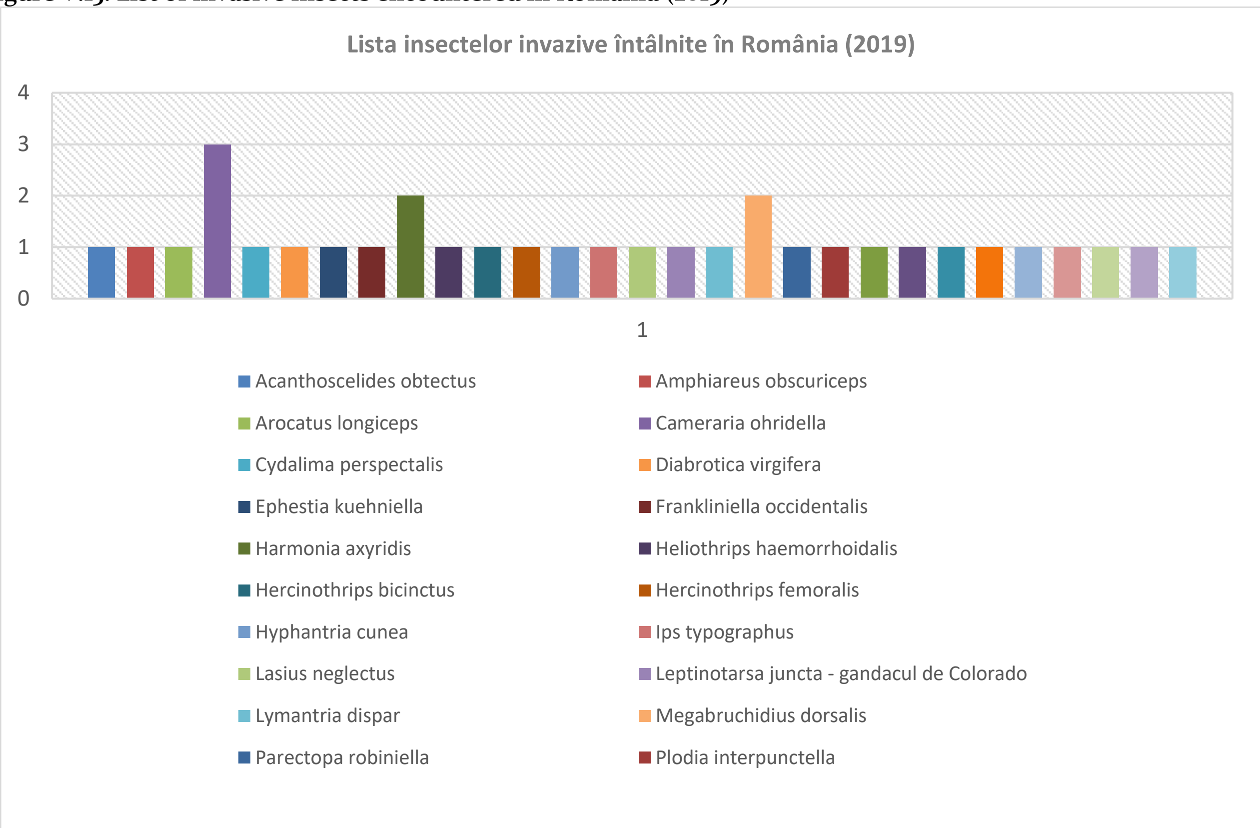
In the period 2018-2022, the Ministry of Environment, Waters and Forests, as beneficiary, implements the project "*Adequate management of invasive species in Romania, in accordance with EU Regulation 1143/2014 on preventing and managing the introduction and spread of invasive allogenic species*" - SMIS 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 Strategy for Biodiversity 2020, by identifying and prioritizing invasive allogenic 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. Additional information regarding 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*
- *Cabomba caroliniana*
- *Elodea nuttallii*
- *Eichhornia crassipes*
- *Eriocheir sinensis*,
- *Heracleum mantegazzianu*
- *Heracleum sosnowskyi*,
- *Impatiens glandulifera*,
- *Lepomis gibbosus*
- *Lysichiton americanus*,
- *Myocastor coypus* -
- *Myriophyllum aquaticum*
- *Nyctereutes procyonoides*,
- *Ondatra zibethicus*
- *Perccottus glenii*
- *Pseudorasbora parva*
- *Trachemys scripta*
- *Orconectes limosus*

Invasive species modify natural ecosystems by degrading fertility, by modifying the physico-chemical properties of the soil, by degrading the quantitative and qualitative characteristics of the vegetal carpet that make aggressive competition with the native species for water, light, space. (Figure V.15.).

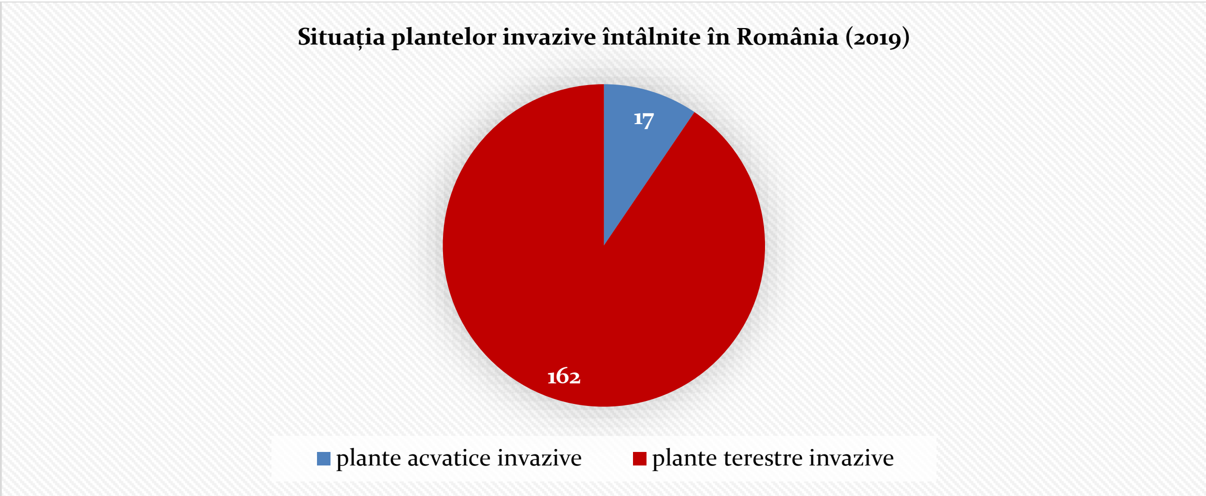
Figure V.15. List of invasive insects encountered in Romania (2019)



Source: Environmental Protection Agencies

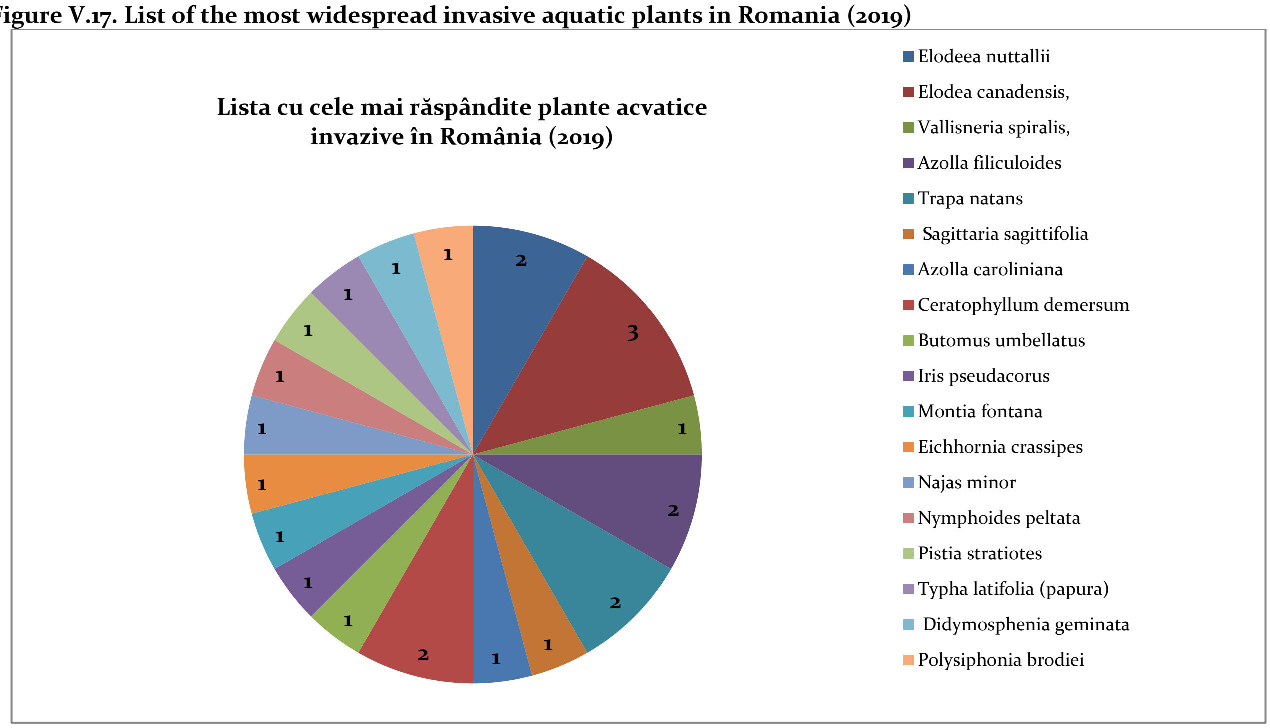
Invasive plant species lead in time to the elimination of native plant species (characteristic of that area), that is, to the decline of biodiversity (loss of biodiversity). Thus, these invasive plants gradually eliminate valuable species - rare protected, or good forage plants (used for pet food - Figure V.16).

Figure V.16. The situation of invasive plants encountered in Romania (2019)



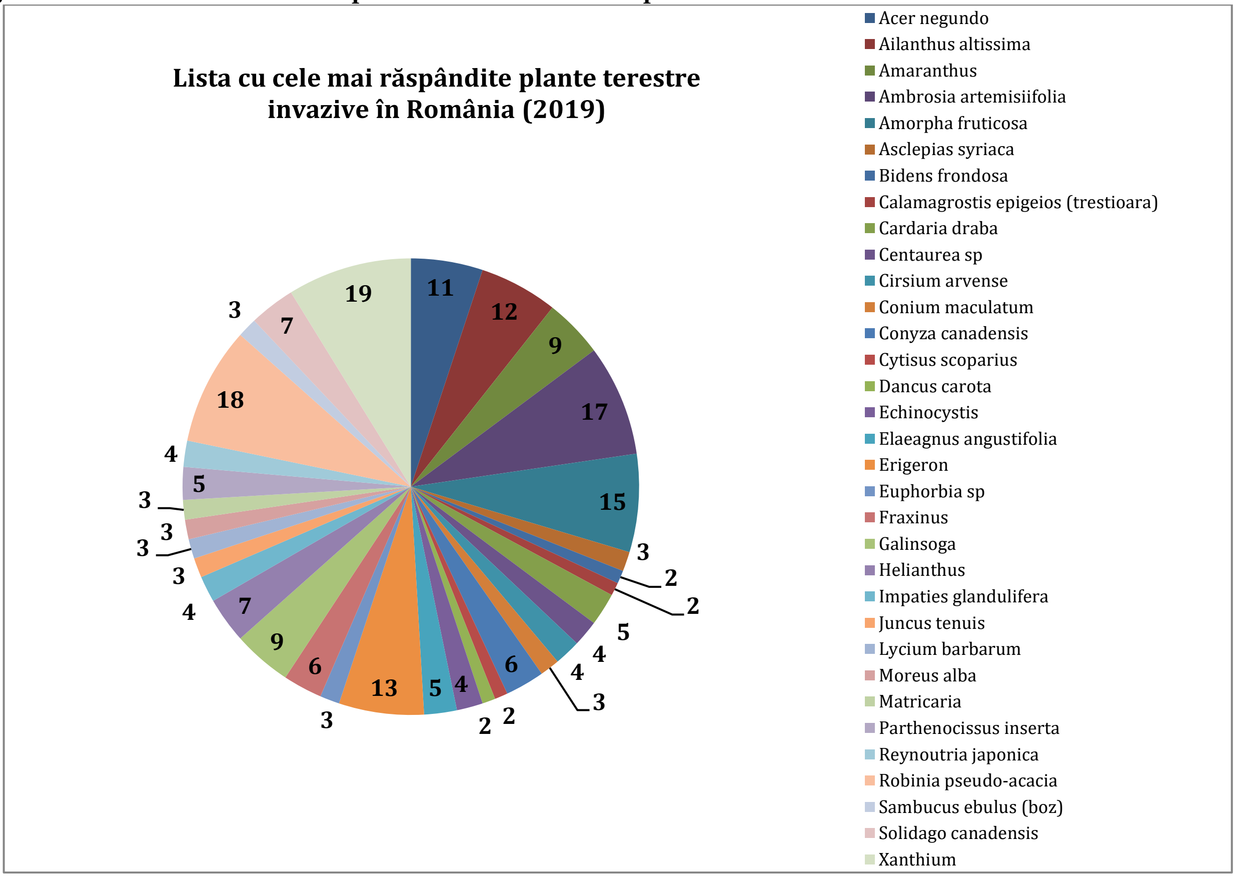
Source: Environmental Protection Agencies

Figure V.17. List of the most widespread invasive aquatic plants in Romania (2019)



Source: Environmental Protection Agencies

Figure V.18. List of the most widespread invasive terrestrial plants in Romania



Source: Environmental Protection Agencies

Prevention and control actions carried out in 2019:

- ✓ *Carrying out an awareness campaign on invasive allogenic species by the central environmental protection authority;*
- ✓ *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, occurs 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 invasive species, and here we refer especially to Robinia pseudacacia, but also to Ailanthus altissima, Amorpha fruticosa, Gleditsia triacanthos*

Conclusions on the impact of invasive species on natural ecosystems:

- ⌘ elimination of rare or endangered species from native flora by invasive plant species;
- ⌘ changes in biodiversity;
- ⌘ microclimate change;
- ⌘ increase economic costs for their removal from the ecosystem;
- ⌘ competition of invasive species with native vegetation for space, light, water and nutrients;
- ⌘ altering the natural cycles of nutrients and water in invaded ecosystems;
- ⌘ damage to mycorrhizal fungi, with direct effects on decreased vitality of many mycorrhizal species;
- ⌘ change in soil chemistry (elimination of allelopathic substances, etc.), with the effect

of changing the structure of plant communities;
- reduction of food sources for native fauna;
- changes in the succession of phytocenoses, food chains, etc;
- increasing the incidence of pathogens and the appearance of exotic diseases.

FRAGMENTATION OF ECOSYSTEMS

RO 44
Indicator code Romania: 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, relying on land cover maps made by interpreting satellite images. The indicator is intended to address the issue of integrity of ecosystems by providing a "measure" of land disintegration across the whole of Romania.

In terms of biodiversity, the indicator has relevance by providing information on the evolution of the surfaces 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.

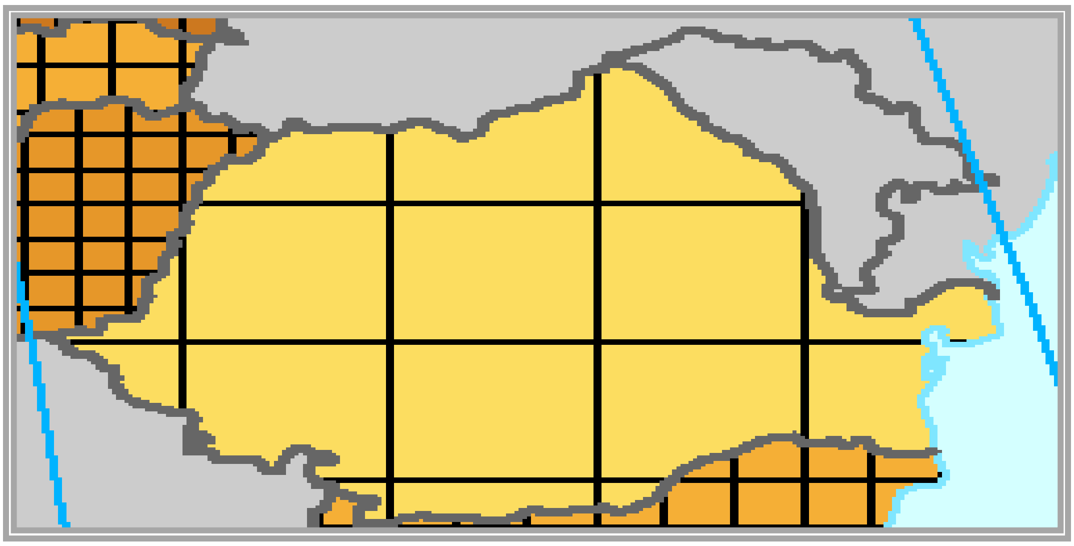
The conclusions of the report “Landscape fragmentation in Europe Joint EEA-FOEN” show, however, a lower fragmentation of Romania's territory compared to other EU countries, the situation being similar to that of the Nordic countries.

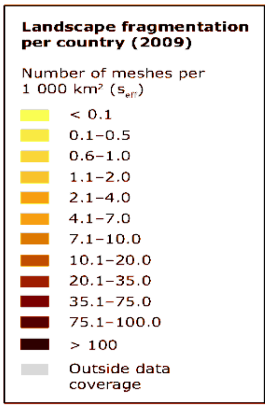
The evolution of the percentage of forest area losses between 1990–2000 is presented in the form of a map (using the Corine Land Cover database).

In the map below, the fragmentation of habitats is shown in terms of the number of meshes on a given 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.19. Illustrating the level of land fragmentation in Romania





Source: http://www.eea.europa.eu/data-and-maps/figures/illustration-of-the-level-of

REDUCING NATURAL AND SEMI - NATURAL HABITATS

RO 14
Indicator code Romania: RO 14 EEA indicator code: CSI 014
TITLE: LAND OCCUPANCY
DEFINITION: The indicator shows the quantitative change in the occupation of agricultural, woodland, semi-natural and natural land by the expansion of urban and artificial land. Includes building areas and urban infrastructure, as well as urban green spaces, sports and recreation complexes.

Land is a finite resource, and the way it is exploited is one of the main determinants of environmental change, with a significant impact on the quality of life and ecosystems, as well as on infrastructure management.

The main determining factors in land occupancy are grouped in processes resulting from the expansion of:

- housing, services and recreation areas;
- industrial and commercial areas;
- transport networks and infrastructure;
- undeveloped mines, quarries and landfills;
- construction sites.

Another 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 torrential flows, also lead to land use change and of course to habitat degradation and destruction.
The extension of the built-up area in the areas in the immediate vicinity of the protected natural areas or even inside them with the purpose of later realization of some residential areas or even tourist resorts generates a strong pressure on the protected natural areas.

FOREST EXPLOITATION

RO 45

Indicator code Romania: RO 45
EEA indicator code: SEBI 017

TITLE: FOREST:FOREST FUND, GROWTH AND CUTTING TIMBER

DEFINITION: The indicator shows the evolution of the forest fund, net annual growth and annual cuttings, as well as the utilization rates of forests (fraction of annual cuts in annual growth).

A threat to forests is the prospect of overexploitation of forests and overcoming the possibility established by forestry arrangements in the context of an increasing demand for wood for both the wood processing industry and the production of renewable energy. To this is added the tendency of export of wood in raw form, not processed with negative effect on the activity of economic operators in the wood processing industry. Regarding the latter aspect, it should be mentioned that this industry belongs entirely to the private sector, so that the central public authority responsible for forestry does not have the skills and intervention tools to influence the economic mechanism of wood recovery in the form of logs, by export, on foreign markets, and any legislative initiative to limit the export would contravene the European Union legislation.

Until 2008, the maximum volume of timber that could be harvested annually from forests was established by government decision, being usually 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 for harvesting has experienced an ascending dynamics, following the application of the provisions of the Ordinance no. 70/1999, regarding the necessary measures for the accessibility of the forest fund, by the construction of forest roads. After the entry into force of Law no. 46/2008 - The forest code, the volume of wood that can be harvested annually from forests cannot exceed the annual possibility established by the forestry arrangements.

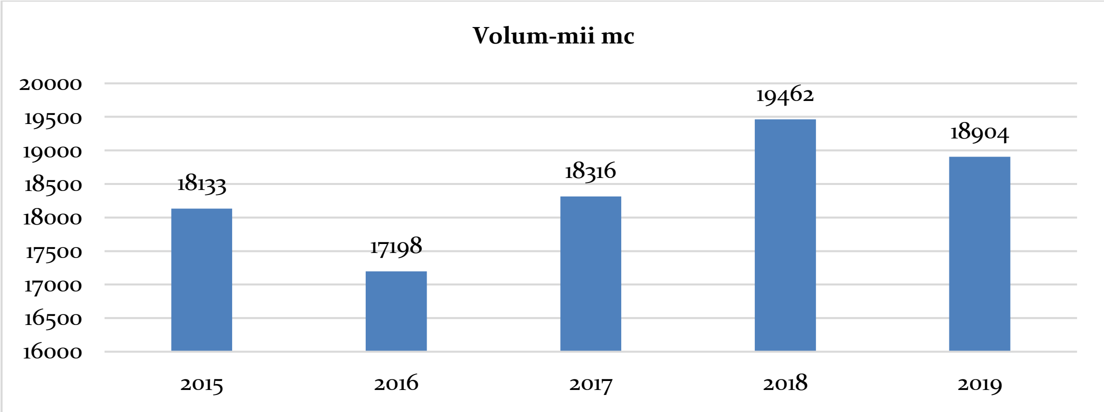
Table V.3. The volume of timber harvested in the period 2015-2019

Year	Main products	By-products	Hygiene products	Total
2015	12045	3889	2199	18133
2016	11107	4138	1953	17198
2017	12133	4374	1809	18316
2018	13776	3957	1729	19462
2019	13366	3923	1615	18904

Source: INS

The wood harvested in 2019 was lower than in 2018 by 2.9%. The volume extracted in 2019 exclusively from the national forest fund was 18,055 thousand cubic meters, the remaining 849 thousand cubic meters was harvested from the forest vegetation located on lands outside the forest fund.

Figure V.20. Volume of timber harvested between 2015-2019



Source: INS

The main danger to which forests in Romania are subject is the phenomenon of uncontrolled logging. The permanent economic and social changes and the development of the process of retrocession of the forest lands to the former owners without them being accompanied by appropriate legislative and institutional measures, have had a constant increase of the pressures exerted on the forests.

Faced with the real danger of irreversible degradation of large areas of forest, for preventing and combating illegal logging, but also for fulfilling the obligations assumed by the government program and those established by the Decision of the Supreme Defense Council of the Country, the Ministry of the Environment, Water and Forests of adopted a set of measures as follows:

- On the legislative level, the aim was to ensure an updated and adequate normative framework, which would eliminate the permissive or interpretable lacuna character of the current regulations in the field;
- At the institutional level, the aim was to strengthen the capacity of action of the Forest Guards by extending, both in terms of attributions and in terms of number of personnel and logistics, of the territorial commissariats of forest and hunting regime;
- Ensuring the financial funds needed to reforest the forest land areas from which the timber was harvested and which were not reforested within the legal term;
- Development of the integrated computer system for tracking wood materials SUMAL, operationalizing the FMIMS system and developing the "Forests' Radar" system, alerting the institutions with responsibilities in this area.
- Establishment of antitrust measures in the wood industry, elimination of abuses of dominant position and monopoly, as well as rules of valorization of the wood for the benefit of the sustainable development of the local communities.

NETWORK OF NATURAL PROTECTED AREAS

RO 41
Indicator code Romania: RO 41 EEA indicator code: SEBI 007
TITLE: NATURAL PROTECTED AREAS DESIGNATED AT NATIONAL LEVEL
DEFINITION: The indicator illustrates the rate of increase in the number and total area of protected areas of national interest over time. The indicator can be characterized by: IUCN categories, bio-geographic region and country.

Changes in data on protected natural areas occurred in 2015 following the implementation by the Ministry of Environment of the project "***Creation of spatial data sets according to the INSPIRE technical specifications for protected natural areas, including Natura 2000 sites, taking into account the optimization the facilities for their administration*** ", through which the limits of the protected natural areas were analyzed, following the collection of data from the field based on the existing documentation.

The last designations of protected natural areas were made in 2016: 1 natural park - Văcărești Natural Park, 23 special avifauna protection areas (SPA) and 54 sites of community importance (SCI) and the areas of several existing SCIs were extended .
At the level of 2019 in Romania there are a number of 945 protected natural areas of national interest.
The table below contains data on the categories of protected natural areas in 2019.

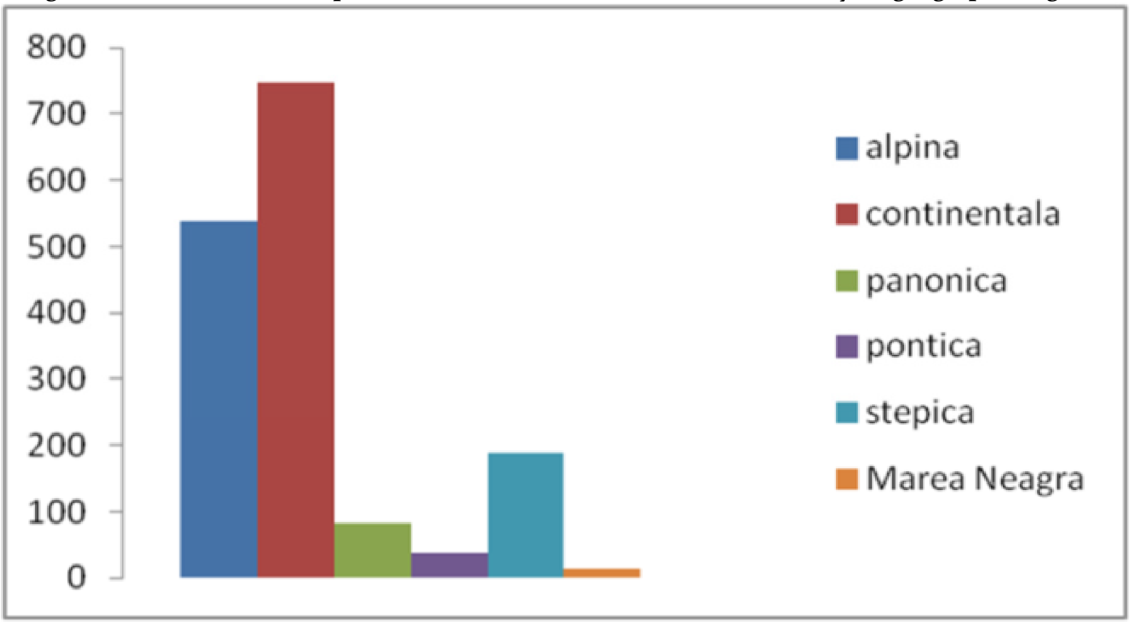
Table V.4. Categories of protected natural areas in Romania at the level of 2019

Categories of protected natural areas	Number	Surface (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
Reservations of the biosphere	3	661939.33
Wetlands of international importance (situri RAMSAR)	19	1096640.01
Natural sites of the universal natural heritage	1	311915.88

Source: MMAP

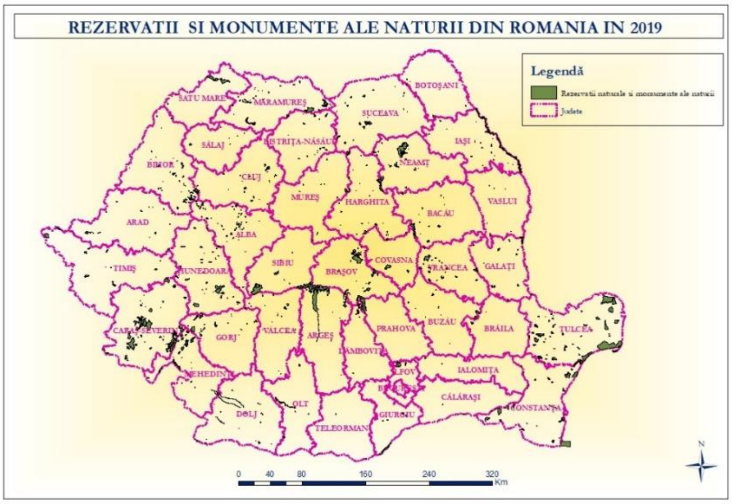
The establishment of the Bucegi nature reserve in 1926 opened the process of designating protected natural areas in Romania. The number of protected natural areas increased to 425 in 1990, but the highest number of designated protected natural areas of national interest was in the period 2000-2007. Currently, Romania has over 1500 protected natural areas, of which approximately 2/3 are of national interest, and their distribution by counties and biogeographical regions is presented in the *graphs, tables and maps below*:

Figure V.21. Distribution of protected natural areas of national interest by biogeographic regions



Source: ibis.anpm.ro MMAP

Figure V.22. National distribution of protected natural areas of national interest: nature reserves and monuments, natural and national parks



Sursa: MMAP

Table V.5. National parks in Romania in 2019

Name	County	Surface (ha)
Total		**317419.19**
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: MMAP

Table V.6. Natural parks in Romania in 2019

Name	County	Surface (ha)
Total		**769841.81**
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	Bucureşti-sector 4	184.719

Source: MMAP

RO 42

Indicator code Romania: RO 42
EEA indicator code: SEBI 008

TITLE: PROTECTED AREAS OF COMMUNITY INTEREST DESIGNATED IN ACCORDANCE WITH THE HABITAT AND BIRDS DIRECTIVES

DEFINITION: The indicator shows the current state of implementation of the Habitats Directive (92/43 / EEC) and Birds (79/409 / EEC) by the Member States through two sub-indicators:
(a) highlighting spatial coverage trends with Natura 2000 site proposals;
(b) calculating an index of sufficiency based on these proposals.

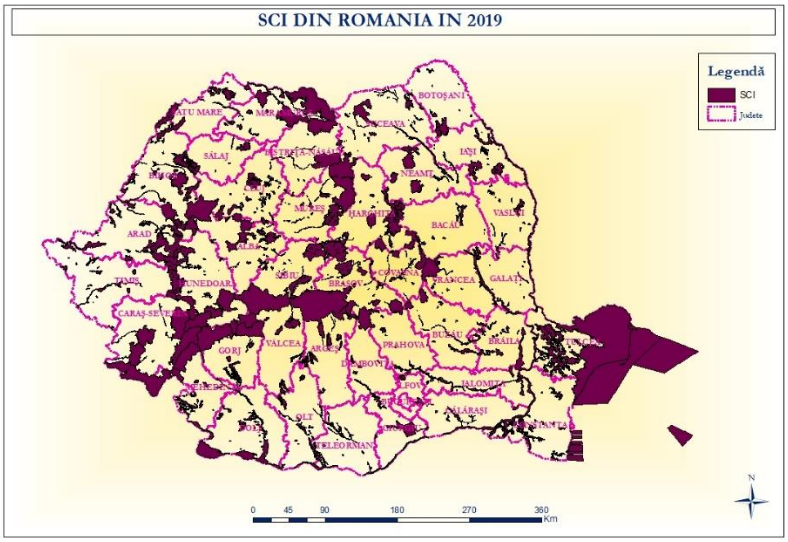
As a member state of the European Union, Romania contributes to ensuring biodiversity at European level by conserving natural habitats, as well as wildlife. In this sense, on the territory of Romania was created the Natura 2000 Ecological Network, through which the species and habitats considered to be of community importance are preserved by designating *sites of community interest SCI - Sites of Community Importance and SPA- The area of special avifaunistic protection*. This ecological network of sites has the role of ensuring the maintenance or restoration of natural habitat types and species in a favorable state of conservation within their natural distribution areas.

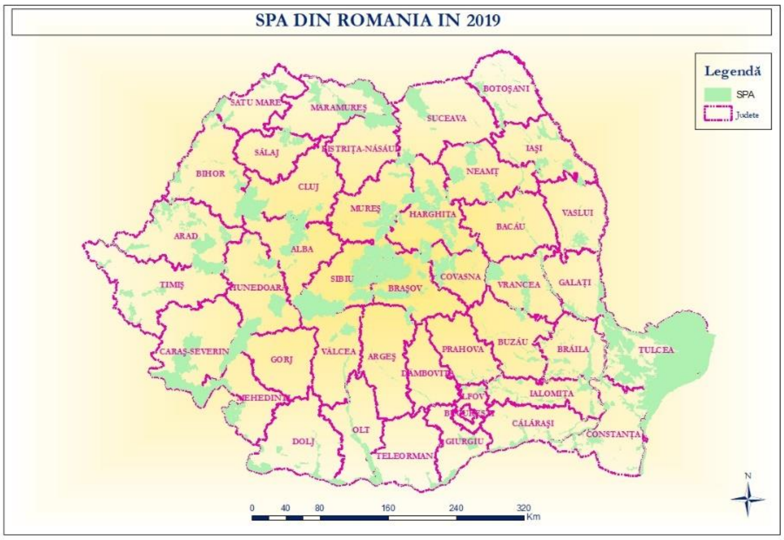
In 2016, Romania designated the last Natura 2000 sites, reaching a number of 606, of which 435 SCIs and 148 SPAs.

The area covered by Natura 2000 sites has increased from about 18% in 2007 to about 23% of the country's area today.

The maps below show the national distribution of SCIs and SPAs in 2019, a situation unchanged from the time of the last designation..

Figure V.23. National distribution of Natura 2000 sites





Source: MMAP

The standard forms of Natura 2000 sites were updated in 2019 with information provided by the management plans, carried out within the 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 area reference for the favorable status of the habitat type in the protected natural area* ", or" *the size of the reference population for the favorable status in the protected natural area*". This information is available on the website of the European Environment Agency (https://cdr.eionet.europa.eu/ro/eu/n2000/) and can also be consulted in the online application Integrated Environmental System (SIM) implemented at the level of the National Environmental Protection Agency (NEPA) which has a component dedicated to the field of Nature Conservation known as RNI-IBIS or SIM-CN available at natura.anpm.ro.

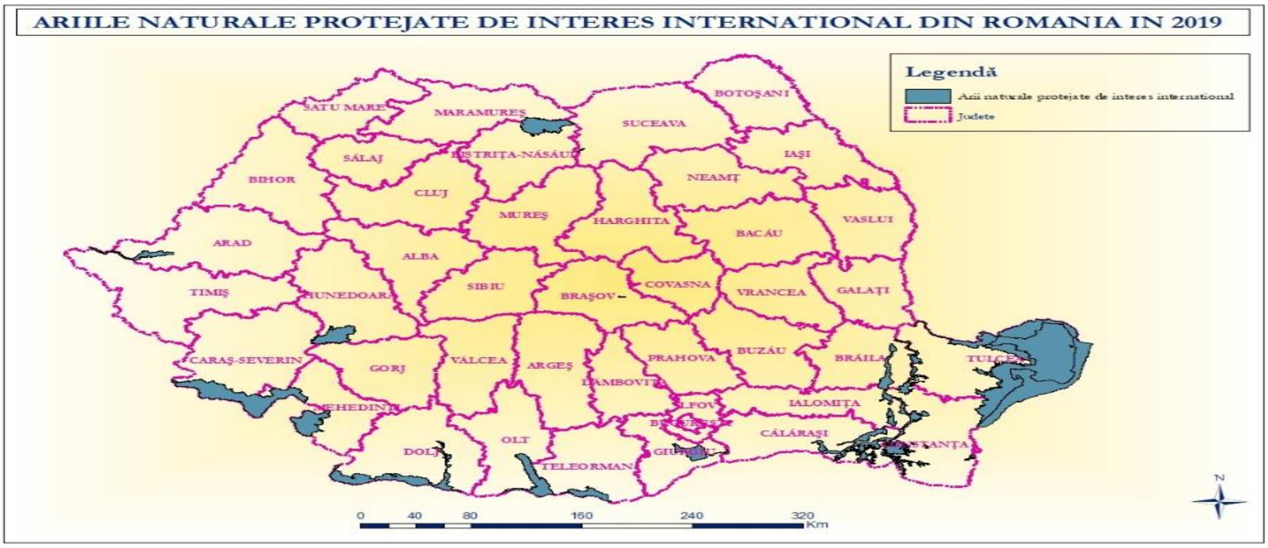
The application is intended for both environmental protection agencies and the Ministry of Environment, Waters and Forests, as well as research institutions and NGOs, to use the data collected, collect new data and information and update them, in order to support environment decisions, as well as reporting to the European institutions.

In 2019, the Ministry of Environment, Waters and Forests began an extensive process of designating

special protection areas (SAC). Romania is in the process of approving the first set of SACs, for SCIs 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 the protected natural areas of international interest, namely biosphere reserves, wetlands of international importance also known as Ramsar sites and natural sites of universal natural heritage. The map below shows the national distribution of these protected natural areas.

Figure V.24. National distribution of protected natural areas of international interest



Source: MMAP

Biosphere Reserves
Three Biosphere Reserves have been declared in Romania
- Delta Dunării (1991)
- Pietrosul Rodnei (1979)
- Retezat (1979).

The table below provides information on the areas and national distribution of these protected natural areas.

Table V.7. Biosphere Reserves in 2019

Name	County	Surface (ha)
Total		**661939.33**
Delta Dunării	Tulcea, Constanța	576421.07
Pietrosul Rodnei	Maramureș, Bistrița-Năsăud,	47202.31
Retezat	Caraș-Severin, Hunedoara, Gorj	38315.95

Source: MMAP

From the national network of protected natural areas, **the Danube Delta** is distinguished, both as a surface and as a level of biological diversity, having triple international status: Biosphere Reserve, Ramsar Site, Natural and Cultural World Heritage Site.
Retezat National Park, being also a Biosphere Reserve, included in the international network of biosphere reserves by the UNESCO Committee "Man and Biosphere" (1979), is located in the western part of Romania (it is the oldest national park in Romania, being declared so by law in 1935).
Rodnei Mountains National Park is the largest protected natural area located in the Northern Group of the Eastern Carpathians, covering an area of over 46,399 hectares, of which an outcrop was declared in 1979 as a Biosphere Reserve, within the UNESCO-MAB program.

Ramsar Sites

At the end of 2019, Romania had 19 RAMSAR sites designated by the Secretariat of the Ramsar Convention, with a total area of 1156448 ha, shown in Table V.8.

Table V.8. Ramsar sites in Romania in 2019

Name	County	Surface (ha)
Total		1156448
Delta Dunării	Tulcea, Constanța	647000
Parcul Natural Porţile de Fier	Caraș-Severin, Mehedinți	115666
Ostroavele Dunării-Bugeac-Iortmac	Călărași, Constanța, Ialomița	82832
Blahnița	Mehedinţi	45286
Confluența Olt-Dunăre	Olt, Teleorman	46623
Calafat-Ciuperceni-Dunăre	Dolj	29206
Bistreț	Dolj	27482
Parcul Natural Comana	Giurgiu	24963
Dunărea Veche - Brațul Măcin	Brăila, Tulcea, Constanța	26792
Brațul Borcea	Călărași, Ialomița	21529
Confluența Jiu-Dunăre	Dolj	19800
Suhaia	Teleorman	19594
Insula Mică a Brăilei	Brăila	17586
Parcul Natural Lunca Mureşului	Arad, Timiș	17166
Canaralele de la Hârșova	Ialomița, Constanța	7406
Iezerul Călărași	Călărași	5001
Lacul Techirghiol	Constanța	1462
Tinovul Poiana Stampei	Suceava	640
Coplexul Piscicol Dumbrăvița	Brașov	414

Source: RAMSAR site: https://www.ramsar.org/wetland/romania

Natural sites of the universal natural heritage

Since 1991, the Danube Delta has been included on the UNESCO World Heritage Convention List, as a recognition of the value of the universal natural heritage of this territory.
The reasons behind the designation as a site of universal natural heritage were mainly the complexity of habitats of world value for certain rare and endangered species, being a unique wetland, 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.

NATIONAL FOREST FUND: STATE AND CONSEQUENCES

EVOLUTION OF THE FOREST FUND SURFACE AREA

RO 45
Indicator code Romania: RO 45 EEA indicator code: SEBI 17
TITLE: FORESTS: forest fund, growth and harvesting of timber
DEFINITION: The indicator shows the evolution of the forest fund, net annual growth and annual cuts, as well as the utilization rate of the forests (the annual cut of the annual increase).

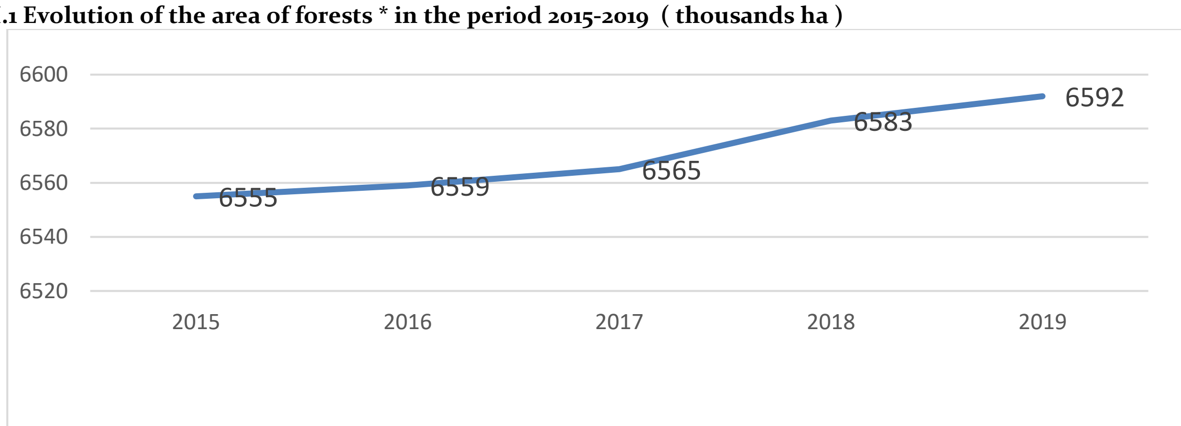
Romania's national forest fund had an area of 6592 thousand hectares at the end of 2019, respectively 27.7% of the country's area. On December 31, 2019, compared to the same date of 2018, the forest fund area increased by 9 thousand hectares due mainly to the redevelopment of forested pastures and the introduction of degraded land in the forest fund, under Law no. 46/2008 on the Forestry Code, republished, with subsequent amendments and completions. The evolution of the forest fund area (thousand ha), by categories of use and species, in the period 2015 - 2020 is presented in table VI.1 and figure VI.1.

Table VI.1 Evolution of the surface of the forest fund, by categories of use and species, in the period 2015 – 2019 (thousands ha)

Categories of use	2015	2016	2017	2018	2019
Total forest fund	6555	6559	6565	6583	6592
The surface of forests *, of which:	6399	6404	6406	6418	6427
• resinous	1931	1929	1924	1917	1915
• deciduous	4468	4475	4482	4501	4512
Other land in the forest fund	156	155	159	165	165

Source: M.M.A.P. - Forestry Policies and Strategies Directorate (*)

Figure VI.1 Evolution of the area of forests * in the period 2015-2019 (thousands ha)

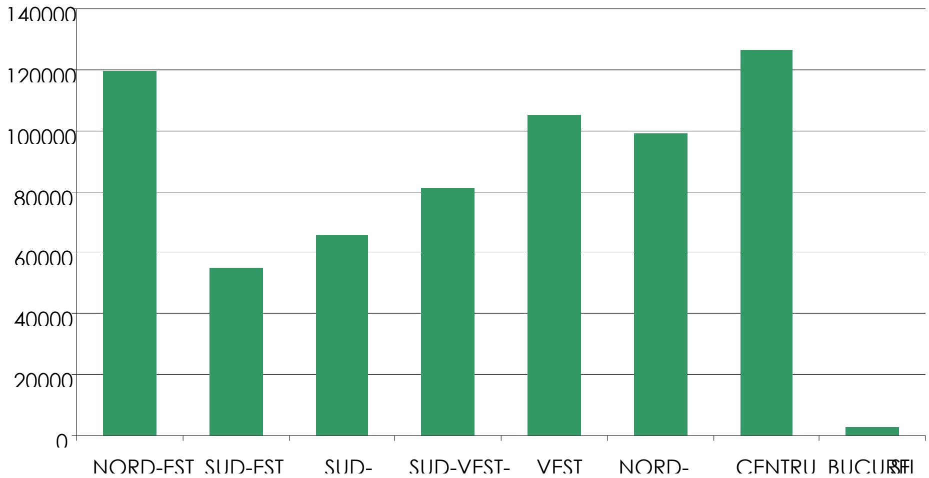


Source: M.M.A.P. - Forestry Policies and Strategies Directorate

Approximately 42% of the forest fund area covers the counties of Suceava (6.6%), Caraş-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 (figure VI.2) indicates a significant forest share in the CENTER development regions (19.3%) and NORTHEAST (18.2%), 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 forestry fund, by development regions, at the end of 2019 (ha)

Source: INSSE



The forest area per capita is 0.34 ha (on January 1, 2019 the resident population was 19,405 thousand people[1]), close to the European 0.31 ha. [1]Romanian population resident on January 1, 2019 www.insse.ro.

The average annual growth, at the level of 2019, was 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 shows the harvesting index of the wood mass (m3 / year / ha) from 2015 to 2019.

Tabelul VI.2 2 Timber harvest index - (m^3/year/ha) in the period 2015-2019

YEAR	2015	2016	2017	2018	2019
Timber harvest index - m3 / year / ha	2.8	2,7	2,8	2,95	2,95

Source: M.M.A.P. - Forestry Policies and Strategies Directorate

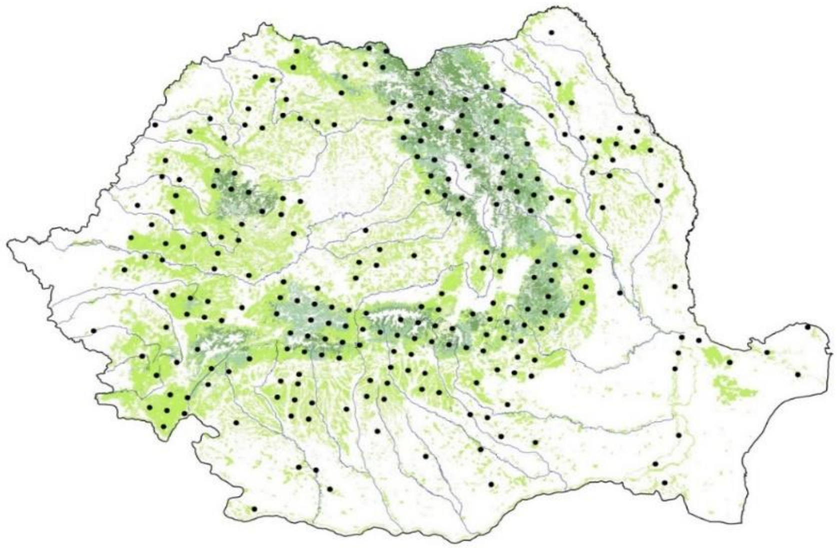
FOREST HEALTH

RO 46
Indicator code Romania: 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 dried or demolished trees, by type of forest (m^3 / ha).

Evolution of forest health

The health assessment of trees in 2019 was carried out within 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.3). This network is not representative in Romania (sampling error being 8%), the results showing only a trend of health evolution 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 approximately 1.3%). In 2019, a total number of 5721 trees was evaluated, of which 989 coniferous (17.3%) and 4732 deciduous trees (82.7%).

Figure VI.3 Pan-European Forest Health Monitoring Network (16x16 km - Level I)



Source: INCDS„Marin Drăcea"

The average percentage of damaged trees (defoliation> 25%) at national level is 11.6%, decreasing by 2.1 percent compared to 2018. By groups of species, there is an increase in the average percentage of trees damaged by conifers from 9.6% in 2015, 10.4% in 2016, 10.7% in 2017, 12.7% in 2018 to 13.7 percent in 2019, unlike hardwoods, where in 2019 there is a decrease in the average percentage of damaged trees from 15% in 2017, 13.9% in 2018 to 11.2 in 2019 (*table VI.3*).

Table VI.3 Dynamics of the percentage of healthy (Def≤25) and injured trees (Def> 25)

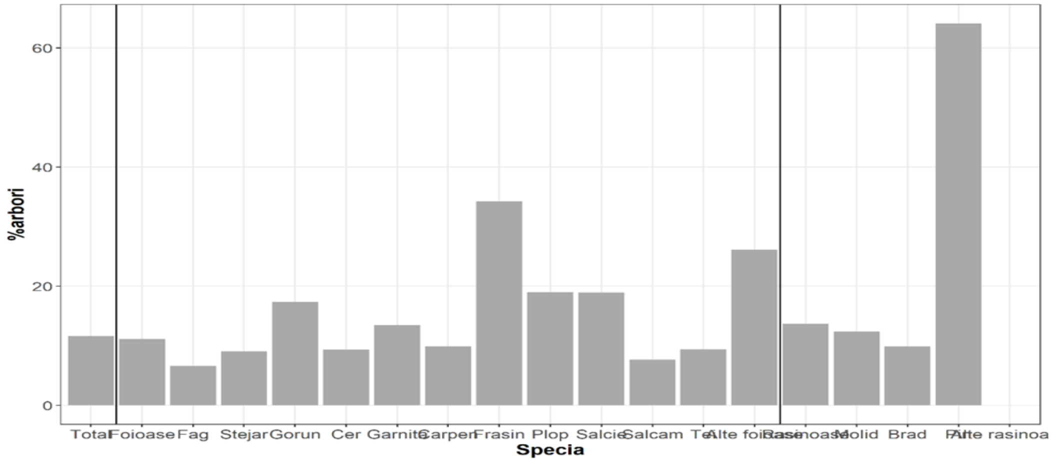
Year	No. trees	Share%	Def≤25%	Def>25%
Species group	**Resinous**			
2015	1103	19,0	90,4	9,6
2016	1120	19,3	89,6	10,4
2017	1092	18,6	89,3	10,7
2018	1051	18,0	87,3	12,7
2019	989	17,3	86,3	13,7
Species group	**Decidous**			
2015	4705	81,0	86,1	13,9
2016	4688	80,7	85,8	14,2
2017	4788	81,4	85,0	15,0
2018	4781	81,9	86,1	13,9
2019	4732	82,7	88,8	11,2
Species group	**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

Source: INCDS„Marin Drăcea"

Among the conifers, the fir tree registers the best state of health with a proportion of damaged trees decreasing slightly compared to 2018 from 12.9% to 9.9% in 2019. Instead, for spruce and pine there is an increase in the percentage of damaged trees, from 10.4% in 2018 to 12.4% in 2019, respectively from 61.5% in 2018 to 64.1% in 2019.

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 to 9.1% in 2019. Maximum values of the proportion of damaged trees are found in ash (34.3%), willow (18.9%), sessile oak (17.4%) and poplar (27.6%) (*figure VI.4*).

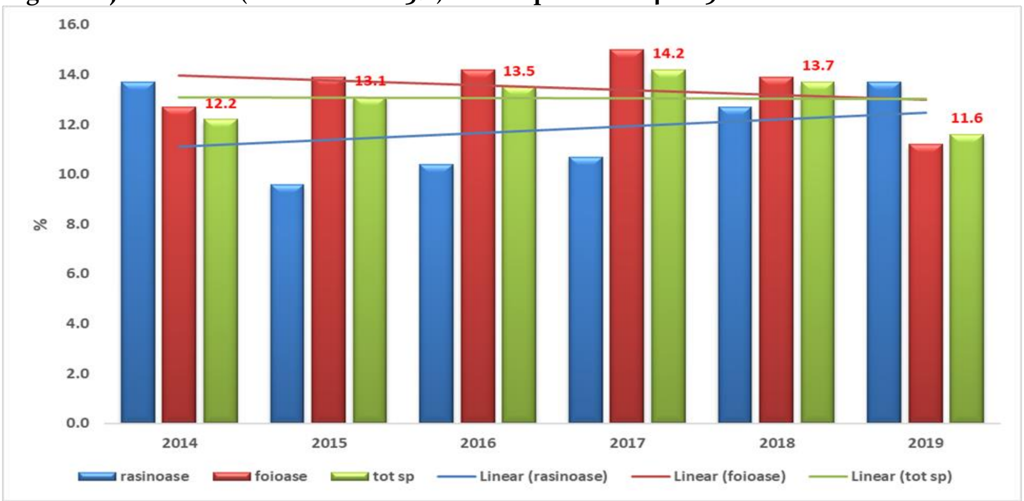
Figure VI.4 Percentage of damaged trees (Def> 25%) for the main species and species groups in 2019



Source: INCDS „Marin Drăcea"

Overall, the results of evaluations conducted in recent years (2014-2019) 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 greater than 25% (damaged trees), which in 2019 recorded a value of 11.6%, 0.7 percent lower than in 2014 (12.3%) (see *figure VI.5*).

Figure VI.5 Percentage of injured trees (defoliation> 25%) for the period 2014-2019



Source: INCDS„Marin Drăcea"

Evolution of the phenomenon of abnormal drying of trees

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 occurrence and evolution of the phenomenon of premature drying of the trees, according to the observations and the results of the specialized studies, is the *climatic changes* (the greenhouse effect which resulted in the increase in air temperature, the increasing aggressiveness of ultraviolet rays due to the elimination of ozone protection, the arid climate), which generated the appearance of extreme meteorological phenomena such as: excessive temperatures with high frequency and long duration, long lasting successive droughts, precipitations (rains, snowfall) marked quantitatively related to the unit of time and surface area, early and late frosts, etc.

From a meteorological point of view, the year 2019 was characterized by an average temperature of 10.9 ° C, 1.7 ° C higher than that of the reference period 1981-2010, being the year ranked first in the top of the most warm years from 1900-2019. The average amount of precipitation of 614.2 mm was 3% lower than the climatological normal (1981-2010) and in 7 of the 12 months of the year, the average monthly amounts of precipitation were below the normal average values.

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 the 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 drought were the coniferous trees located outside their natural area, especially those in the east of the country, where the water deficit in the soil was very pronounced.

Of the cvercinee, more sensitive proved to be the Quercus pedunculata (pedunculate oak), but also the Quercus pedunculiflora (the Brown oak), Quercus petraea (the sessile oak) Quercus cerris (the Turkey oak) and Quercus frainetto (the Hungarian oak) showed drying phenomena. One of the deciduous species that is in an obvious state of decline is Fraxinus (ash). This species exhibits a high sensitivity to the action of biotic and abiotic factors. The hydric stress in which the Fraxinus (ash) has been subjected in the last decade, characterized by the existence of particularly dry periods alternating with periods characterized by excess moisture, caused its debilitation.

In recent decades, in several forest areas, pollution has increased, 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. 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 of physiological debilitation 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.

Source: M.M.A.P.- D.P.S.S.

The forest protection works, carried out by the National Directorate of Forests - Romsilva, target both the state public property forest fund (FFPPS) and the forest fund belonging to other owners (FFAD), for which it provides forest management / services based on contracts . In 2019, the area of forests infested with forest pests was 608,354 ha. Of this surface, on 187,600 ha works were applied to prevent the multiplication and to control the forest pests in order to ensure a proper phytosanitary condition of the forest vegetation. The centralized situation of the forest areas infested with forest pests, as well as those on which pest prevention and control works were applied, in the period 2014-2019, is presented in the *table VI.4*.

Table VI.4 The centralized situation of the forest areas infested with forest pests, as well as of those on which pest prevention and control works were applied, during 2015-2019

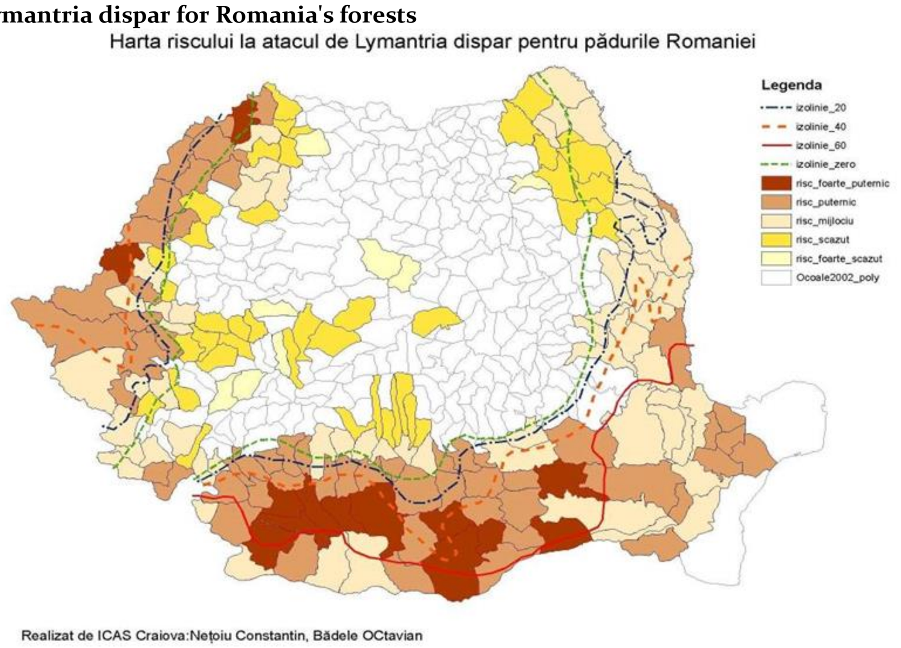
Nr. Crt.	Characteristics		Year/ surface (ha)				
			2015	2016	2017	2018	2019
0	1	2	3	4	5	6	7
1	The surface of forests infested with forest pests	FFPPS	430804	419744	467758	470694	498847
		FFAD	110668	98595	98790	105221	109507
		TOTAL	**541472**	**518339**	**566548**	**575915**	**608354**
2	Area of forests where pest control works have been applied	FFPPS	126016	127163	142497	142199	147289
		FFAD	44440	43030	42524	40430	40311
		TOTAL	**170456**	**170193**	**185021**	**182629**	**187600**

Source: National Directorate of Forests - Romsilva

Among the pests specific to the forest vegetation in Romania, annual infestations on significant forest areas are produced by defoliating insects (*Lymantria dispar, Tortrix viridana and Geometridae species*) in the case of deciduous trees, and in the case of softwood trees the main harmful species are beetles which attack between bark and wood (*Ipide*). As for the defoliating insect Lymantria dispar, it entered the gradation in 2019, so for the next 2-3 years is expected to increase the area of deciduous trees that will be infested with it (*see Figure VI.6*).

In the case of coniferous trees, the insects that are reported annually on large areas are beetles that attack between bark and wood (*Ipidele*). The appearance of outbreaks of *Ipide* infection is closely related to the negative action of abiotic factors (wind, snow, drought, etc.). The literature characterizes this group of insects as secondary pests, and which, only under certain conditions (natural disasters, late interventions in the application of preventive measures, etc.), can turn into primary pests.

Figura VI. 6 Risk map of Lymantria dispar for Romania's forests



Source: National Directorate of Forests - Romsilva

Calamized wood mass

The main factor that led to the occurrence of calamities in the forest fund for which the administration / forestry services of the National Forests Authority - Romsilva are ensured, in 2019, was the wind. It particularly affected coniferous trees, which have shallow root systems and lower slenderness coefficients, causing them to uproot or break.

Against the background of the physiological weakening of trees, as a result of the effects produced by abiotic factors (wind, drought, pollution, etc.), various types of insects (bark and xylophagous) were present, as well as diseases caused by fungi and bacteria, which accentuated the state of decline of the trees, eventually leading to their drying.
In 2019, the volume of wood mass resulting from felling and breaking of trees was 445,766 m^3. Regarding the trees affected by the abnormal drying phenomenon, their volume was 195,700 m^3.

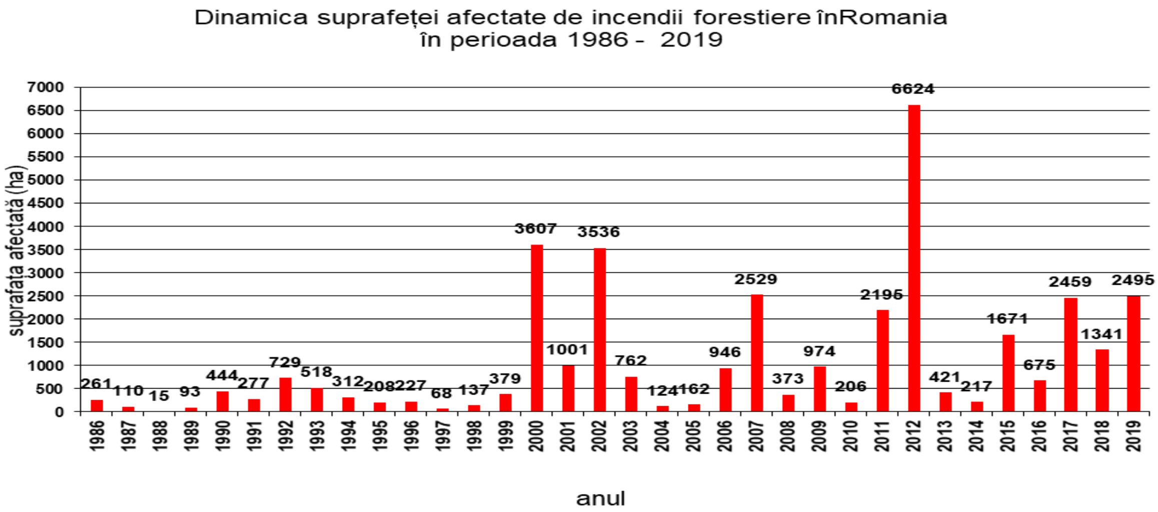
Source: NATIONAL DIRECTORATE OF FORESTS - ROMSILVA

Prevention and firefighting

In 2019, the production of a total number of 425 forest vegetation fires was recorded in Romania, which affected a total area of 2495.6 ha, of which 417 fires occurred in the national forest fund on 2437.6 ha and 8 the fires occurred on 58 ha with forest vegetation located on lands outside the national forest fund. As a result of these fires, material damages were initially estimated in a total value of 173.95 thousand lei, produced by burning a number of 105.7 thousand seedlings from plantations and natural regenerations and a quantity of 1154 cubic meters of wood, following that after the entry in the vegetation of the seedlings to be finalized the amount of damages in the plantations. The causes of forest fires were established as unknown for 87 fires on 781.78 ha, accidental causes on power lines in the number of 3 fires on 3.5 ha, negligence on 329 fires on 1705.2 ha (by spreading the fire in the field agricultural caused by the burning of dry vegetation on meadows and stubble, burning of garbage, from lit cigarettes, etc.) and intentional, without a known motivation, to a number of 6 fires on 5.12 ha.
Figures VI.7 and VI.8 show the dynamics of the affected area and the number of forest fires in Romania in the period 1986 - 2019.

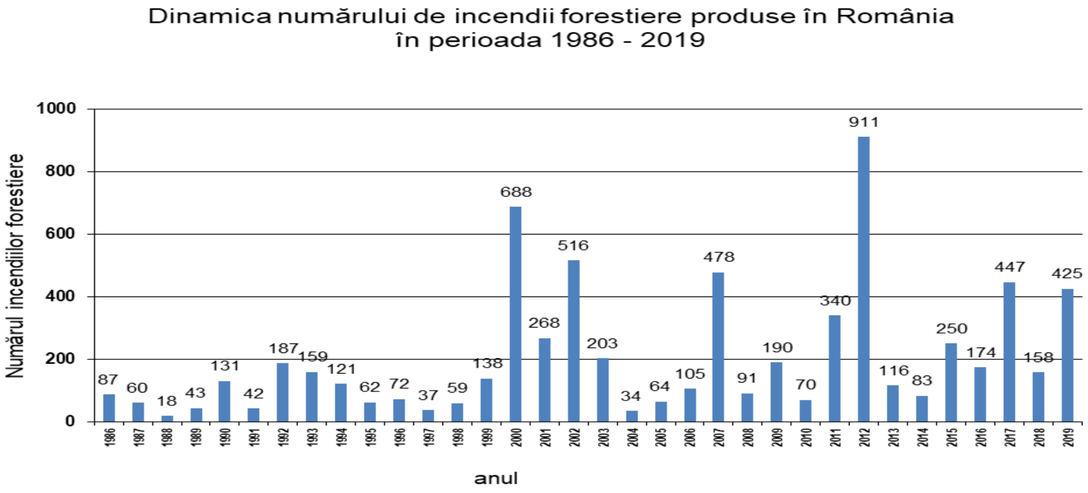
Source: M.M.A.P.- D.P.S.S.

Figure VI. 7 Dynamics of the area (ha) affected by forest fires in Romania during the period 1986-2019



Source: M.M.A.P.- D.P.S.S.

Figure VI.8 Dynamics of the number of forest fires produced in Romania during the period 1986-2019



Source: M.M.A.P.- D.P.S.S.

From the graphs above (figures VI.7 and VI.8) it is observed that the year 2019 was a similar one to 2017 in terms of the number and area of forest affected by fires. It is considered that an acceptable multiannual average would be around 500 ha affected annually.

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 in agricultural lands adjacent to forests, mainly due to pasture and stubble clearing fires. It is found that the burning of pastures and hayfields is predominant before entering the vegetation or at the exit from the 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, should be permanently eliminated from the practice of farmers.

In 2019, the densest period with registered forest fires was between March 7 and April 6, when 243 fires were recorded on 1624 ha. In contrast, no fires were reported in January and June.

In general, in Romania, forest fires occur during the period of vegetative rest, so that the damage caused is not great, being litter fires, which only superficially affect the organic horizon of the soil and the organisms in this area. On the other hand, if there is a young plantation in the path of the fire, especially one that includes resinous species, due to the low height of the seedlings, we face the total burning and their canopy, causing a total loss of the plantation, being necessary their subsequent restoration.

As measures to be considered further to reduce the risk of forest fires, it is mentioned:

- the need to improve specific legislation, through joint proposals of MMAP, IGSU and MADR, including by developing a technical standard aligned with the current conditions of the intervention technique, but also with the possibilities of access to the field; this will be the subject of the activity of the MMAP representative in the Working Group that will be established within the National Platform for Disaster Risk Reduction - vegetation fire component, under the coordination of IGSU and finalization of new technical norms within the SIPOCA project 395;
- concrete and effective measures to deter the burning of pastures, hayfields and stubble, including by reducing or suspending the payment of subsidies for agricultural land from which the fire originated;
- identifying areas with a high risk of fire and monitoring them more closely during periods when forest fires may occur;
- protection of plantations in areas with a high risk of fire, by plowing, where possible, a perimeter strip and maintaining it without grassy vegetation.

Source: M.M.A.P.- D.P.S.S.

THREATS AND PRESSURES EXERCISED ON THE FORESTS

According to RNP ROMSILVA until 31.12.2019, the reconstitution of the property right for the surface of 3,317,900 ha was validated and the surface of 3,176,238 ha was put in possession, according to the data entered in table VI.5.

Table VI.5 The situation of applying the provisions of the land fund laws, year 2019

Forms of ownership	Validated surface *(ha)*	The surface put in possession *(ha)*	The surface not put in possession *(ha)*
Individuals	1.424.296	1.315.501	108.795
Administrative-territorial units	968.873	957.037	11.836
Educational units	7.634	7.285	349
Worship units	127.538	122.946	4.592
Associative forms of ownership	769.651	752.963	15.688
Romanian Academy	16.762	16.500	262
Elias Foundation	3.146	2.006	1.140
TOTAL	**3.317.900**	**3.176.238**	**141.662**

Source: RNP ROMSILVA

Note: The situation presented above does not include the forest lands returned by the former Institute of Forestry Research and Management Bucharest, currently the National Institute for Forestry Research and Development "Marin Dracea", subordinated to the Ministry of Education and Scientific Research.

CUT FOREST SURFACES

RO 45

Indicator code Romania: RO 45
EEA indicator code: SEBI 17

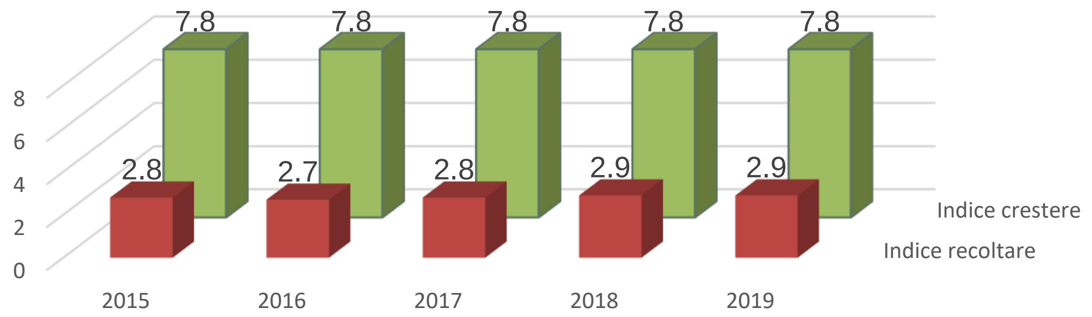
TITLE: FORESTRY: forest fund, raising and harvesting wood

DEFINITION: The indicator shows the evolution of the forest fund, net annual growth and annual cuts, as well as the utilization rate of the forests (the annual cut of the annual increase).

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 high quality wood (resonant wood, wood for aesthetic veneer, etc.) but also wood for timber and pulp is highly sought after in the profile market. At the 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 short time, 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.

Source: M.M.A.P.- D.P.S.S.

Figure VI.9 The evolution of wood cutting m3 / year / ha, in the period 2015-2019 (m3 / year / ha)



Source: M.M.A.P.- D.P.S.S.

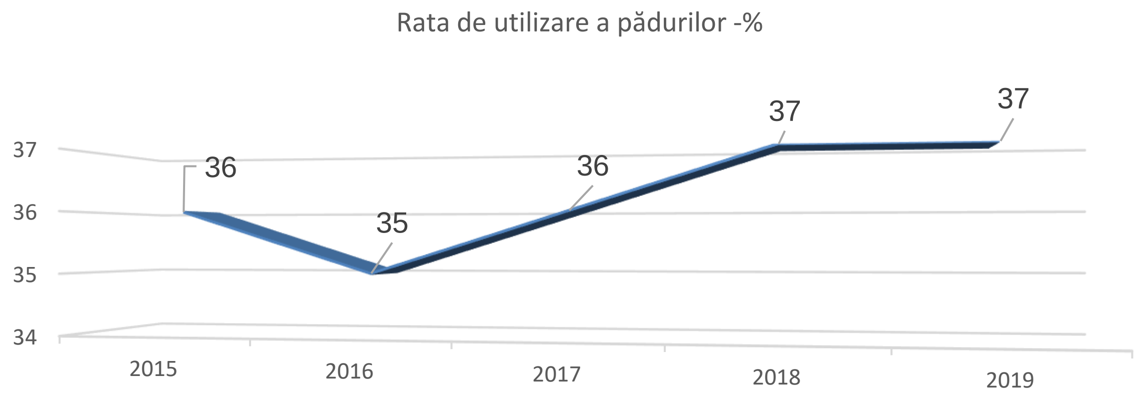
Table VI.6 Evolution of forest areas covered with logs, between 2015-2019

Types of cuttings		Year				
		2015	2016	2017	2018	2019
Regeneration cuttings, of which:	regeneration cuttings in forest-ha	67791	65127	70321	64507	74258
	regeneration cuttings in grove-ha	3665	3229	3212	3573	4022
	substitution cuttings-ha	776	755	728	867	576
	conservation cuttings-ha	24221	68107	103035	112614	111754
Total (ha)		98453	137218	177296	181561	190610

Sursa: M.M.A.P.- D.P.S.S.

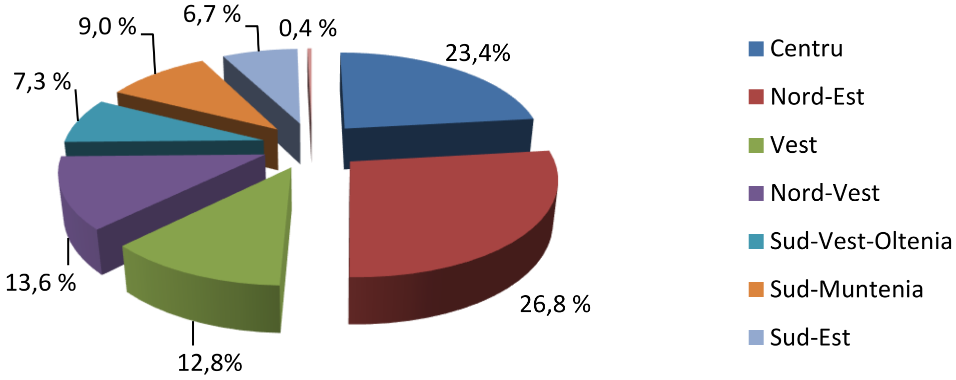
The evolution of forest fund growth and wood harvesting in Romania is illustrated by the **rate of use of forests**(%) **(the ratio between tree felling and tree growth)**.

Figure VI.10 Forest use rate (%) in 2015-2019



Source: M.M.A.P.- D.P.S.S.

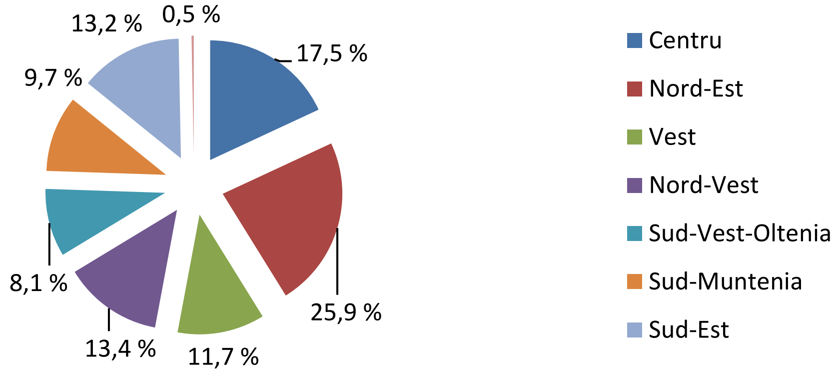
Figure VI.11 Wood mass harvested (%) by development regions in 2019



Source: www.insse.ro

The highest volume of timber was 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% (*Source: www.insse.ro*).

Figure VI.12 Forest regeneration works (%), by region of development, in 2019



Source: www.insse.ro

CHANGING LAND USE

RO 44
Indicator code Romania: 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, relying on land cover maps made by interpreting satellite images. It is based on a simple methodology, including mathematical calculations and GIS analysis, based on Corine Land Cover data (CLC).

Fragmentation of ecosystems

Over the past two centuries, under the impact of anthropogenic activities in conjunction with those induced by natural disturbing factors, land use and land cover has undergone a continuous transformation through the local reduction of forest areas and the increase in land area of agricultural or land plots 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 entities. In the application of the forest regime, the owners of forest lands 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.

Source: M.M.A.P.- D.P.S.S.

CLIMATE CHANGE

Climate change endangers the development and productivity of forests by increasing the frequency and severity of droughts in the summer season with an impact on tree species sensitive to drought. Indirect effects on forest productivity are: changes in the severity and frequency of pest and disease outbreaks, increasing populations of harmful insects and mammals, and the impact of existing and new invasive species.
Source: Ministry of Environment, Waters and Forests

TRENDS, FORECASTS AND ACTIONS ON SUSTAINABLE MANAGEMENT OF FORESTS

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 forested area of the European Union is protected under the Natura 2000 program, and a large part of the rest of the area is sheltered by species protected under 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 forest industries in the European Union, which fall under the industrial policy of the European Union. 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, 5.4 billion euros from the European Agricultural Fund for Rural Development have 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).*

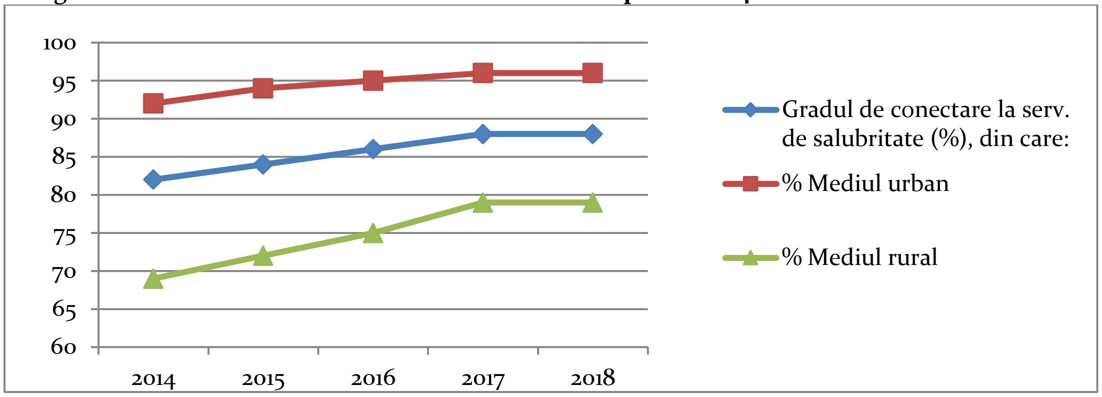
MUNICIPAL WASTE GENERATION AND MANAGEMENT

RO 16
Indicator code Romania: RO 16 EEA indicator: 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.)

According to the provisions of the National Plan on Waste Management, approved by H.G. no. 942/2017, "municipal wastes are household wastes and other wastes, which, by nature or composition, are similar to household wastes". According to Decision 2011/753 / EU establishing norms 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. Municipal waste collection is the responsibility of the municipalities, who can carry out these tasks either directly (through the specialized services within the Local Councils) or indirectly (by delegating this responsibility on a contract basis, to specialized and authorized companies to perform the sanitation services).

At national level, municipal waste collection is not widespread. The figure below shows the evolution of the degree of connection to the sanitation service in the period 2014-2018.

Figure VII.1. Degree of connection to the sanitation service in the period 2014-2018



Source: National Environment Protection Agency

The degree of connection of the population to the sanitation service is maintained around 88%.
The quantities of waste generated by the population not served by sanitation services are calculated using 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.
Municipal waste management involves 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 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 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).
Municipal waste is disposed of exclusively by landfill. To date, no municipal waste incineration plants have been put into operation in Romania. At the end of 2018, 43 compliant landfills for municipal waste were authorized for operation.

Indicators of sustainable development regarding municipal waste

According to the recommendations of EUROSTAT (Guide on collecting data on municipal waste), municipal waste represents household and similar waste, generated by households, institutions, commercial units and economic operators.
This includes bulky waste, waste from parks, gardens and street cleaning, including the contents of street rubbish bins, as well as electrical and electronic equipment waste from households.
According to the way of collection, 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 not collected by a sanitation operator, but managed directly by the generator.
They are excluded:
- Sludges from urban wastewater treatment;
- Construction and demolition waste.

Sustainable development indicators on municipal waste refer to:
- Generated municipal waste;
- Municipal waste treated by: energy recovery, storage, recycling (excluding composting and anaerobic digestion), composting.

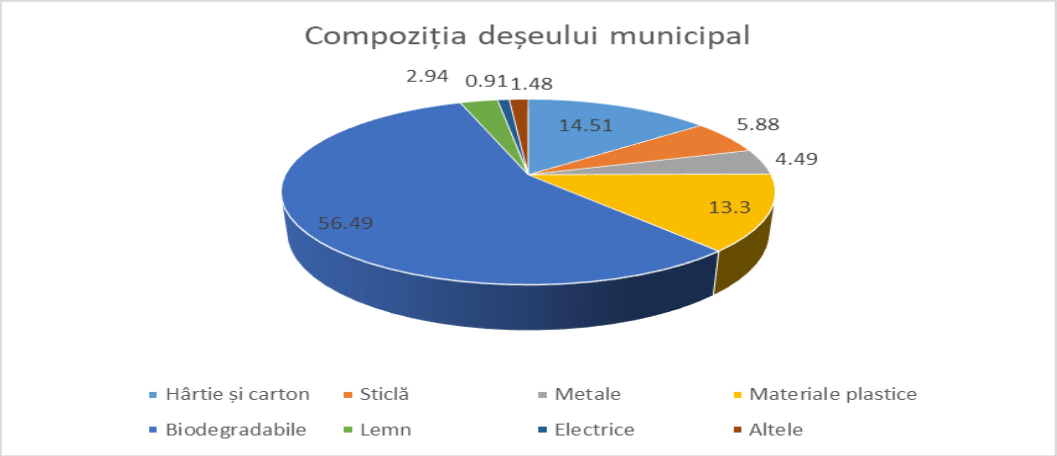
Also, the EUROSTAT guide recommends that the recyclable waste streams (paper, plastic, metal, etc.) that result from the sorting plants and subsequently sent to the recycling facilities should be considered as recycled.
In view of the above, the following municipal waste indicators were calculated at national level:
- ***Municipal waste generated - 5296239 tons in 2018***

  The value was calculated by summing the quantities generated for the following types of waste:
  - deşeuri menajere şi asimilabile şi din servicii domestic and similar waste and from municipal services collected by sanitation operators, excluding inert waste, 4680085 tons;
  - domestic waste generated and not collected by sanitation operators, 314022 tons;
  - recyclable waste from the population, collected through the authorized economic operators, other than the sanitation operators (paper and cardboard, metals, plastic, glass, wood, textiles, WEEE - preliminary data, waste batteries and accumulators) 302132 tons.
- ***Recycled municipal waste (including composting) – 586406 tons in 2018***

  The value was calculated by summing the recycled quantities for the following types of waste:
  - domestic and similar waste and from municipal services 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, biodegradable, textiles, WEEE - preliminary data, waste batteries and accumulators).

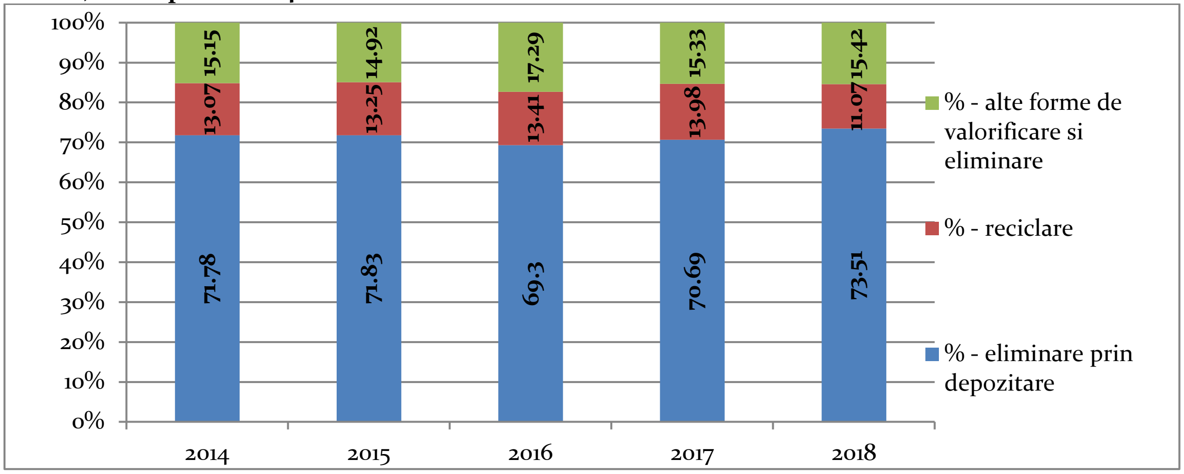
The degree of recycling achieved for municipal waste in 2018 was 11.08%.

Figure VII.2. The composition of municipal waste for 2018



Source: National Environmental Protection Agency

Figure VII.3. The share of the main municipal waste management activities, related to the amount of waste generated, in the period 2014 - 2018



Source: National Environmental Protection Agency

Note: The decrease in the share of recycled waste in 2018 is determined by the change of calculation methodology - for this year, the amount of individually composted biodegradable waste was no longer considered recycled, taking into account the provisions of PNGD and European legislation

From the above it is observed that starting with 2016 the amount of waste deposited has an increasing trend, which is inconsistent with the principles and objectives adopted by the EU through the legislative package on the circular economy. The main causes that lead to an increase in the amount of waste stored are:

- waste management facilities developed under integrated waste management systems are not operational or do not operate at the planned capacity and efficiency;
- lack of infrastructure for separate waste collection or its faulty operation, non-implementation of the "pay for what you throw away" system, poor involvement of sanitation operators and local public administration in separate waste collection and transport to waste treatment facilities for recovery.

Municipal waste recycling rate, according to Law 211/2011 on the waste regime, republished, with subsequent amendments and completions and Directive 2008/98 on waste, with subsequent amendments and completions

The Waste Directive 2008/98, as subsequently amended and supplemented, as well as the national legislation transposing it, provide objectives for recycling targets for municipal waste and construction and demolition waste.
In order to verify the achievement of the objective of preparation for reuse and recycling of at least 50% of the total mass generated, at least for waste paper, metal, plastic and glass from household waste or, as the case may be, from other sources, to the extent waste streams are similar to household waste, for the reference year 2018 method 2 of Commission Decision 2011/753 / EU laying down the rules and calculation methods for verifying compliance with the objectives set out in Article 11 (2) of the Directive 2008/98 / EC of the European Parliament and of the Council. This method is used as a result of the provisions of GD no. 942/2017 on the approval of the National Waste Management Plan. Only the quantities of waste paper, metal, plastic, glass and wood from household and similar waste, including public services, shall be taken into account for the purpose. The application of calculation method 2 resulted in a recycling rate of municipal waste of 15.74%.

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

RO 63
Indicator code Romania: RO 63 EEA indicator code: WASTE 003
TITLE: ELECTRICAL AND ELECTRONIC EQUIPMENT WASTE
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.

The main objectives of the legislation in force regarding WEEE are:

- preventing the occurrence of waste electrical and electronic equipment and reusing, recycling and other forms of recovery of these types of waste, to reduce to a large extent, the amount of waste disposed of;
- improving the environmental performance of all operators involved in the life cycle of the EEE (producers, distributors and consumers) and especially of the economic agents directly involved in the treatment of waste electrical and electronic equipment.

Only producers registered in the Register of Manufacturers and Importers of EEE, constituted at NEPA, may be placed on the market.
At the beginning of 2006, the procedure for registering the producers of electrical and electronic equipment was started in the Register of manufacturers and importers of electrical and electronic equipment, according to the requirements of the legislation in force. At the end of 2019, there were 3431 registered manufacturers of electrical and electronic equipment (EEE).
The evolution of the quantities of EEE placed on the market in the period 2014-2018 is presented in the table below.

Table VII.1. EEE placed on the market

Category	Quantities of EEE (tonnes)				
	2014	**2015**	**2016**	**2017**	**2018**
1 - Large household appliances	84995.17	103475.36	129548.53	140581,085	146784,122
2 - Small household appliances	10466.12	14667.61	16224.62	18467,346	22675,815
3 - IT and telecommunication equipment	13400.46	13469.45	13231.54	15230,911	16041,998
4 - Consumer goods	14832.53	15236.29	17594.37	27702,545	26189,229
5 - Lighting equipment	5350.9	6010.49	7042.15	9084,300	13666,176
6 - Electrical and electronic tools	7727.25	9654.61	11108.44	18030,341	23932,625
7 - Toys, sports and leisure equipment	999.47	1616.51	2150.54	3489,874	4718,894
8 - Medical devices (except for all implanted and infected products)	394.51	673.90	564.86	889,331	1430,588
9 - Surveillance and control instruments	938.16	2566.35	2126.21	3343,294	4538,296
10 - Automatic dispensers	482.54	808.83	1093.56	**1225,335**	1169,179
TOTAL	**139587.1**	**168179.40**	**200684.82**	**238044,36**	**261146,92**

Source: National Environment Protection Agency

In order to achieve the annual objectives of collection, reuse, recycling and recovery of WEEE, producers can act:

- individually, using their own resources;
- by transferring these responsibilities, on a contract basis, to a legal economic operator established and authorized for this purpose.

The operating licenses and contact details of the authorized collective organizations are published on the website of the Ministry of Environment, Waters and Forests in the chapter Waste Management - WEEE Commission (http://www.mmediu.ro/categorie/comisie-deee/213).

The minimum objectives for the collection of WEEE, 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;
- In the period 2017-2020, 45% of the average quantities of WEEE 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 2018, the corresponding collection target has not been reached in any year.

The evolution of the quantities of WEEE collected in the period 2014-2018 is presented in the table below.

Table VII.2. WEEE collected

Category	Quantities of EEE (tonnes)				
	2014	**2015**	**2016**	**2017**	**2018**
1 - Large household appliances	20465.24	24122.22	29592.17	31175,22	35755,95
2 - Small household appliances	1021.16	1218.31	1320.07	1303,18	1633,02
3 - IT and telecommunication equipment	4803.3	6837.44	5645.37	6571,14	9362,28

4 - Consumer goods	3513.27	5385.17	7063.19	6545,39	9699,59
5 - Lighting equipment	1140.05	1781.32	1292.77	2002,53	3171,92
6 - Electrical and electronic tools	815.37	796.00	891.33	903,08	1206,34
7 - Toys, sports and leisure equipment	65.6	107.26	115.51	83,39	91,31
8 - Medical devices (except for all implanted and infected products)	34.07	48.43	83.24	67,33	114,16
9 - Surveillance and control instruments	236.42	383.15	411.01	700,15	2065,84
10 - Automatic dispensers	64.51	94.84	239.79	337,79	678,47
TOTAL	**32158.99**	**40774.13**	**46654.45**	**49689,20**	**63778,88**

Source: National Environment Protection Agency

The WEEE collected is treated both in Romania and in other EU member states. The capitalization objectives provided by the legislation, respectively achieved, are presented in the following table.

Table VII.3. Recovery objectives for WEEE

Category	Objective of recovery envisaged by legislation (%)	Achieved recovery targets (%)				
		2014	**2015**	**2016**	**2017 (preliminary data)**	**2018 preliminary data)**
1 - Large household appliances	80	93	70	84	88	90
2 - Small household appliances	70	88	93	75	91	91
3 - IT and telecommunication equipment	75	87	78	99	91	79
4 - Consumer goods	75	88	83	87	91	83
5 - Lighting equipment	80	93	54	80	83	83
6 - Electrical and electronic tools	70	91	95	71	91	89
7 - Toys, sports and leisure equipment	70	84	65	82	91	94
8 - Medical devices (except for all implanted and infected products)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
9 - Surveillance and control instruments	70	86	88	71	95	95
10 - Automatic dispensers	80	92	93	83	86	89

Source: National Environment Protection Agency

PACKAGING WASTE

RO 17
Indicator code Romania: RO 17
EEA indicator: CSI 17
TITLE: GENERATION AND RECYCLING OF PACKAGING WASTE
DEFINITION: The indicator is the total quantity of packaging used in Romania, expressed in kg per capita and year.

Based on the legislation in force, the economic operators with responsibilities report the data on the packaging placed on the market and the managed packaging waste. The analysis and interpretation of the data was performed by NEPA. The results obtained are presented below.
The annual targets for recovery or incineration in energy recovery incineration plants and, respectively, 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% by weight of packaging waste;

b) recycling of at least 55% of the total weight of packaging materials contained in packaging waste, with the achievement of minimum values for the recycling of each type of material contained in packaging waste.

(2) The values of recycling targets for each type of material are as follows:

a) 60% by weight for glass; RSY
b) 60% by weight for paper / cardboard;
c) 50% by weight for metal;
d) 15% by weight for wood;
e) 22.5% by weight for plastic, considering only recycled plastic material.

Table VII.4. 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 Environment Protection Agency

Table VII.5. Recovered 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	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**

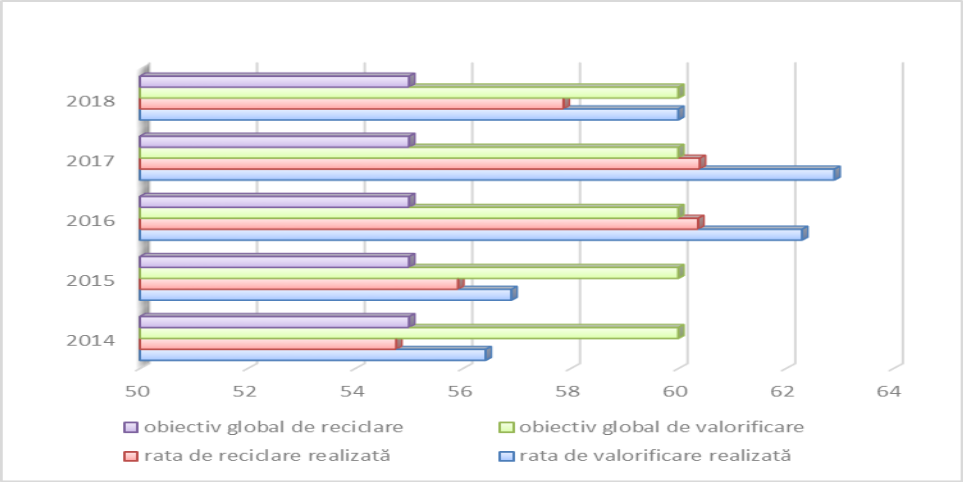
Source: National Environment Protection Agency

Table VII.6. Waste of recycled packaging, by material types, 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 Environment Protection Agency

Figure VII.4. The trend of recovery and recycling rates for packaging waste



Source: National Environment Protection Agency

END-OF-LIFE VEHICLES (VSU)

RO 69
Indicator code Romania: RO 69 EEA indicator code: TERM 11
TITLE: END OF LIFE VEHICLES
DEFINITION: The indicator shows the number of end-of-life vehicles and tracks whether the reuse and recovery target and the reuse and recycling target relative to the average empty mass of the end-of-life treated vehicles have been met. The indicator is expressed in units collected / year and percentage.

The economic operators involved in the management of end-of-life vehicles are: manufacturers, distributors, collectors, insurance companies, as well as operators whose activity object is: treatment, recovery, recycling of end-of-life vehicles, including their components and materials.

Between 2007 and 2014, the economic operators had the obligation to ensure the achievement of the following objectives, taking into account the average empty mass:

- re-use and recovery of at least 75% of the average mass per vehicle and year of vehicles manufactured before January 1, 1980;
- the re-use and recovery of at least 85% of the average mass per vehicle and year of vehicles manufactured after January 1, 1980;
- re-use and recycling of 70% of the average mass per vehicle per year of vehicles manufactured before January 1, 1980;
- re-use and recycling of 80% of the average mass per vehicle and year of vehicles manufactured since January 1, 1980.

Starting with January 1, 2015, the economic operators are obliged to ensure the achievement of the following objectives, taking into account the average empty mass:

- re-use and recovery of at least 95% of the average mass per vehicle and year, for all end-of-life vehicles;
- re-use and recycling of at least 85% of the average mass per vehicle per year, for all end-of-life vehicles.

In order to monitor the achievement of the objectives set out above, economic operators carrying out collection and treatment operations of end-of-life vehicles are required to report specific information. The centralized data at national level are presented below.

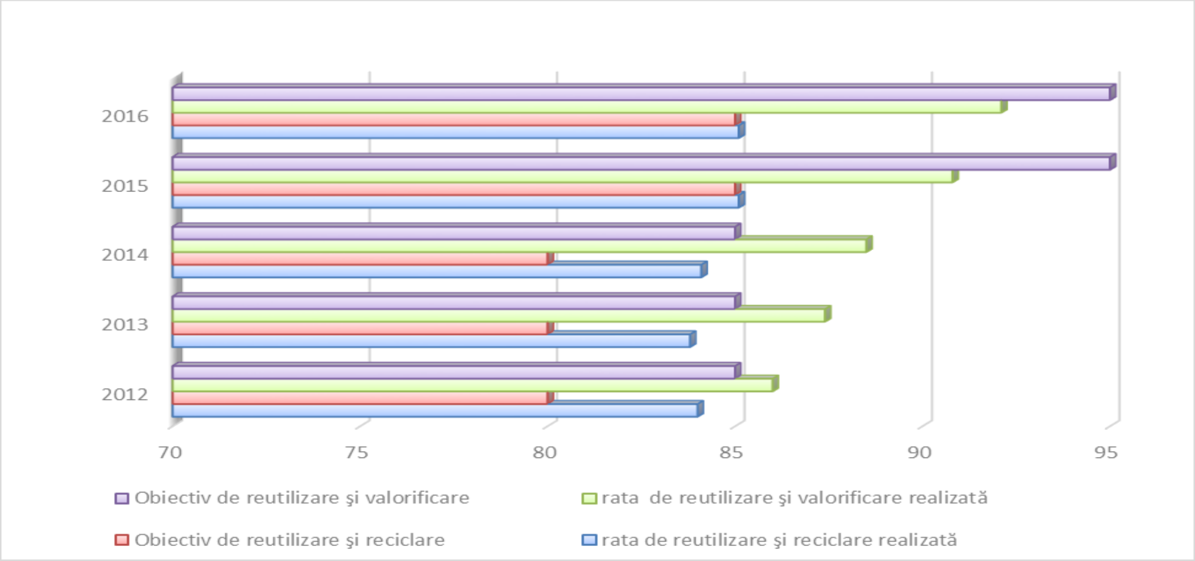
Table VII.7. VSU collected and treated in the period 2012 – 2016

Număr VSU	2012	2013	2014	2015	2016
	bucăți	bucăți	bucăți	bucăți	bucăți
VSU colectate	55374	37340	43351	43228	44762
VSU tratate*	57950	37989	42138	41886	46576

** Diferența dintre numărul de vehicule scoase din uz colectate și numărul de vehicule scoase din uz tratate se datorează faptului că nu toate vehicule scoase din uz în anii anteriori au fost tratate*

Source: National Environment Protection Agency

Figure VII.5. Trend of re-use / recycling / recovery rates



Source: National Environment Protection Agency

CHANGES RELEVANT TO THE CLIMATE FRAMEWORK IN ROMANIA

RO 12

Indicator code Romania: RO 12
EEA indicator code: CSI 12

TITLE: TEMPERATURE AT NATIONAL LEVEL

DEFINITION: This indicator shows absolute changes and average temperature changes at national level.

Climate characterization of 2019

In 2019, the average annual temperature in the country (10.9ºC; Table VIII.1.) was 1.7ºC higher than the standard climatological normal (for the reference period 1981 - 2010) (Figure VIII.1.). The highest average annual temperatures, over 12.0 ºC were recorded at altitudes below 250 m in Muntenia, Oltenia, southern Moldova, Crișana, Banat and Maramureș and throughout Dobrogea. The highest value of the average annual temperature in the country, 14.4 ºC, was registered at the Constanța meteorological station, and the lowest, -0.6 ºC, at Omu Peak. Positive deviations of the average monthly temperature, average per country, compared to the climatological normal (1981-2010), corresponding to each month, were registered in 9 of the 12 months of the year and had values between 0.5 ºC (April) and 4.9 ºC (March). In May and July, the deviation values were negative, but close to normal (-0.9 ºC in May and -0.2 ºC in July), and in January the average monthly temperature, average per country, was equal to normal climatological (1981-2010). Analyzing the classification in severity classes of the thermal anomalies from 2019, compared to the median of the reference interval, it is found that the thermal regime was extremely hot throughout the country. It should be noted that the year 2019 is on the first place in the top of the warmest years from the period that begins with the year 1900 and until now.

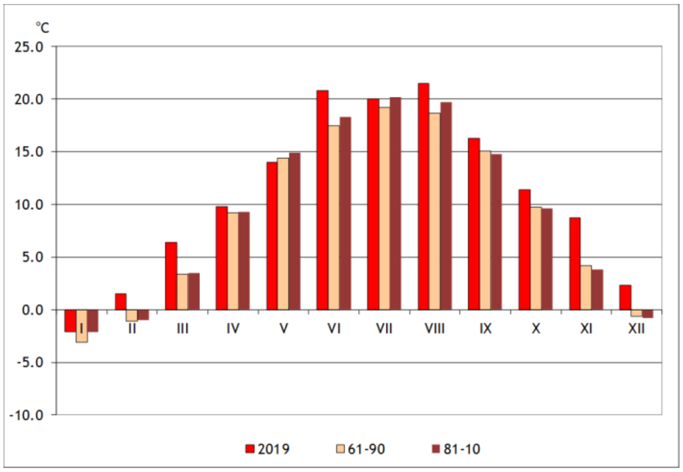
The distribution on the territory of the country of the average annual temperature in 2019 is presented in Figure VIII.2.

Tabelul VIII.1. Average annual temperatures and average annual rainfall in Romania in recent years.

Year	2014	2015	2016	2017	2018	2019
Temperature (în ºC)	10,2	10,5	10.4	9,9	10,4	10,9
Precipitations (în mm)	807,8	630,1	791,5	673,5	698,8	614,2

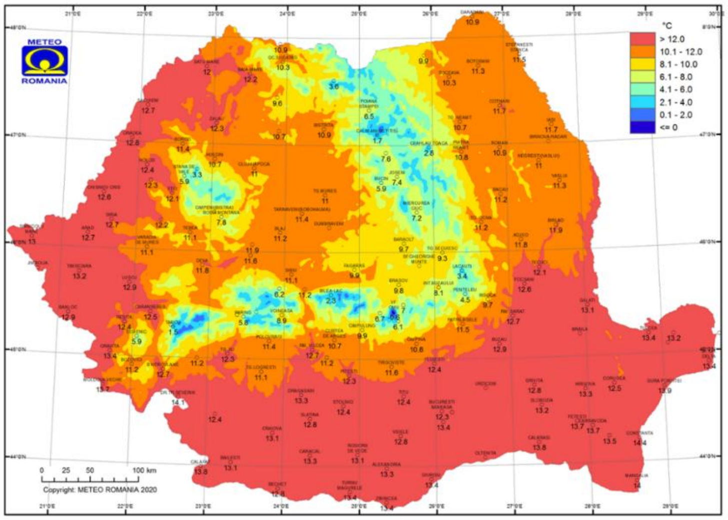
Source: National Meteorological Administration

Figure VIII.1. The average monthly temperature in Romania in 2019, compared with the climatological norm (1961-1990, 1981-2010)



Source: National Meteorological Administration

Figure VIII.2. Average annual temperatures in 2019 (în ºC).



Source: National Meteorological Administration

RO 47

Indicator code Romania: RO 47
EEA indicator code: CLIM 02

TITLE: RAINFALLS AVERAGE

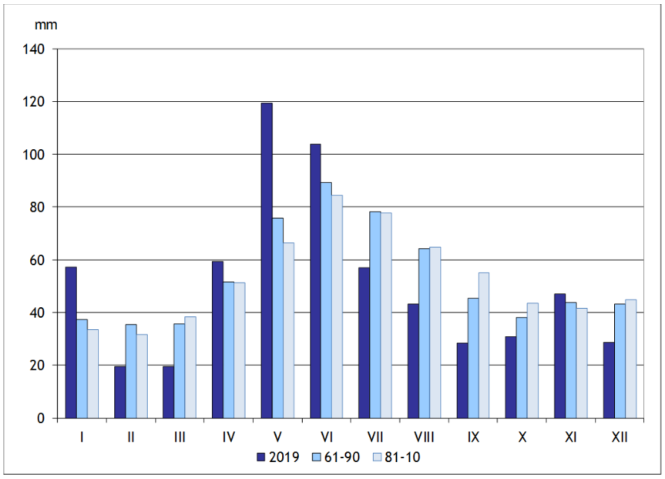
DEFINITION: This indicator is defined by:

- Annual rainfall trends at national level
- The projected changes in annual rainfall and summer season at national level

The average amount of precipitation accumulated in 2019 in Romania (614.2 mm; Table VIII.1.) was only 3% lower than the climatological normal (1981-2010) (Figure VIII.3.). Annual precipitation amounts greater than 1000 mm were recorded only in mountainous areas. The lowest annual rainfall, below 400 mm, was recorded in Dobrogea, southeastern Moldova and eastern Muntenia, and in the plain and plateau areas (at altitudes below 550-600 m) the annual rainfall had values between 400 and 600 mm. The highest annual rainfall was recorded in Bâlea-Lac, 1641.0 mm, and the lowest, 157.9 mm, in Sulina. Negative deviations of the amount of monthly precipitation, average per country, compared to the climatological normal (1981-2010) corresponding to each month, calculated as a percentage, were in 7 of the 12 months of the year, ranging between 27% in July and 49% in March, and positive deviations were registered in the rest of the months, oscillating between 13% in November and 80% in May. Analyzing the classification in severity classes of the rainfall anomalies from 2019 compared to the median of the reference interval (1981-2010), it is found that the rainfall regime was deficient and very deficient in Dobrogea, in the western half of Maramureş, in the north of Banat and on areas in central and northwestern Transylvania. In the central-western half of Moldova, in the Ciuc Depression and in the east of Maramureş, the precipitations were surplus or even very surplus. Otherwise, the annual rainfall was within normal limits, with isolated surpluses and deficits.

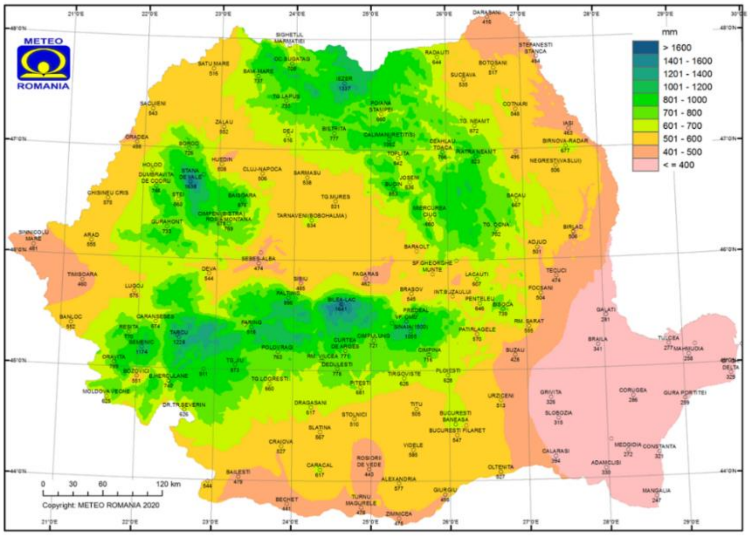
The distribution on the territory of the country of the annual precipitation quantities in 2019 is presented in Figure VIII.4.

Figure VIII.3. The average monthly amount of rainfall in Romania in 2019, compared with the climatological norm (1961-1990, 1981-2010)



Source: National Meteorological Administration

Figure VIII.4. Annual amounts of precipitation in 2019 (in mm).

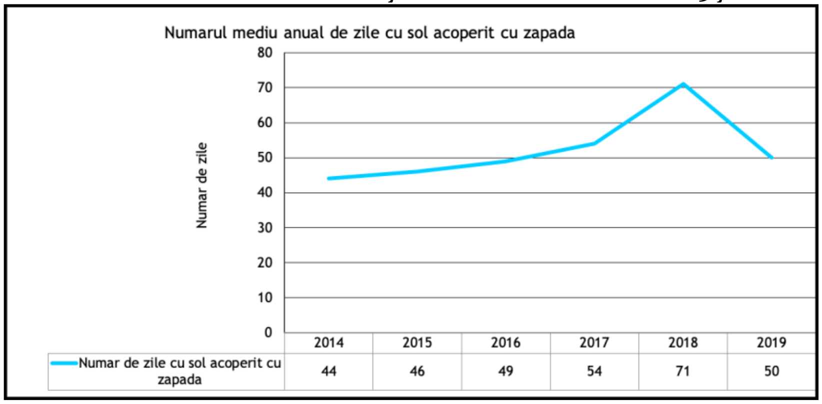


Source: National Meteorological Administration

RO 49
Indicator code Romania: RO 49 EEA indicator code: CLIM 08
TITLE: THE DEGREE OF SNOW COVERING
DEFINITION: This indicator is defined by: • Evolution of snow cover at national level •Trend of snow recorded in March (excluding mountain areas) •Forecast changes concerning the annual number of days with snow

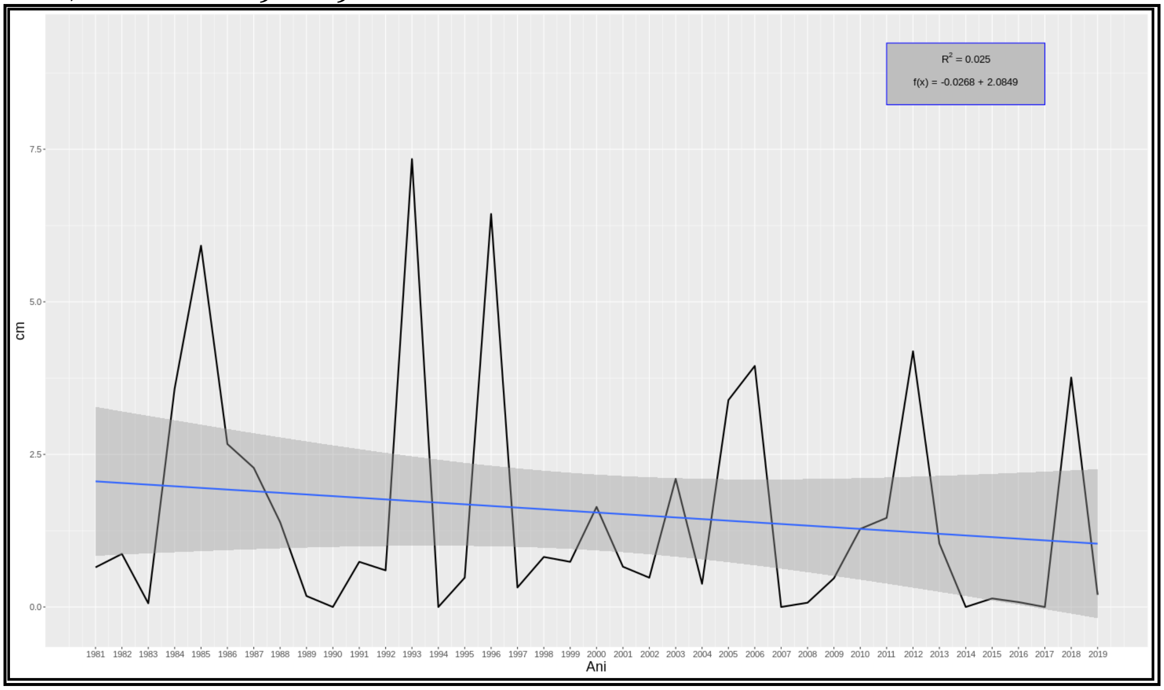
The average annual number of snow-covered days in Romania is illustrated in Figure VIII.5. In 2019 there was a decrease in the number of days with snow-covered soil, compared to 2018. The trend of the thickness of the snow layer (except for mountain stations), highlighted in March, for the period 1981-2019, is one of significant reduction , consistent with developments in both Europe and Asia (Figure VIII.6.) and in line with the global warming signal.

Figure VIII.5. The average annual number of snow-covered days in Romania over the last 5 years and in 2019.



Source: National Meteorological Administration

Figure VIII.6. The evolution of the average thickness of the snow layer (in cm) at the level of Romania (except for the mountain stations) in March, in the interval 1981-2019 and the associated linear trend.



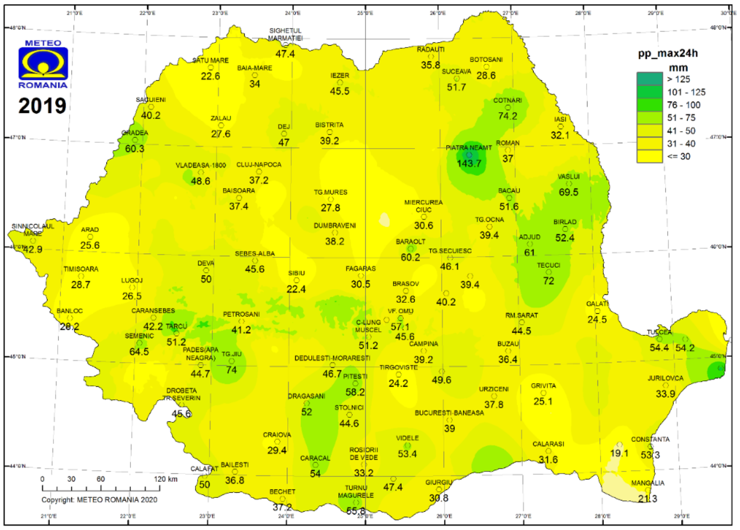
Source: National Meteorological Administration

RO 48
Indicator code Romania: RO 48 EEA indicator code: CLIM 04
TITLE: EXTREME RAINFALL
DEFINITION: This indicator is defined by: • Evolution of the number of consecutive days with rainfall (wet periods), or no precipitation (dry periods) • The projected changes for the next 20 years on maximum rainfall during summer and winter

The map on the maximum amount of precipitation recorded in 24 hours in 2018 (Figure VIII.7.) is consistent with the general characteristics of 2019 (Figure VIII.4.).

In 2019, the maximum value of the maximum amount of precipitation accumulated in 24 hours, was registered in Piatra Neamț (Figure. VIII.7).

Figure VIII.7. The maximum amount of precipitation accumulated in 24 hours, recorded in 2019, at the meteorological stations covering the territory of Romania (in mm).

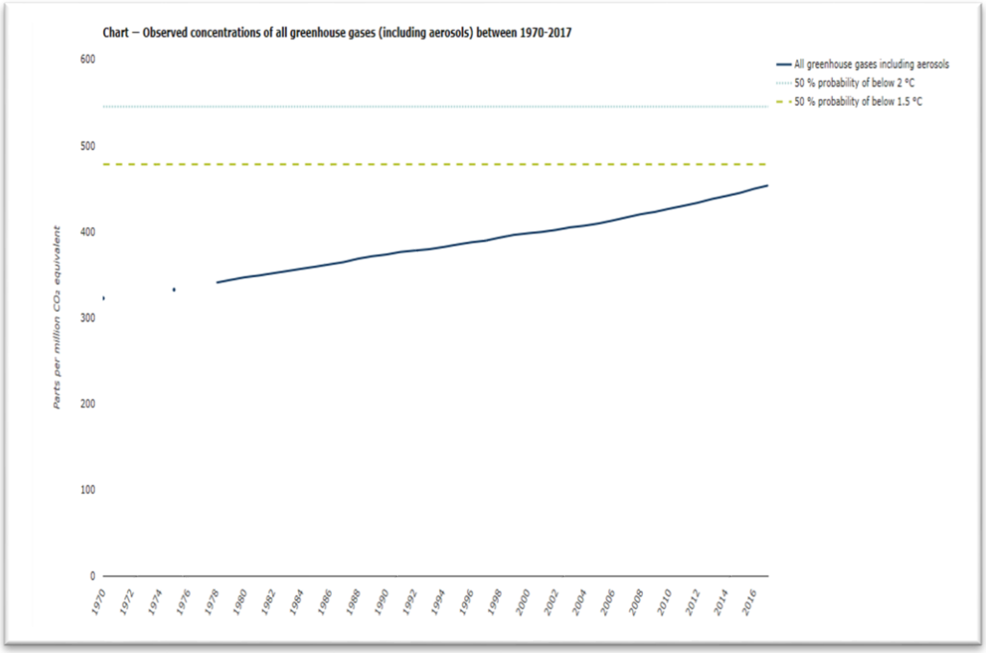


Source: National Meteorological Administration

CONCENTRATION OF GREENHOUSE GAS IN THE ATMOSPHERE

RO 13
Indicator code Romania: 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. • Forecast changes for the next 20 years on maximum rainfall in summer and winter

Figure VIII.8. Trends observed in total greenhouse gas concentrations (1970-2017)

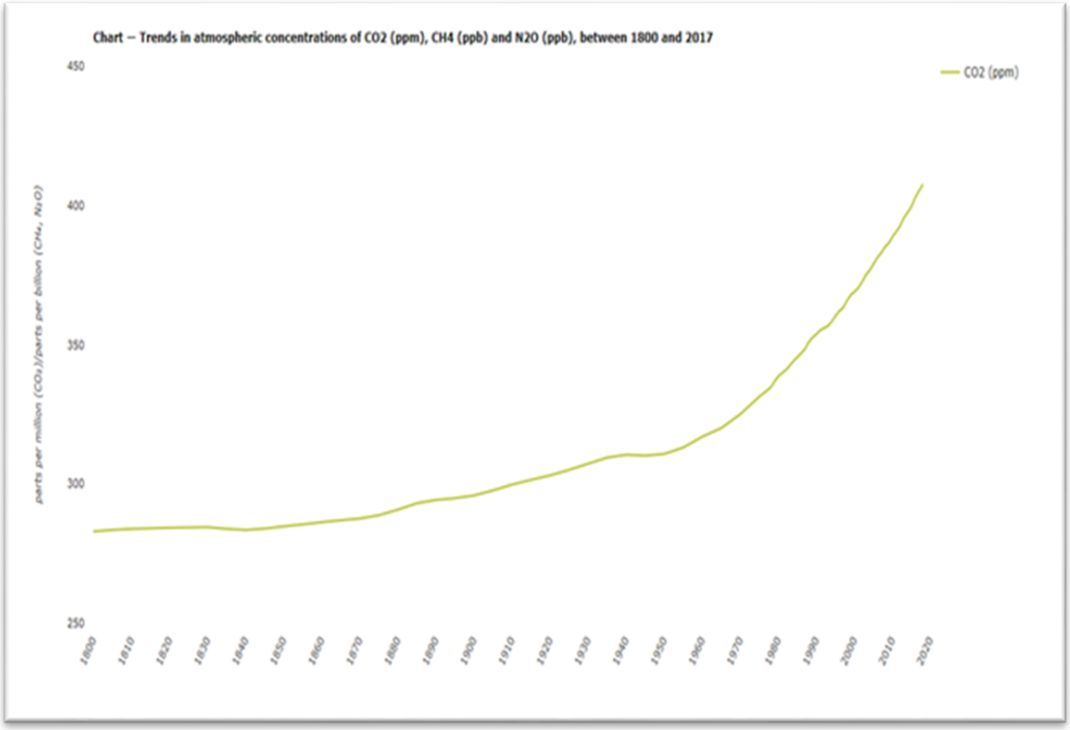


Sursa: *https://www.eea.europa.eu/data-and-maps/indicators/atmospheric-greenhouse-gas-concentrations-6/assessment*

Note:
Data are expressed in CO_2 equivalent.
The figure includes the contribution of the Kyoto Protocol (KPG) gases, the Montreal Protocol gases (MPG) and other coercive agents, such as ozone and aerosols (referred to herein as non-protocol gases (NPG)). The values of 430 and 530 ppm CO_2 equivalent correspond to a 50% probability of limiting the increase of the global average temperature to 1.5 ° C and 2.0 ° C respectively above pre-industrial levels. Note that the trend only covers the period 1970-2015, due to the limited availability of historical data on ozone forcing.

The average annual level of CO2 concentration reached 405 ppm in 2017 and 408 ppm in 2018 (Figure VIII.9). This represents an increase of over 125 ppm (+ 145%) compared to pre-industrial levels (before 1800) (NOAA, 2018). In general, CO2 concentrations in the atmosphere exceed the range of concentrations recorded in ice cores in the last 800,000 years (IPCC, 2013).

Figure VIII.9. Global carbon dioxide concentration



Source: https://www.eea.europa.eu/data-and-maps/indicators/atmospheric-greenhouse-gas-concentrations-6/assessment

Note:
CO_2 (carbon dioxide) in parts per million (ppm)
CH_4 (methane) in parts per billion (ppb)
N_2O (nitrous oxide) in parts per billion (ppb)

THE IMPACT OF CLIMATE CHANGE ON NATURAL SYSTEMS

RO 53
Indicator code Romania: 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 100-year return period.

For the years 2017, 2018 and 2019 I.N.H.G.A. Bucharest has not established significant historical flood events.

Table VIII.2. Synthetic table on floods in Romania

No. Crt.	Year	No. events	No. significant events	Affected urban areas
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

Source: National Administration "Romanian Waters" and National Institute of Hydrology and Water Management

During 2019, a number of 154 extreme meteorological phenomena were registered, of which:

- 140 extreme events caused by floods or river runoff;
- 12 events caused by melting snow or due to the freeze-thaw phenomenon;
- 1 coastal erosion event on the Black Sea coast;
- 1 extreme event produced by drought.

Următoarele evenimente au însoțit fenomenele de inundații:

- 27 extreme events caused by heavy rainfall and puddles;
- 14 extreme events caused by heavy rainfall and hail;
- 11 extreme events caused by heavy rainfall and wind.

A number of 1243 ATUs and 3246 localities were affected by the floods at least once. Population affected by floods: 6945 inhabitants.

THE IMPACT OF CLIMATE CHANGE ON SOCIO-ECONOMIC SYSTEMS AND SECTORS

RO 56

Indicator code Romania: RO 52
EEA indicator code: CLIM 030

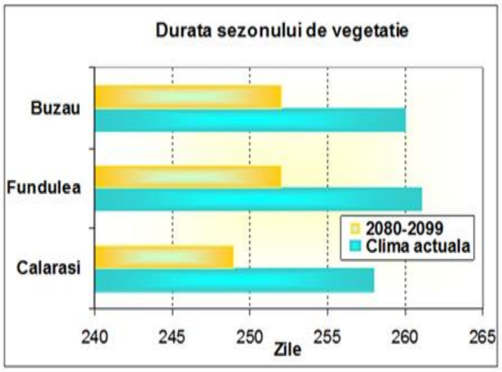
TITLE: THE AGRICULTURAL GROWTH SEASON

DEFINITION: This indicator is defined by the number of days with positive temperatures in a year.

The season of vegetation represents that period of the year, also called the frost-free season, in which the most favorable conditions of plant development are recorded. Figure VIII.10 shows the duration of the growing season for the wheat crop for both the present period and the period between 2080-2099.

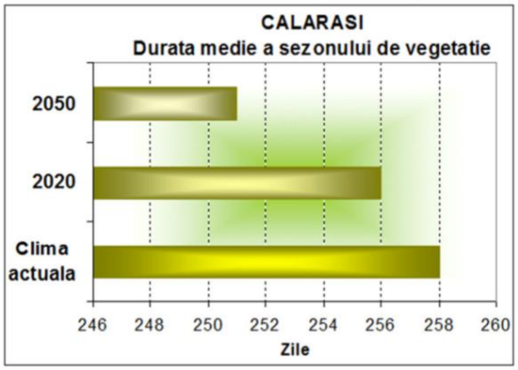
The projections were made using the climatic model RegCM3, developed at ICTP, Trieste, under the IPCC, A1B emission scenario. For all three stations analyzed significant decreases (number of days) of the duration of the vegetation season are observed. For example, in Calarasi (Figure VIII.11), it is possible to observe a decrease of the vegetation season by 2-14 days, due to the increase of the temperature. For the average duration of the growing season, simulations of the HadCM3 climate model were used, for the period 2020-2050, under the IPCC A2 emission scenario.

Figure VIII.10. Duration of the wheat growing season 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

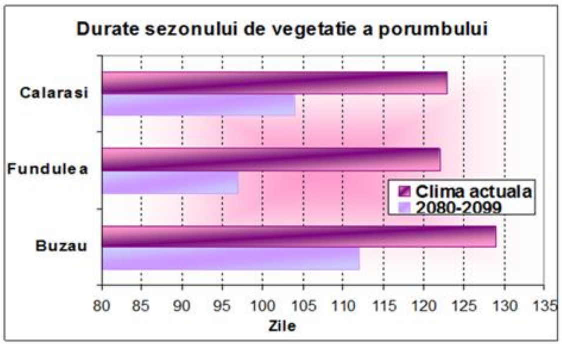
Figure VIII.11. Duration of the wheat growing season at the Calarasi station



Source: National Meteorological Administration, Extreme meteorological phenomena in Romania - implications on agriculture, 5th edition ICAR Forum

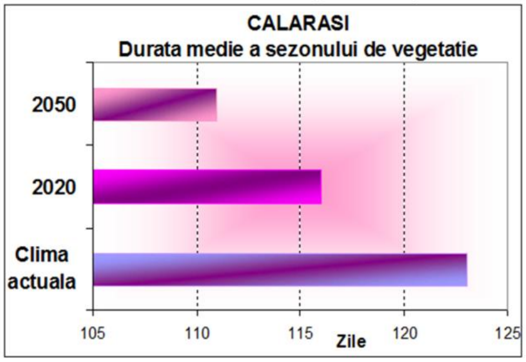
Regarding the corn crop (Figure VIII.12), a decrease of the production is observed as a result of the increase of the water deficits in the soil, especially in the filling phase of the grains. For Calarasi station (Figure VIII.13), the shortening of the vegetation season by 7 days in 2020 and 12 days in 2050, respectively, is observed, as a result of the increase in air temperature.

Figure VIII.12. Duration of the growing season for corn crop 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.13. Duration of the vegetation season for corn cultivation at Calarasi station



Source: National Meteorological Administration, Extreme meteorological phenomena in Romania - implications on agriculture, 5th edition ICAR Forum

RO 57

Indicator code Romania: RO 57
EEA indicator code: CLIM 32

TITLE: PRODUCTIVITY OF AGRICULTURAL CROPS DETERMINED BY THE LACK OF WATER RESOURCES

DEFINITION: This indicator can be mainly defined by the yield of agricultural crops due to the lack of water resources.

The availability of ground water is directly affected by the water requirement of the crops for evapotranspiration, which depends mainly on the temperature and the vegetation stage of the plant, and the water requirement of the crops depends on the local weather conditions: soil, the development stage of the plant and its characteristics.

Forecasts of climate change (air temperature and precipitation) in Romania for the period 2001 - 2030 were built by applying two extrapolation methods (dynamic and static) recommended by IPCC and applied to some global models (AOGCM) or regional models (RegCM) and applied in the case of the A1B IPCC forecast (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;
- average rainfall values for December and February will decrease, while October and June will increase, and for the other months average values will not change significantly.

The results of the dynamic modeling for the period 2001-2030 compared to the period 1960-1990 show:

- the average temperature will increase further in the eastern part of Romania;
- the temperature of the winter air outside the Carpathians is expected to drop by 1.5 ° C, and in summer it will increase by 0.2 ° C;
- spring - the temperature will increase by 1.8 ° C;
- autumn - the temperature is expected to rise;
- summer - rainfall will increase especially in the west;
- increased rainfall in the autumn season;
- decrease of precipitation in the winter season.

Source: 5th National Communication of Romania, Bucharest January 2010

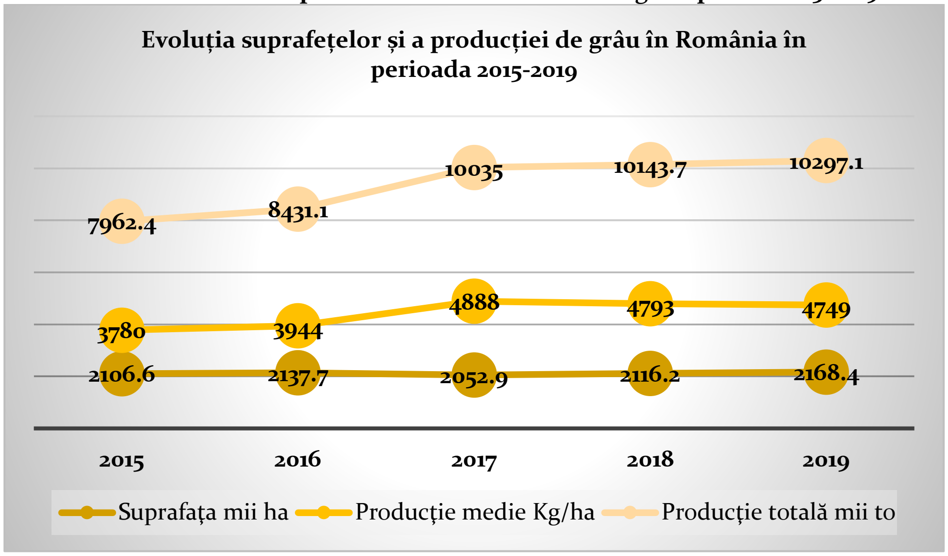
Table VIII.3. The cultivated area and production of wheat crop in Romania, perioada 2015-2019

Year	The cultivated surface		Year
2015	2106.6	7962.4	3780
2016	2137.7	8431.1	3944
2017	2052.9	10035	4888
2018	2116.2	10143.7	4793
2019	**2168.4**	**10297.1**	**4749**

INS data source, TEMPO-Online database

The evolution of wheat crop yield in Romania (kg / ha), period 2015-2019, is illustrated in the Figure below.

Figure VIII.14. The evolution of areas and wheat production in Romania during the period 2015-2019



INS data source, TEMPO-Online database

RO 58

Cod indicator România: RO 58

Cod indicator AEM: CLIM 34

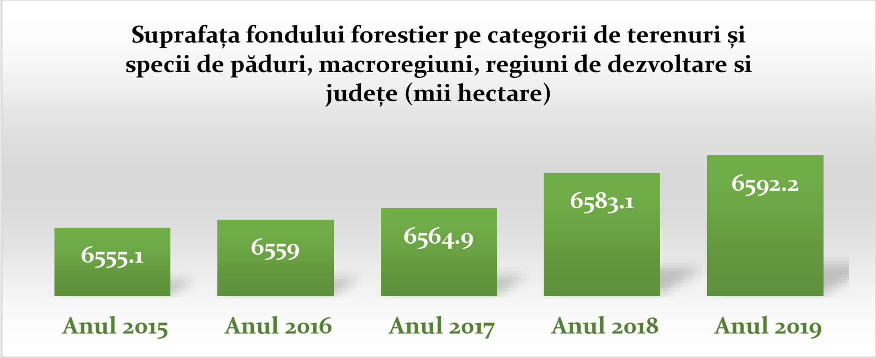
TITLE: AREAS OCCUPIED BY FORESTS

DEFINITION: This indicator is defined by:

- The forest area;
- The volume of forest biomass.

The evolution of the forest fund area in the period 2015-2019, by categories of land and forest species, macro-regions, development regions and counties, is represented in Figure VIII.15.

Figure VIII.15. The evolution of the forest fund surface



INS data source, TEMPO-Online database

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 wood harvested

In accordance with the provisions of Law no. 46/2008 - Forestry Code, with subsequent amendments and completions, of the provisions of forestry arrangements and of the real conditions of exploitation of the wood mass, in 2019, from the forest fund public property of the state was harvested a total volume of 9,447 thousand m³ of wood mass .

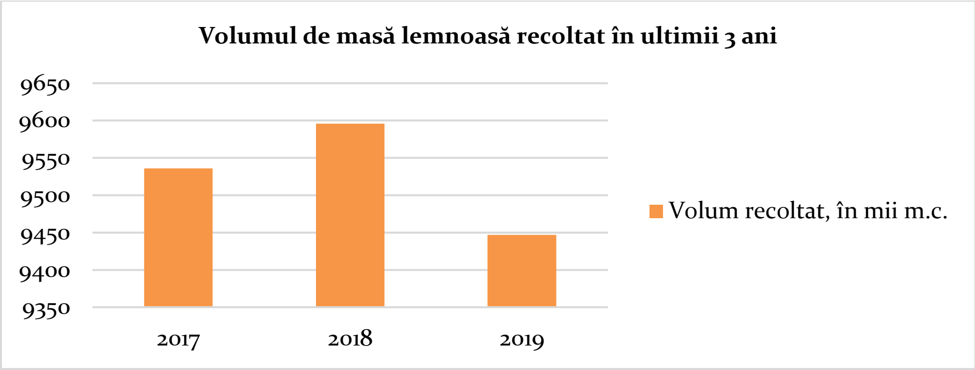
The situation of wood harvesting by ways of capitalization is presented in the Table VIII.4.

Table VIII.4. The situation of harvesting the wood mass by ways of capitalization (thousand m³)

YEAR	Total volume of wood harvested	Of which: capitalized as standing timber	operated by providing services	operated on its own
2017	9.535,8	7.556,2	441,8	1.537,8
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

Source: National Directorate of Forests - Romsilva

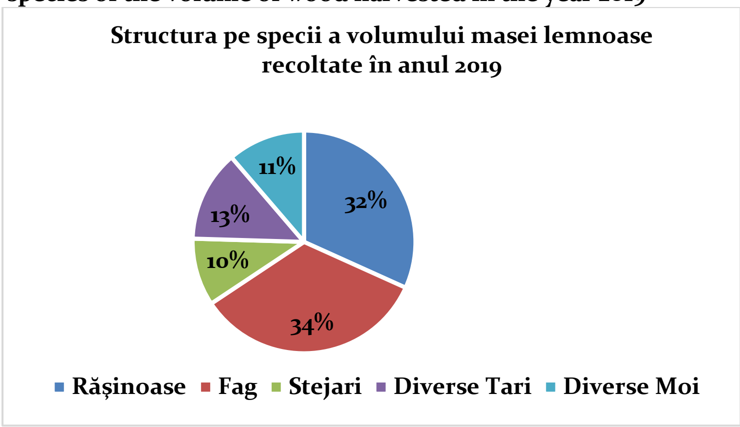
Figure VIII.16. The volume of wood harvested in the last 3 years



Source: National Directorate of Forests - Romsilva

The structure by species of the volume harvested in 2019 is, in general, similar to that of previous years, being represented as follows:

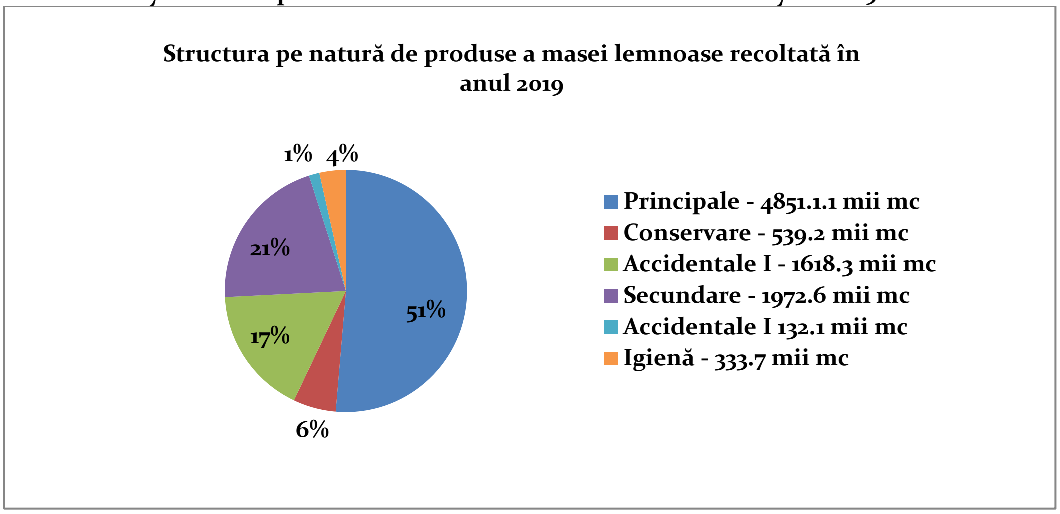
Figure VIII.17. The structure by species of the volume of wood harvested in the year 2019



Source: National Directorate of Forests - Romsilva

By nature of products, 7,372.1 thousand cubic meters are the main products and those assimilated to them (canning and accidental products I), 1,938.5 thousand cubic meters are by-products (including the volume of accidental products II) and 285.3 thousand cubic meters are hygiene products.

Figure VIII.18. The structure by nature of products of the wood mass harvested in the year 2019



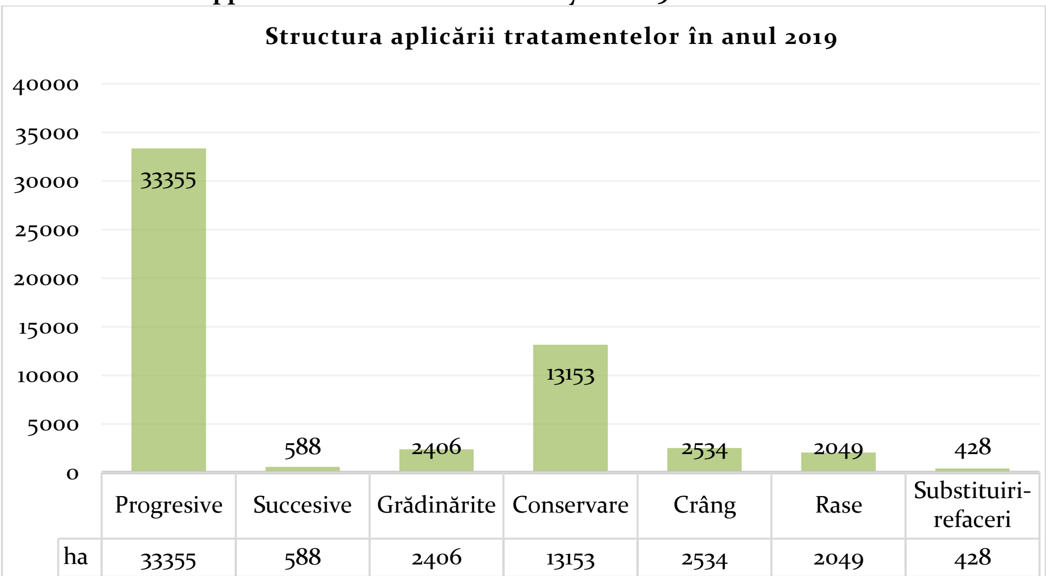
Source: National Directorate of Forests - Romsilva

Due to the action of destabilizing factors, biotic and / or abiotic, during 2019 accidental products were harvested that accumulated a volume of 1,750.4 thousand cubic meters (18% of the total volume of wood harvested in 2019), from which 1,618.3 thousand cubic meters of accidental products I and 132.1 thousand cubic meters of accidental products II.

The rational and sustainable management of the state-owned forest fund 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 continuously exercising the multiple functions (ecological, economic and social) that trees can meet. 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 share of the application of treatments (methods of regeneration of trees), as area covered, is shown in the graph below.

Figure VIII.19. The structure of the application of treatments in the year 2019



Source: National Directorate of Forests - Romsilva

B. Care work for young trees

In the forest fund public property of the state administered by RNP - Romsilva in 2019, care works were carried out on a total area of 107,360 ha, in accordance with the provisions of the forest arrangements.

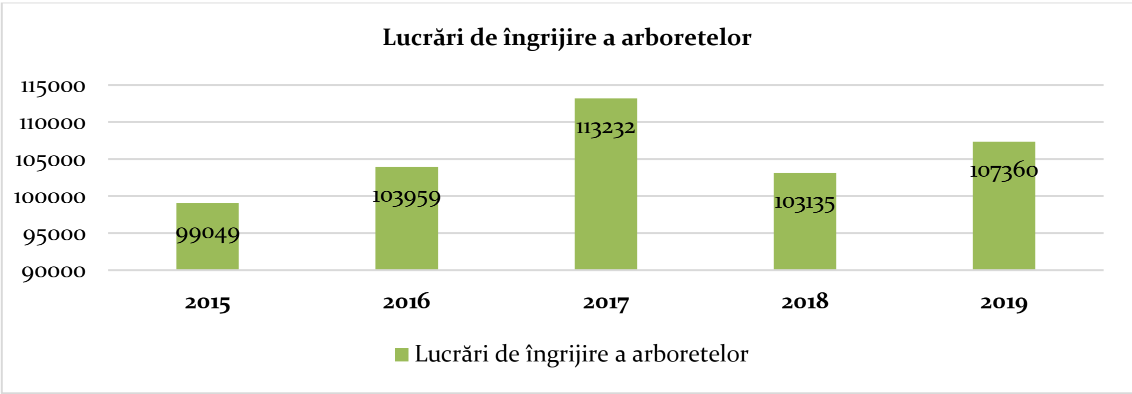
By nature of works, the situation of carrying out the care works is presented as follows:

Table VIII.5. The situation of carrying out the care works by nature of works (ha)

The nature of the works	2015	2016	2017	2018	2019
Releases	9.344	10.220	10.614	12.797	11.334
Clearing	15.447	16.388	17.040	18.723	17.533
Thinning	72.578	75.814	83.067	69.978	76.430
Artificial pruning	1.680	1.537	2.511	1.637	2.063
TOTAL	**99.049**	**103.959**	**113.232**	**103.135**	**107.360**

Source: National Directorate of Forests - Romsilva

Figura VIII.20. Works care stands



Source: National Directorate of Forests - Romsilva

In the forest fund of other owners, based on the forest administration / services contracts concluded with RNP - Romsilva, the forestry departments aimed at carrying out the care works of young trees and in the forest fund of other owners, in accordance with the provisions of forest arrangements and the condition of trees.

In 2019, in the respective forests, care works were carried out on the young stands on 13,258 ha, of which:

- Releases 761 ha;
- Clearing 1.333 ha;
- Thinning 11.164 ha.

RO 60
Indicator code Romania: RO 60 EEA indicator code: CLIM 036
TITLE: EXTREME TEMPERATURES AND HEALTH
DEFINITION: This indicator is defined by the annual national mortality rate caused by extreme summer temperatures.

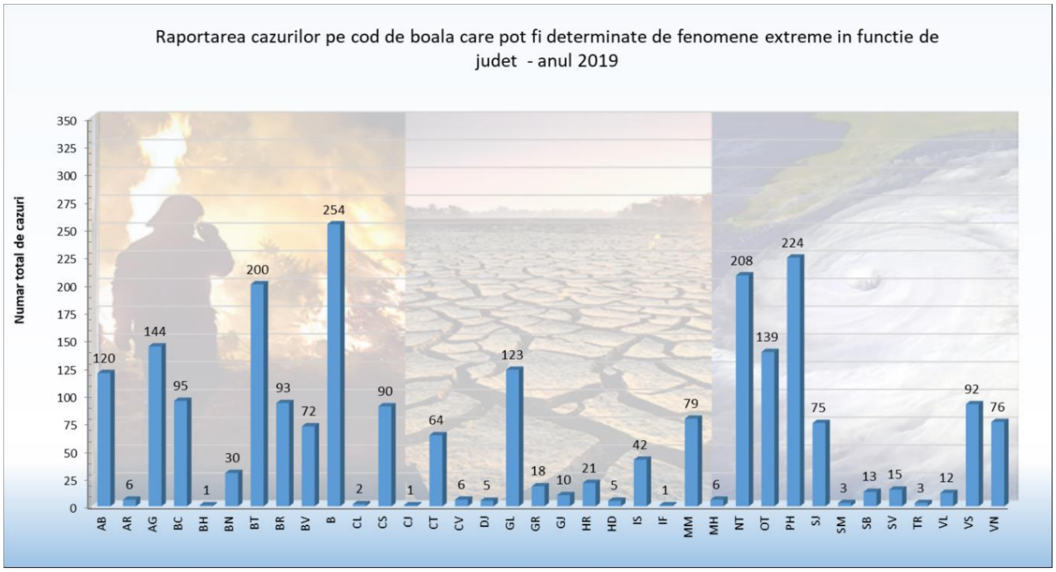
CNMRMC - INSP, manages the National Electronic Register of Environmental Risks (ReSanMed). The ReSanMed Register is a specific tool at national level for managing information related to the impact of environmental factors on population health, established in 2017, the year in which CNMRMC organized a training session with all data providers (DSP representatives) who accesses the register. The purpose of this register is to identify, obtain and analyze information on the role of environmental factors in the onset or worsening of diseases among the general population, in order to apply prevention measures and make the best decisions to improve the health of the population.

One of the objectives of this register is to monitor the direct effects on certain categories of diseases influenced by global climate change and extreme weather events.

In ReSanMed were registered a number of 1342 reports in the climate change module in 2017, 1750 cases in 2018 and 2348 cases in 2019.

The following counties were NOT registered in the ReSanMed electronic platform in relation to Climate Change for 2019: Buzău, Dâmbovița, Ialomița, Mureș, Timiș, Tulcea.

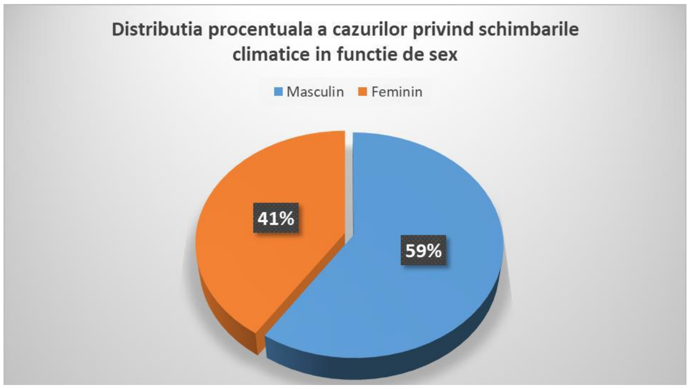
Figure VIII.21. Reporting cases by disease code that can be determined by extreme phenomena depending on the county - year 2019



Source National Institute of Public Health - National Center for Risk Monitoring in the Community

The gender distribution of Climate Change cases is shown in the figure below.

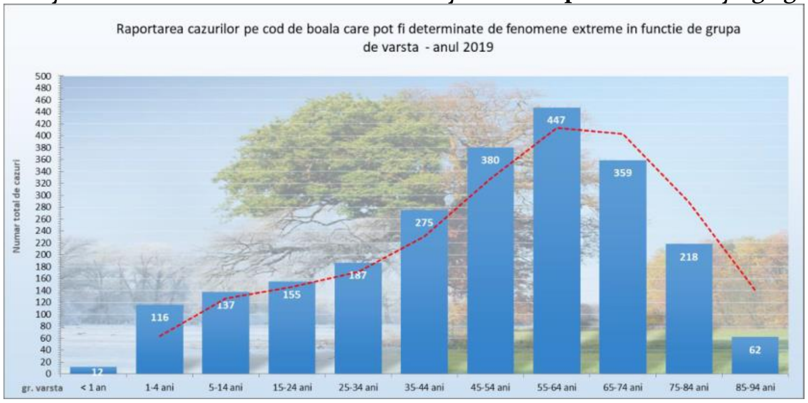
Figure VIII.22. Percentage distribution of climate change cases by gender



Source National Institute of Public Health - National Center for Risk Monitoring in the Community

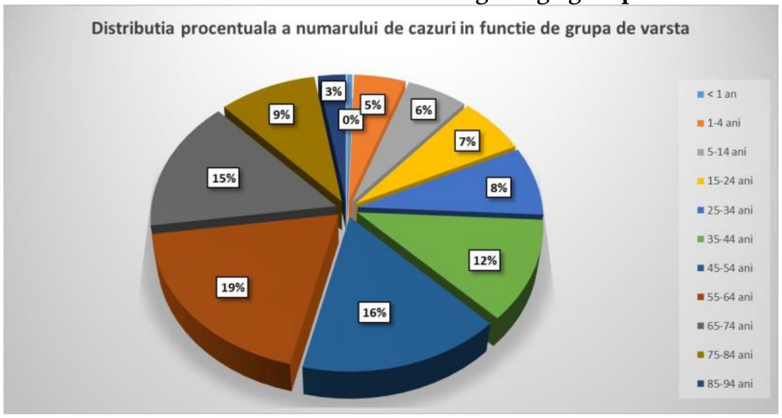
According to the ReSanMed platform records for the Climate Change module, 11 age groups have been structured for the distribution of cases according to age:

Figure VIII.23. Reporting cases by disease code that can be caused by extreme phenomena by age group - year 2019



Source National Institute of Public Health - National Center for Risk Monitoring in the Community

Figure VIII.24. Percentage distribution of the number of cases according to age group

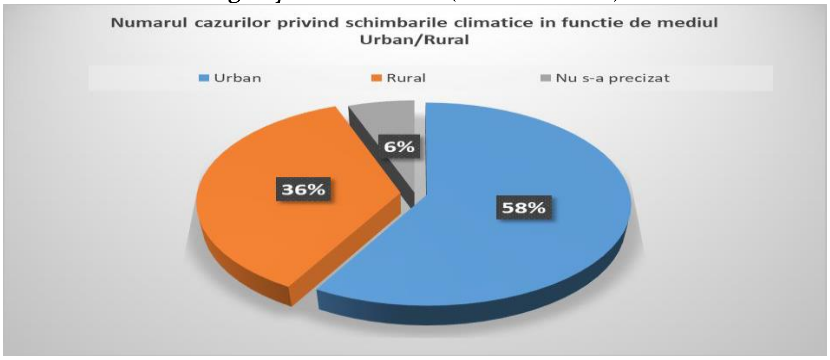


Source National Institute of Public Health - National Center for Risk Monitoring in the Community

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 55-64 years.

The reporting by residence (urban / rural environment) is represented in the figure below.

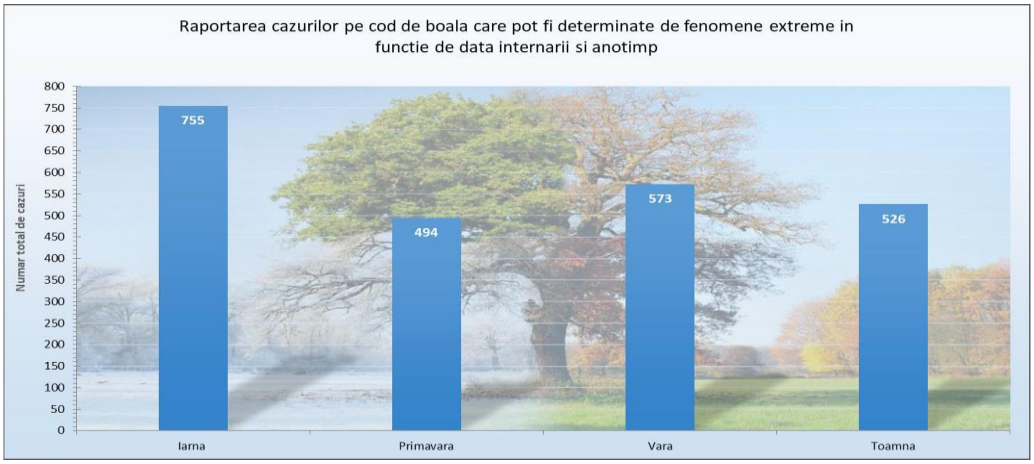
Figure VIII.25. Number of cases of climate change by environment (Urban / Rural)



Source National Institute of Public Health - National Center for Risk Monitoring in the Community

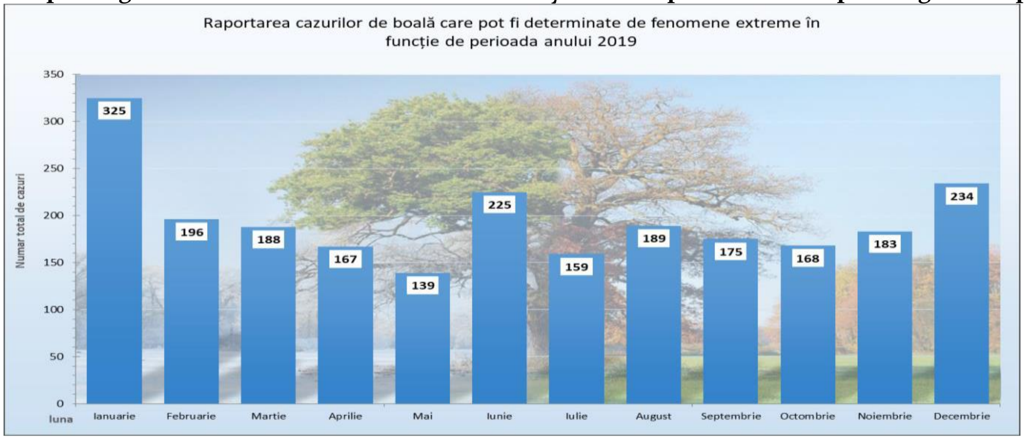
Most hospitalized cases were in the winter months (with a maximum in January), about 76% more than in the other months of the year.

Figure VIII.26. Reporting cases by disease code that can be caused by extreme phenomena depending on the date of admission and season



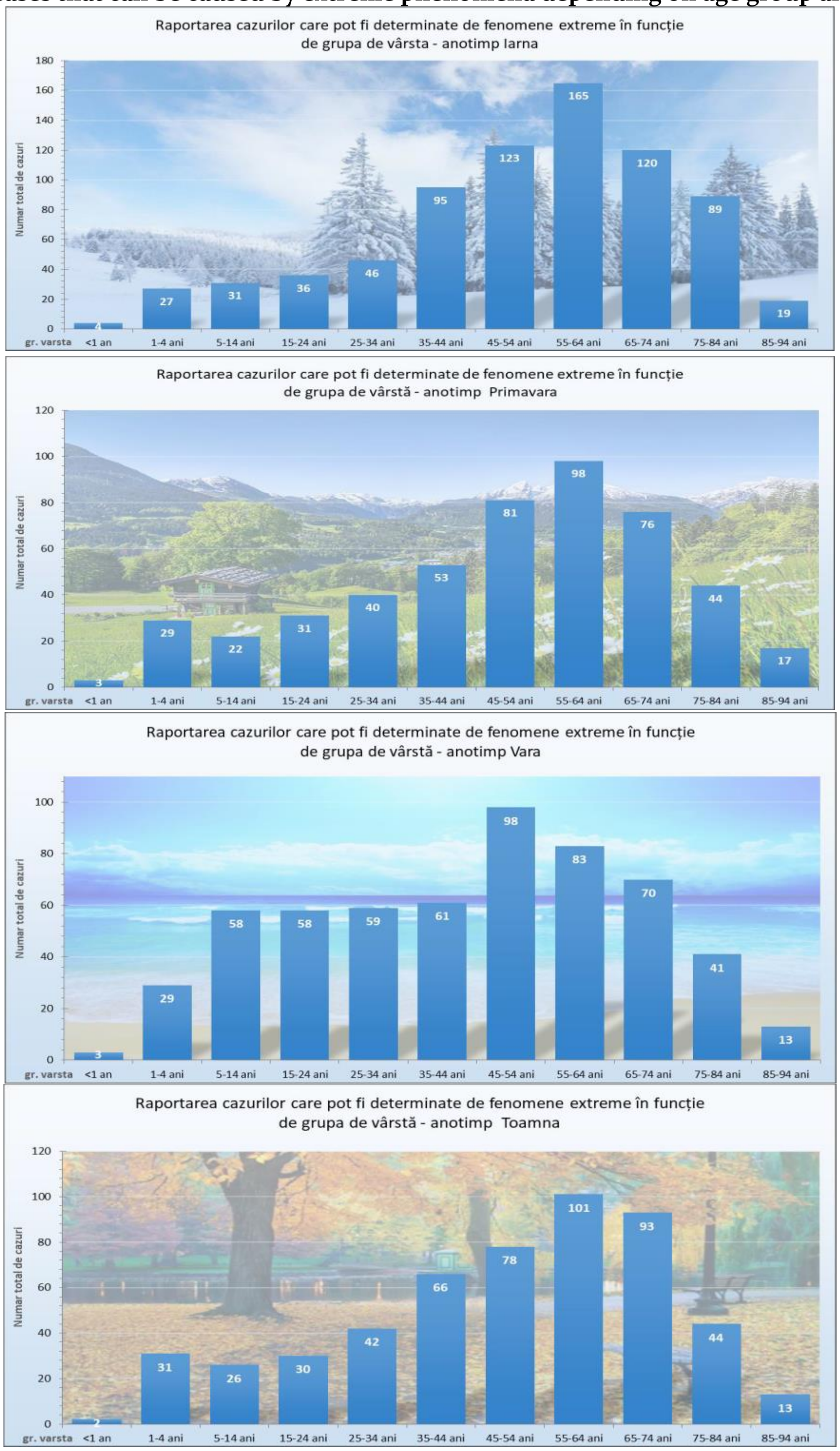
Source National Institute of Public Health - National Center for Risk Monitoring in the Community

Figure VIII.27. Reporting cases of disease that can be caused by extreme phenomena depending on the period of 2019



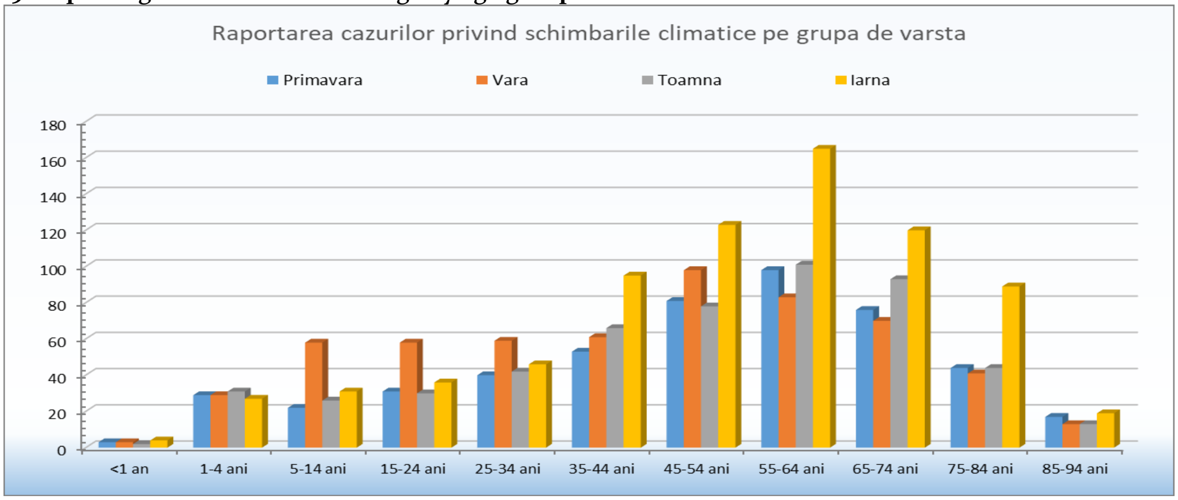
Source National Institute of Public Health - National Center for Risk Monitoring in the Community

Figure VIII.28. Reporting cases that can be caused by extreme phenomena depending on age group and season



Source National Institute of Public Health - National Center for Risk Monitoring in the Community

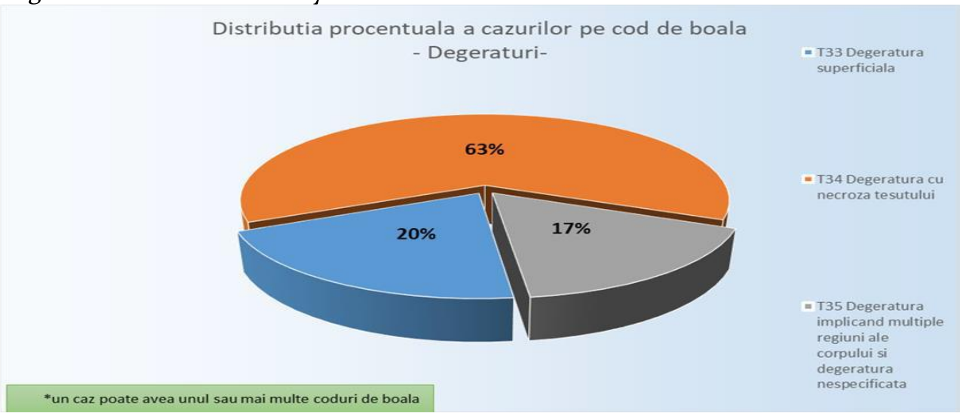
Figure VIII.29. Reporting cases of climate change by age group

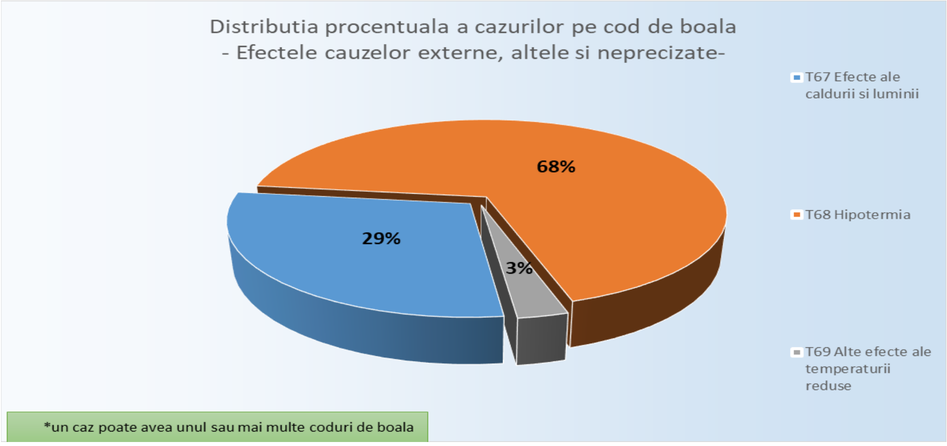


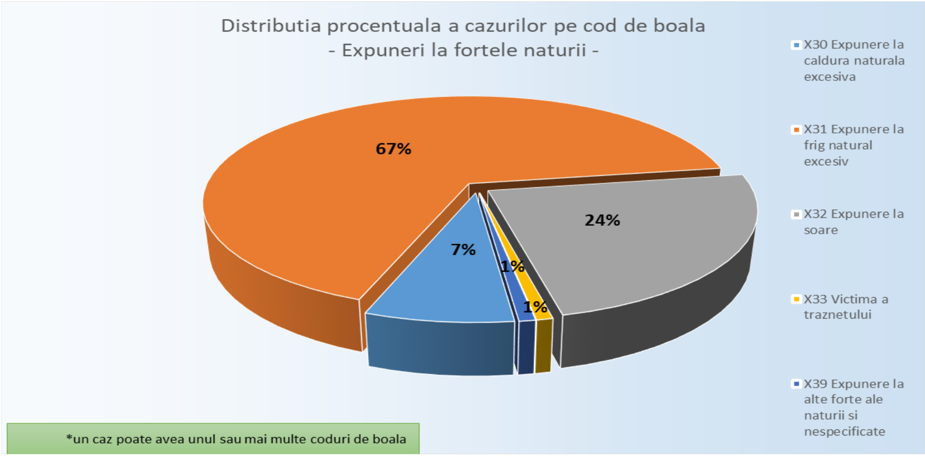
Source National Institute of Public Health - National Center for Risk Monitoring in the Community

People over the age of 45 are most vulnerable to climate change, especially in winter.

Figure VIII.30. Percentage distribution of cases by disease code

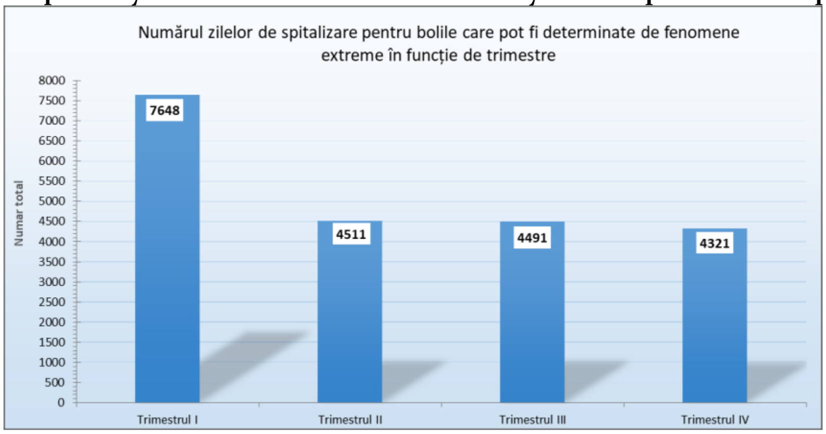






Source National Institute of Public Health - National Center for Risk Monitoring in the Community

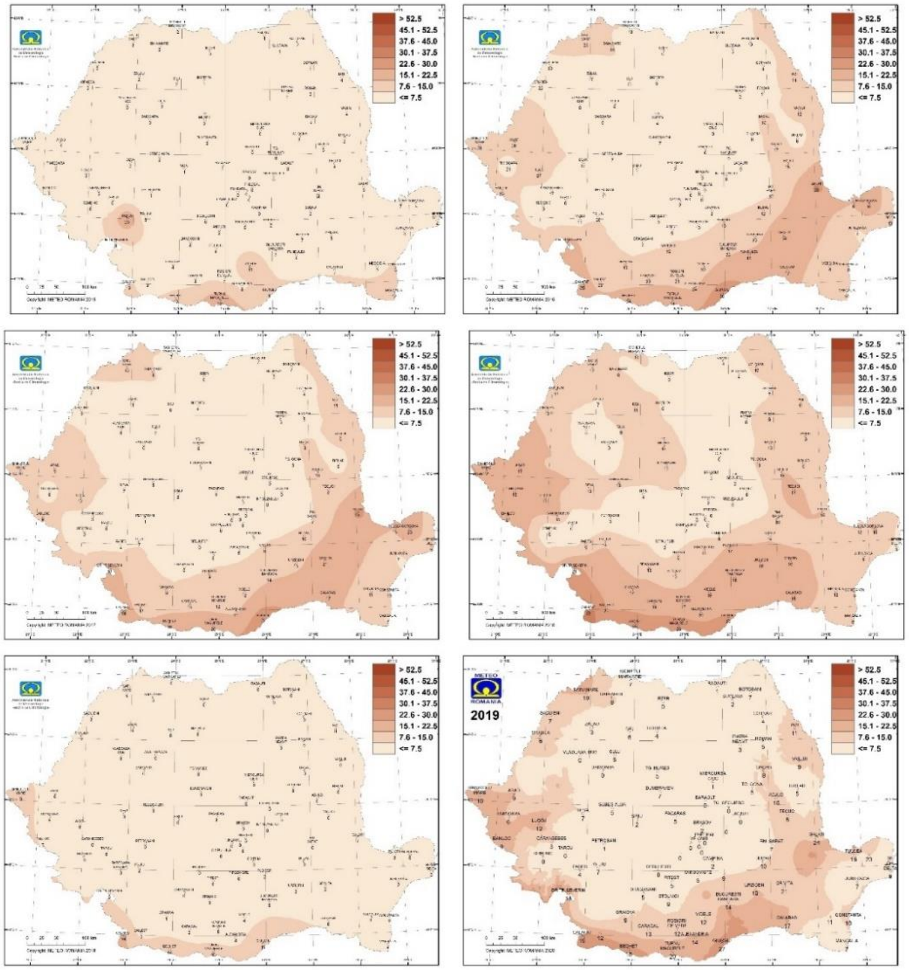
Figure VIII.31Number of hospital days for diseases that can be caused by extreme phenomena depending on the trimester



Source National Institute of Public Health - National Center for Risk Monitoring in the Community

These data and more information are already published in the ReSanMed 2019 report on the official website of INSP / CNMRMC.

Figure VIII.32. Number of days in 2014-2018 and in 2019 when the ITU temperature-humidity index exceeded the critical threshold of thermal discomfort (80 units).



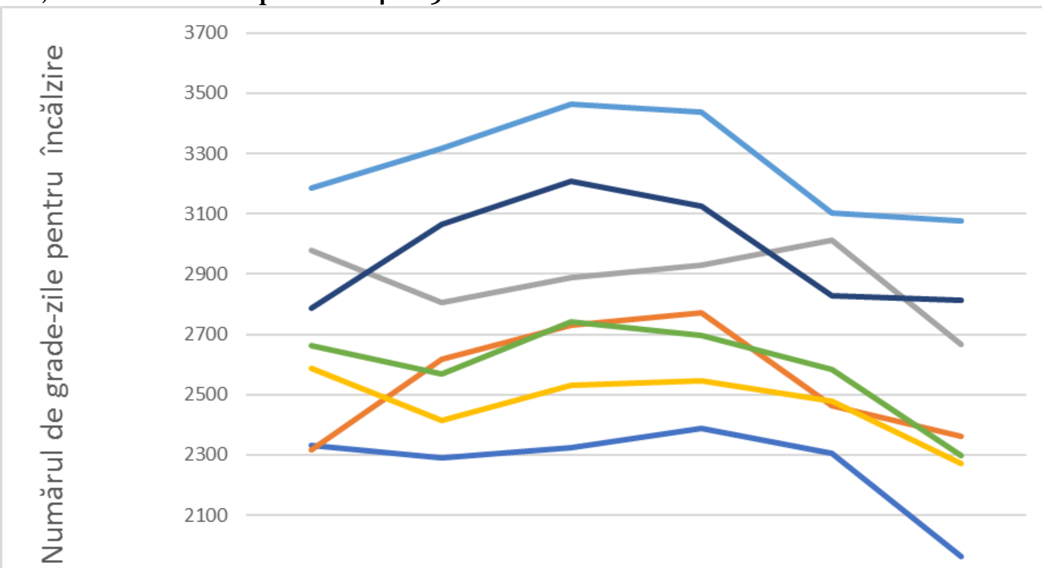
Source: National Meteorological Administration

Figure VIII.32. illustrates that the summer of 2019 was marked by slightly higher values of the number of days in which the temperature-humidity index ITU exceeded the critical threshold of thermal discomfort (80 units) compared to 2018, but a lower thermal stress compared to summer of 2017, when the number of days with thermal discomfort was much higher, on most of Romania

RO 62
Indicator code Romania: RO 62 EEA indicator code: CLIM 047
TITLE: NUMBER OF DEGREES-DAYS FOR HEATING
DEFINITION: This indicator shows the national trend of the number of degrees-days for heating.

In 2019 compared to 2018, Figure VIII.33. suggests a decrease in the number of degrees-days for heating, corresponding to meteorological data from 7 cities covering the territory of Romania. The values in 2019 are the lowest values in the period starting with 2014.

Figure VIII.33. The number of degrees-days for heating, corresponding to meteorological data from 7 cities covering the territory of Romania, calculated for the period 2014-2019.



	2014	2015	2016	2017	2018	2019
Constanta	2331.2	2291.4	2322.6	2387.4	2304.8	1963.2
Arad	2317.7	2615.6	2728.5	2771.7	2462.5	2360.6
Iasi	2978.8	2804.2	2886.9	2928.7	3012.3	2664.4
Bucuresti Filaret	2588.7	2414.4	2531.3	2544.4	2477.3	2272.0
Brasov	3184.8	3318.2	3464.5	3436.7	3102.3	3075.2
Craiova	2660.6	2568.3	2742.1	2695.8	2581.6	2295.9
Cluj Napoca	2785.4	3065.6	3206.6	3125.5	2827	2812.8

Source: National Meteorological Administration

SUBSTANCES DIMINISHING THE OZONE STRUCTURE

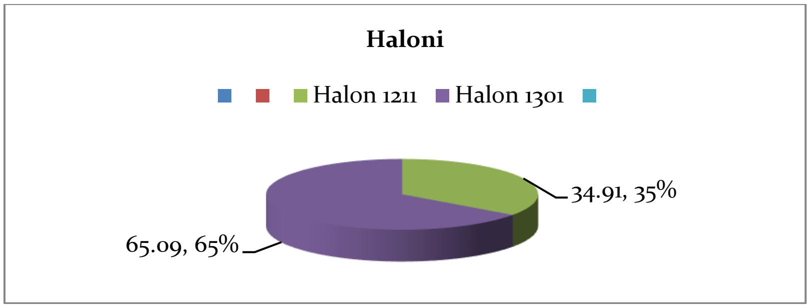
RO 06
Indicator code Romania: RO 06 EEA indicator code: CSI 06
TITLE: PRODUCTION AND CONSUMPTION OF SUBSTANCES LEADING TO OZONE DEPLETION
DEFINITION: This indicator quantifies the production and annual consumption of ozone-depleting substances (ODS) in Romania. ODS are long-lived chemicals that contain chlorine and bromine and destroy the stratospheric ozone layer.

The release of ozone depleting substances into the atmosphere (ODS) leads to the degradation of the stratospheric ozone layer, which is designed to protect humans and the environment against the harmful effect of ultraviolet (UV) radiation. The degradation of the stratospheric ozone layer causes the increase of ultraviolet radiation in the atmosphere, which leads to the appearance of harmful effects on human health, on aquatic and terrestrial ecosystems and on the food chain.

Consumption of substances that depreciate the ozone layer according to Regulation 1005/2009 in 2019

- halons for extinguishing fires on airplanes, military off-road vehicles, military ships
  - H 1301 = 6294 kg
  - H 1211 = 3375 kg

Figure VIII.34. Halons



Source : National Environmental Protection Agency

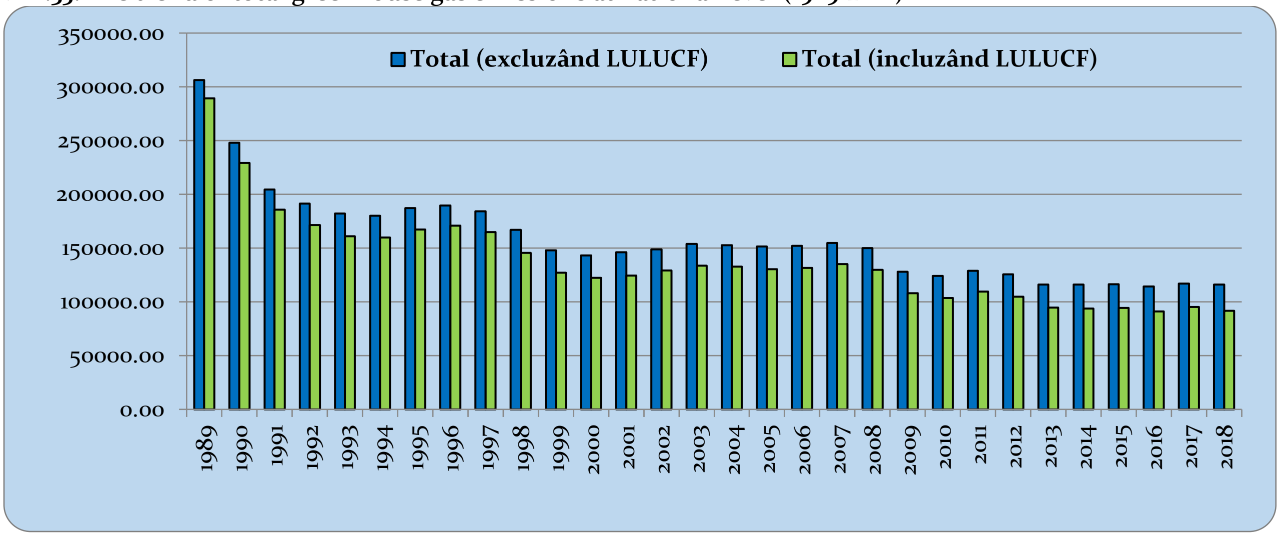
TRENDS OF GREENHOUSE GAS EMISSIONS

RO 10
Indicator code Romania: RO 10 EEA indicator code: CSI 010
TITLE: TRENDS OF GREENHOUSE GAS EMISSIONS
DEFINITION: This indicator shows the trends in greenhouse gas emissions. It analyzes the trends (total and sectoral) in relation to the obligations of the Member States to respect the Kyoto Protocol objectives.

In 2018, total greenhouse gas emissions (excluding the contribution of the sector "Land use, land use change and forestry - LULUCF) decreased by 62.10% compared to the level of emissions in 1989, while net GHG emissions / retentions (taking into account CO2 retentions) decreased by 68.32% (Figure VIII.35).
Total greenhouse gas emissions in 2018, excluding those retained by absorbers, amounted to 116,115.12 kt CO2 equivalent.
The trend of emissions reflects the changes in this period characterized by the transition to a market economy; the period can be divided into three sub-periods: 1989-1999, 2000-2008 and 2009-2018.
The decline in economic activity and energy consumption between 1989 and 1992 directly led to a reduction in total emissions during this period. With the entire economy in transition, some energy-intensive industries have reduced their activities, and this is reflected in the reduction of GHG emissions. Emissions began to rise until 1996, following the revitalization of the economy. Since the start of operation of the first reactor at the Cernavoda nuclear power plant (1996), emissions have decreased again in 1997. The decline continued until 1999.
The level of emissions increased after 2000 and reflects the economic development in the period 2000-2008. The limited decrease in GHG emissions in 2005, compared to the levels of 2004 and 2006, was caused by the hydrological year positively influencing the production of energy in

hydroelectric power 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 VIII.35.).

Figure VIII.35. The trend of total greenhouse gas emissions at national level (1989-2018)



(Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions)

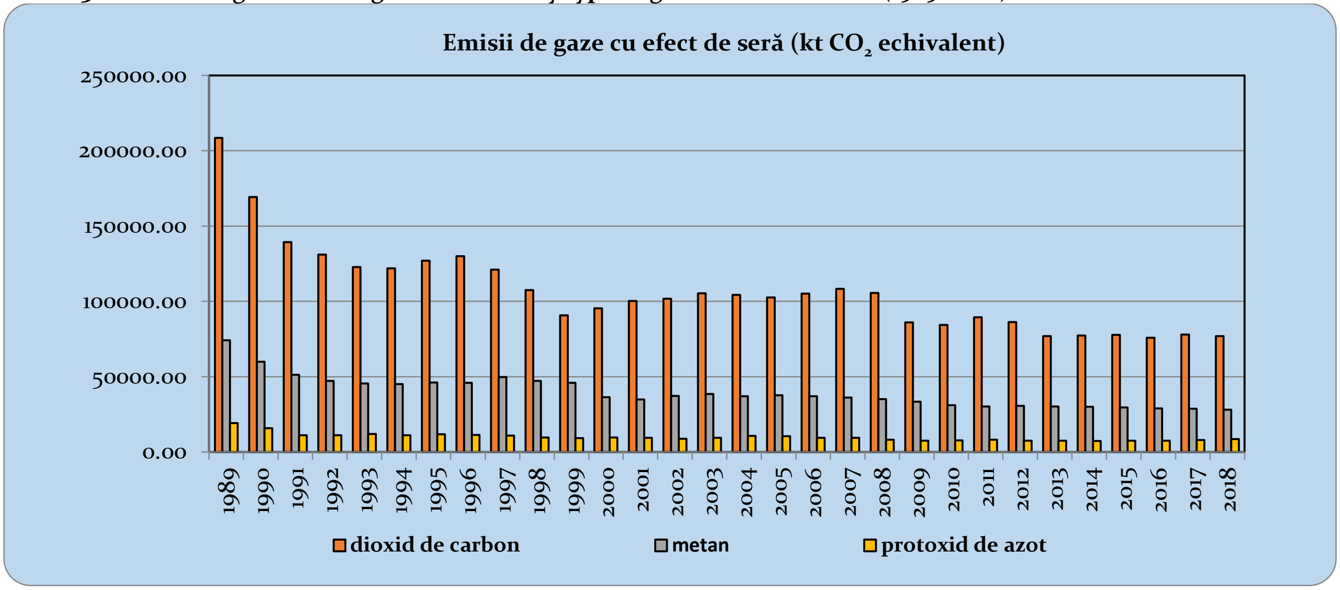
Of the nationally monitored greenhouse gases, carbon dioxide is the most significant pollutant, followed by methane and nitrous oxide (Figure VIII.36.).

Carbon dioxide (CO_2) is the most important anthropogenic greenhouse gas. The decrease of CO_2 emissions in 2018 by 63.12% compared to 1989 (from 208,648.62 kt in 1989 - 68.10% to 76,951.22 kt in 2018 - 66.27%) is caused by the decrease in the amount of burned fossil fuels 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 (CH_4) emissions, mainly related to fugitive emissions from the extraction and distribution of fossil fuels and livestock, decreased in 2018 by 61.95% compared to 1989 (from 74,073.58 kt CO_2 equivalent in 1989 to 28,183.63 kt CO_2 equivalent in 2018). 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 in activities in agricultural soils, the agricultural sector and in activities in the chemical industry 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 decreased in 2018 by 55.17% (from 19,222.94 kt CO_2 equivalent in 1989 to 8,618.21 kt CO_2 equivalent in 2018).

Figure VIII.36. Trends in greenhouse gas emissions by type of gas at national level (1989- 2018)



Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions)

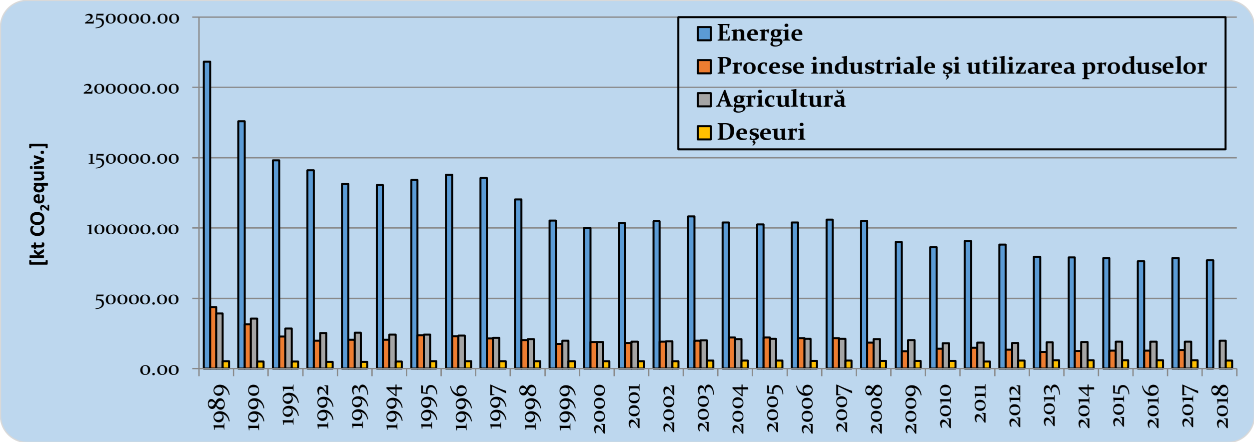
Figure VIII.37.a represents the trends of GHG emissions in each sector of INEGES, excluding the LULUCF sector. GHG emissions from the energy sector decreased by 64.74% compared to the base year 1989.

A significant decrease of 69.25% in GHG emissions was recorded in the Industrial Processes and Product Use sector in 2018, 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 2018 by 49.26% 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 ground.

In the Waste sector, emissions increased in 2018 by 13.12%, compared to the level of 1989.

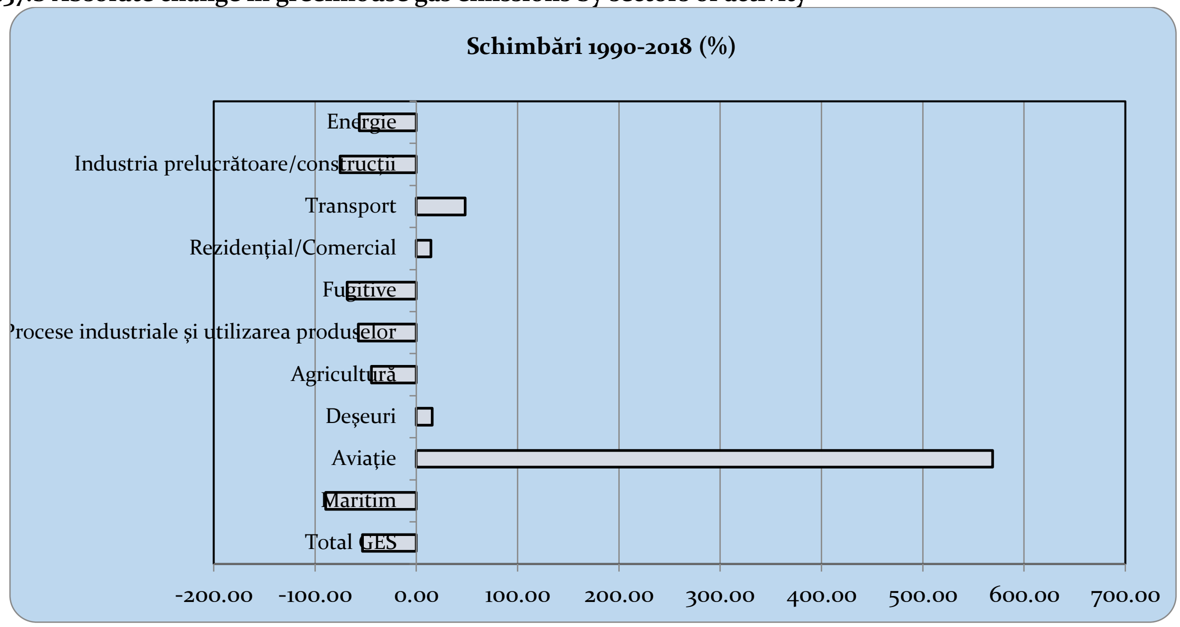
Figure VIII.37.a a Trends of greenhouse gas emissions by sector type at national level (1989 - 2018)



(Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions)

Figure VIII.37.b represents the changes of GHG emissions, on each sector of INEGES, at the level of 2018 compared to 1990.

Figure VIII.37.b Absolute change in greenhouse gas emissions by sectors of activity



Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

AGGREGATED DATA ON THE PROJECTIONS OF GHG EMISSIONS

RO 11
Indicator code Romania: RO 11 EEA indicator code: CSI 011
TITLE: PROJECTIONS OF GREENHOUSE GAS EMISSIONS
DEFINITION: This indicator illustrates the anticipated trends in anthropogenic emissions of greenhouse gases. The purpose of this indicator is to estimate the degree of achievement of the targets set by climate change policies. Estimated progress is calculated as the difference between the projected emissions and the targets set by the Kyoto Protocol. Greenhouse gases are those covered by the Kyoto Protocol (CO_2, CH_4, N_2O, SF_6, HFCs, PFCs and NF_3).

Greenhouse gas emission forecasts were made for 3 scenarios:

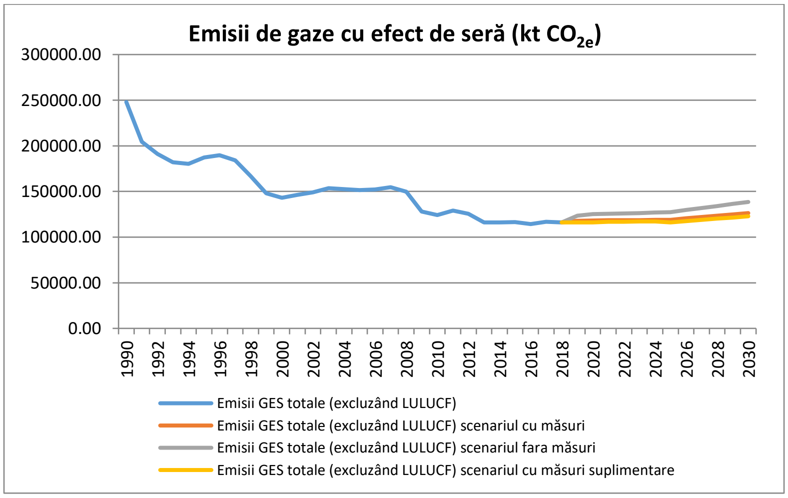
1. Reference scenario that does not include special greenhouse gas emission reduction activities (“*no-measures scenario*”);

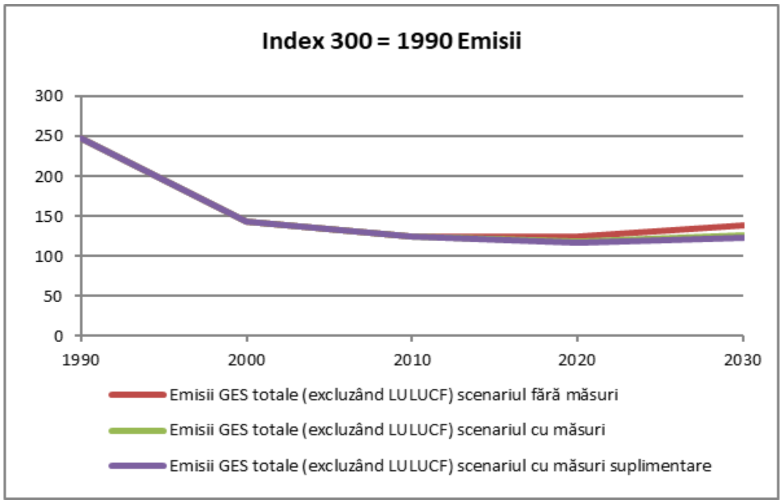
2. The scenario similar to the one from the point of view of the evolution of economic-social indicators, but which contains policies and programs for reducing greenhouse gas emissions (“*scenario with measures*”);

3. The scenario with additional measures - similar to the reduction scenario, but which contains programs with additional measures to reduce greenhouse gas emissions ("*scenario with additional measures*”).

Greenhouse gas emissions projections for the three scenarios show an upward trend in the period 2019-2030 (Figures VIII.44. - VIII.46.).

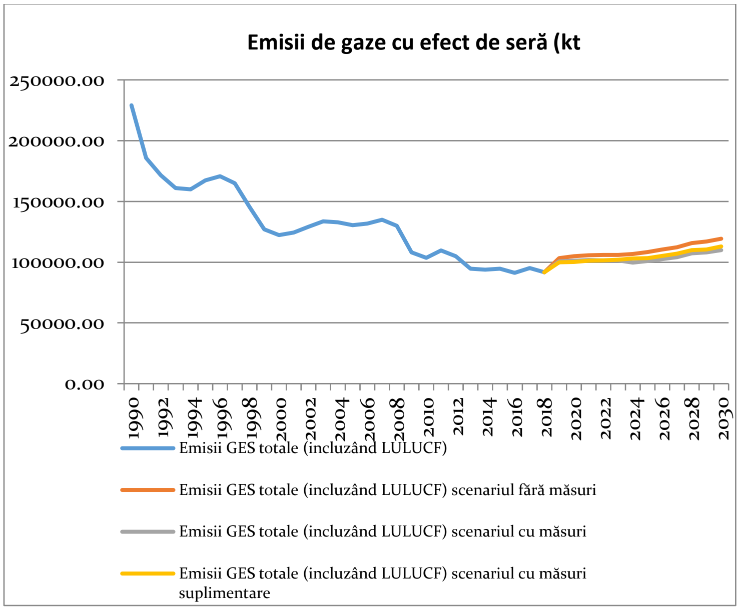
Figura VIII.38. Trends (1990-2018) and projections (2019-2030) of greenhouse gas emissions (excluding LULUCF) at national level





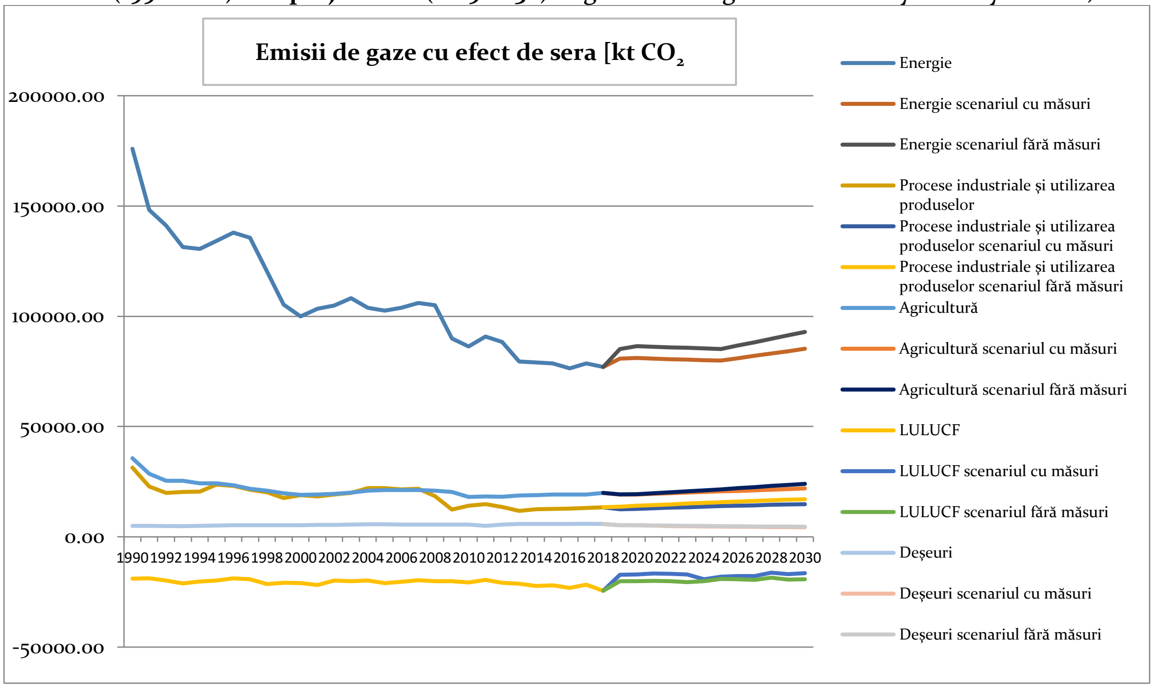
(Data source: Ministry of Environment - Romania's 2017 Report for GHG projection referred în Regulation (EU) No. 525/2013)

Figure VIII.39. Trends (1990-2018) and projections (2019-2030) of greenhouse gas emissions (including LULUCF) at national level



(Sursa datelor: Ministry of Environment - Romania's 2017 Report for GHG projection referred în Regulation (EU) No. 525/2013)

Figure VIII.40. Trends (1990-2018) and projections (2019-2030) of greenhouse gas emissions by activity sectors, at national level



(Data source: Ministry of Environment - Romania's 2017 Report for GHG projection referred în Regulation (EU) No. 525/2013)

ACTIONS FOR CLIMATE CHANGE MITIGATION AND ADAPTATION

RO 37

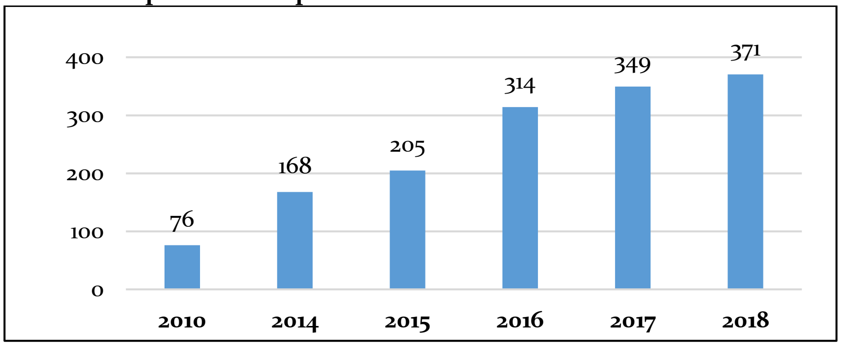
Indicator code Romania: RO 37
EEA indicator code: CSI 037

TITLE: USE OF ALTERNATIVE AND CLEANER FUELS

DEFINITION: Share of fuels with low or zero sulfur content and biofuels in total fuel consumption for road transport (% of fuels sold for transport purposes).

At the national level, the data presented in Figure VIII.41. indicates an increase in the use of biofuels in 2018 by 79.50% compared to 2010.

Figure VIII.41. National biofuel consumption for the period 2010-2018



Source MMAP

RO 31

Indicator code Romania: RO 31
EEA indicator code: CSI 031

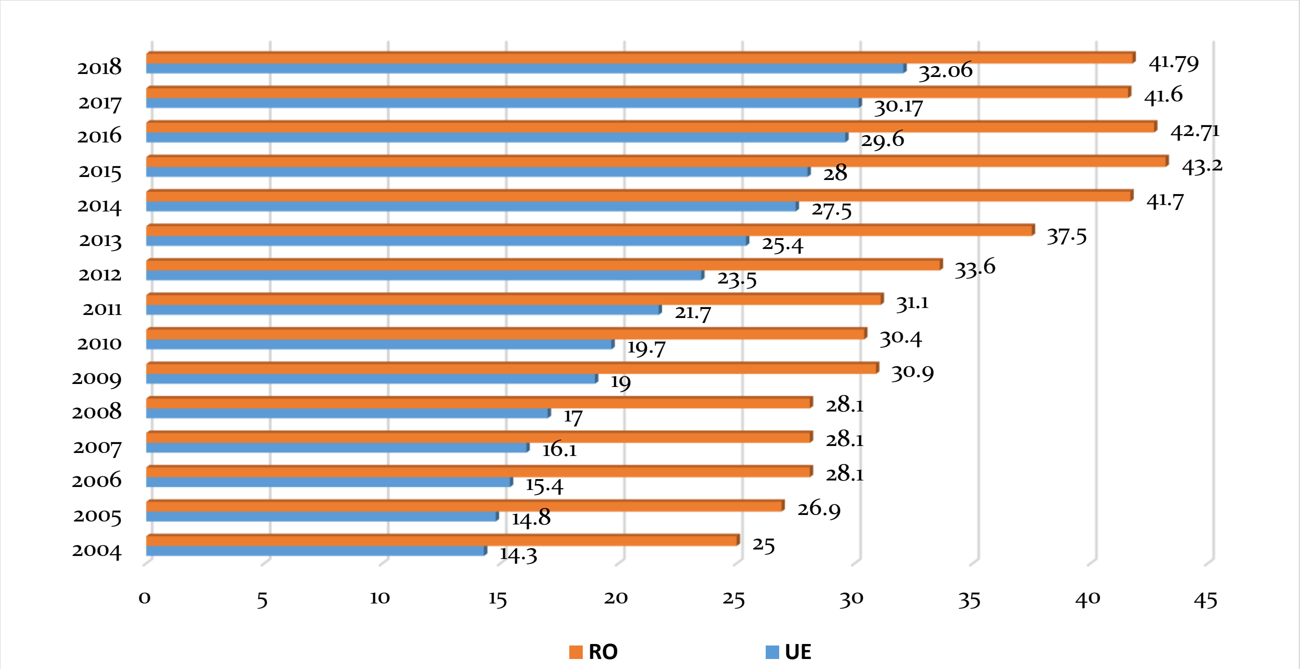
TITLE: ELECTRICITY CONSUMPTION FROM RENEWABLE ENERGY SOURCES

DEFINITION: The share of electricity produced from renewable energy sources is the ratio between the electricity produced from renewable energy sources and the 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.

At the level of the European Union, the share of electricity obtained from renewable sources in total electricity shows for the period 2004-2018 an upward trend, from the value of approximately 14.3% recorded in 2004 to the value of approximately 32.06% recorded in 2018.

In 2018 at national level, 41.79% of the total value of electricity was obtained by capitalizing on renewable energy sources (Figure VIII.42). Supporting environmentally friendly (low environmental impact) solutions for electricity production based on renewable sources contributes to reducing greenhouse gas emissions from the energy sector.

Figure VIII.42. Electricity produced from renewable energy sources at national level, for the period 2004-2018



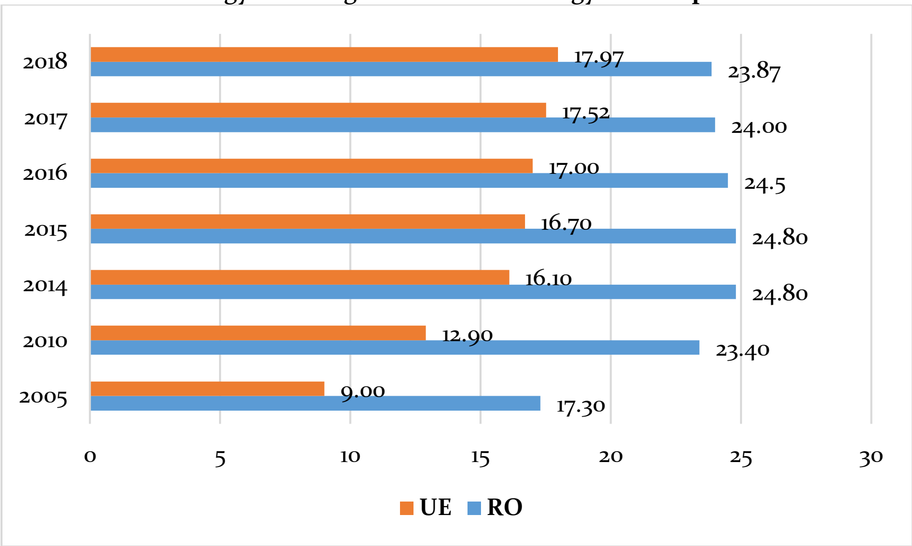
(Source Eurostat https://ec.europa.eu/eurostat/web/energy/data/shares)

RO 30
Indicator code Romania: RO 30 EEA indicator code: CSI 030 / ENER 029
TITLE: PRIMARY ENERGY CONSUMPTION FROM RENEWABLE ENERGY SOURCES
DEFINITION: The share of renewable energy consumption is the ratio between the gross domestic consumption of energy produced from renewable energy sources and the total gross domestic energy consumption, calculated over 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 2005-2018 an ascending evolution, from the value of approximately 9% registered in 2005 to the value of approximately 17.97% registered in 2018.

Also, at national level, the share of renewable energy in total gross domestic energy consumption shows an upward trend for the period 2005-2018, and in 2018 there was a decrease of approximately 0.54% compared to the value established in the previous year (Figure VIII.43).

Figure VIII.43. The share of renewable energy in total gross domestic energy consumption in Romania and EU -28



(Source: Eurostat https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_31&plugin=1)

URBAN ENVIRONMENT AND QUALITY OF LIFE: STATUS AND CONSEQUENCES

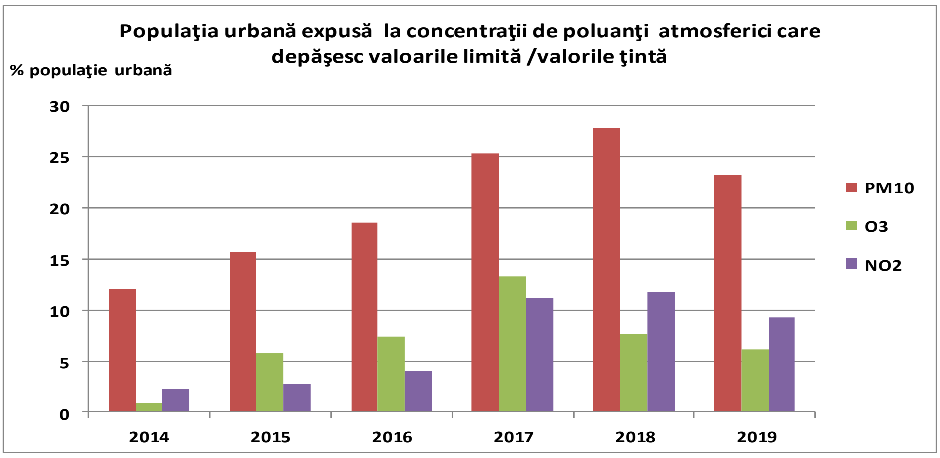
AIR QUALITY OF URBAN AGGLOMERATIONS AND HEALTH EFFECTS

Exceeding the annual average concentration of PM10, NO2, SO2 and O3 in certain urban agglomerations

RO 04
Indicator code Romania: RO 04 EEA indicator code: CSI 04
TITLE: EXCEEDANCES OF LIMIT VALUES CONCERNING AIR QUALITY IN URBAN AREAS
DEFINITION: The indicator is the percentage of the urban population potentially exposed to atmospheric concentrations (in µg / m3) of sulfur dioxide (SO2), particulate matter (PM10), nitrogen dioxide (NO2) and ozone (O3) which exceed the limit value established for the protection of human health.

The National Air Quality Monitoring Network (NAQMN) carries out continuous measurements for sulfur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), ozone (O_3), particulate matter (PM10 and $PM_{2.5}$) , monocyclic aromatic hydrocarbons (benzene, toluene, o, m, p-xylene, ethylbenzene), polycyclic aromatic hydrocarbons and heavy metals. The air quality for each monitoring station is represented by quality indices, based on the measured concentrations of the main atmospheric pollutants. Pollutant concentrations expressed in µg / m^3 are also reported, as well as the number of exceedances of the limit values set 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 NO2, O3, PM10)

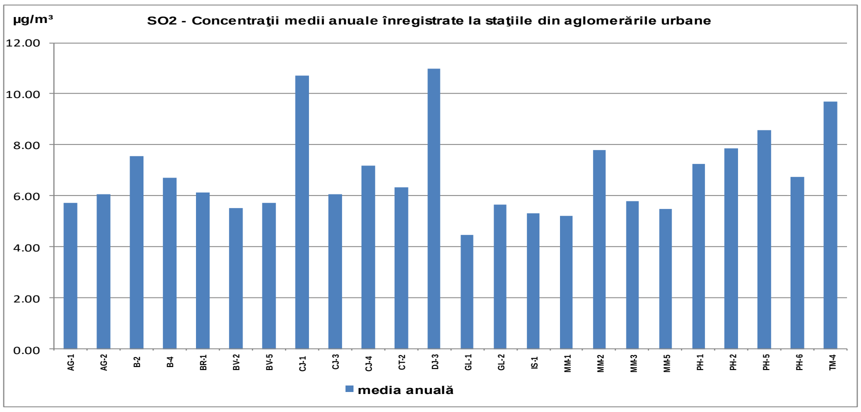


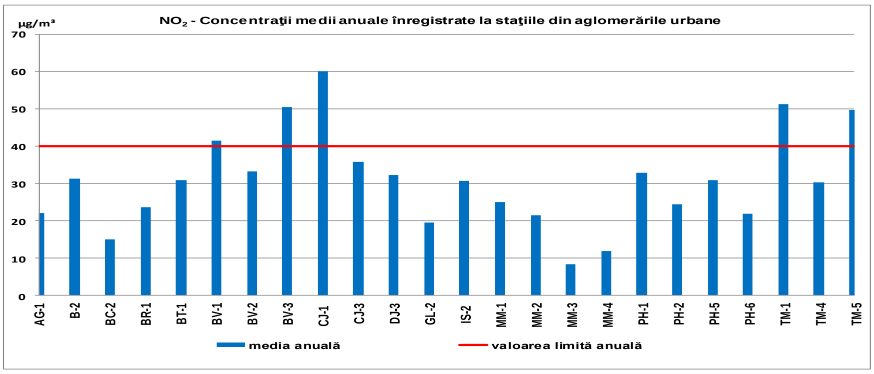
Source: NEPA

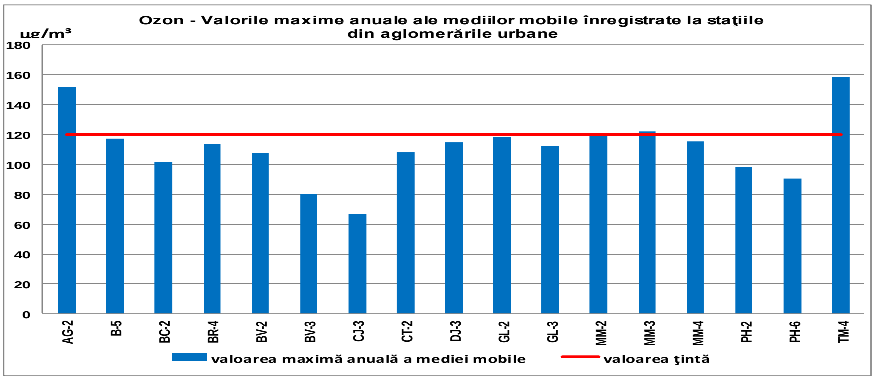
In accordance with the provisions of Law no. 104/2011 concerning the environmental air quality, in Romania, 13 urban agglomerations were established (Bacău, Baia Mare, Braşov, Braila, Bucharest, Cluj-Napoca, Constanţa, Craiova, Galati, Iasi, Piteşti, Ploieşti and Timişoara). In these agglomerations there are automatic monitoring stations with which the ambient air quality is monitored and assessed.

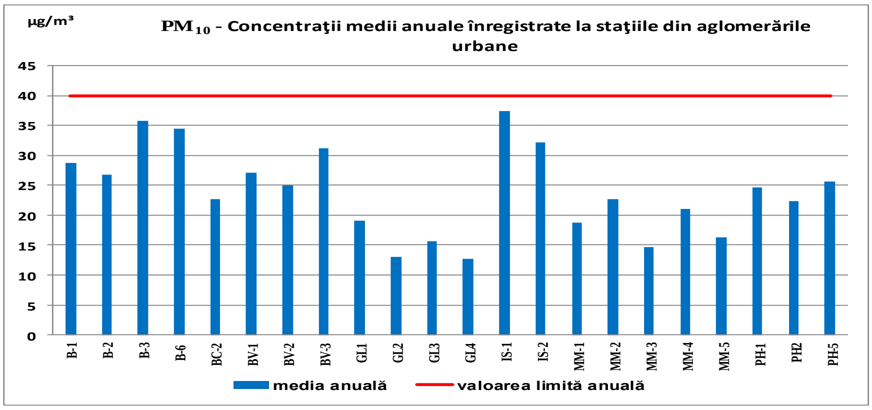
Next, the data obtained in 2019 from these stations are presented graphically for the most important pollutants: SO_2, NO_2, O_3, PM_{10}.

Figure IX.2 Annual average concentrations of atmospheric pollutants recorded at monitoring stations in urban agglomerations in 2019



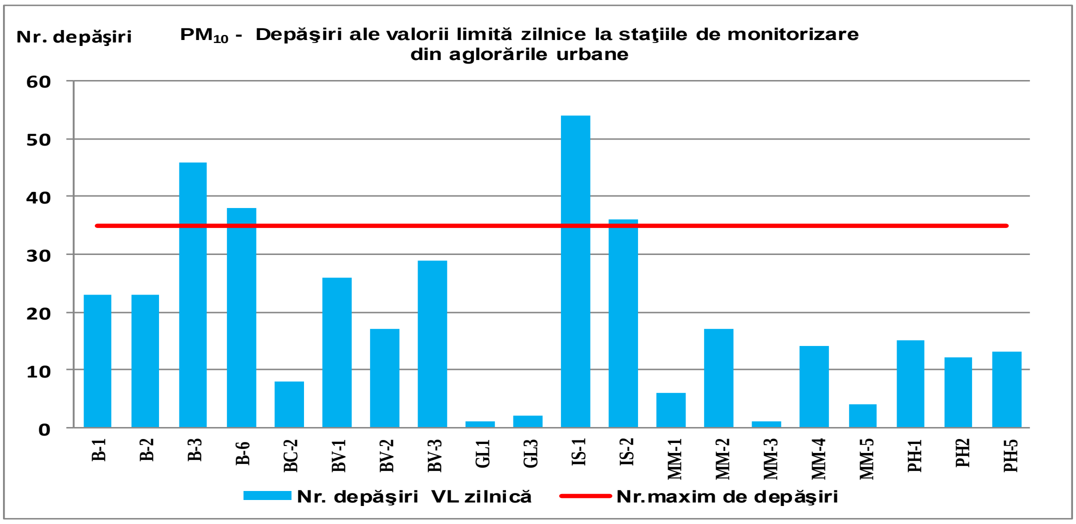






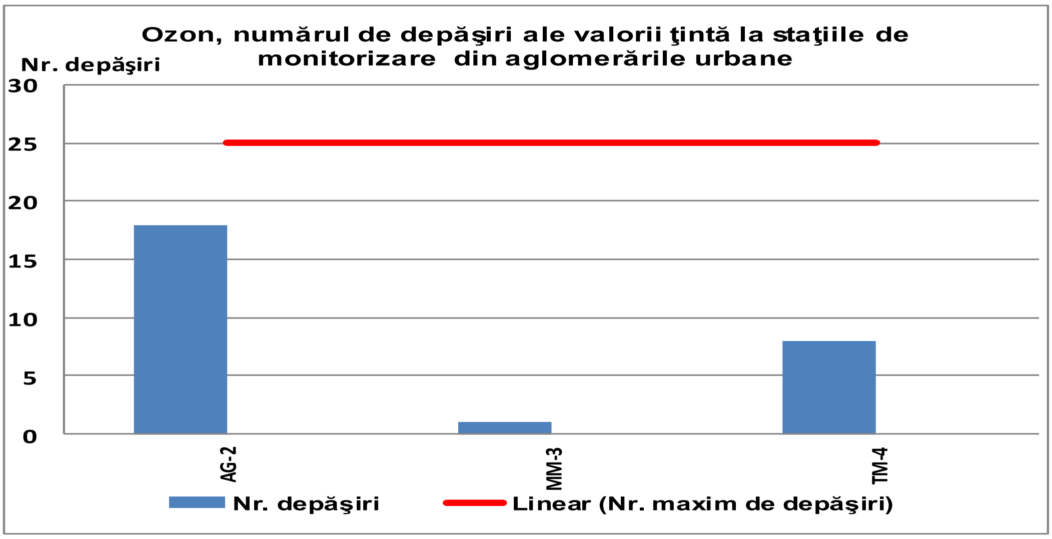
Source: NEPA

Figura IX.3 Number of exceedences of the daily limit value for particulate matter PM10 in urban agglomeration monitoring stations in 2019



Source: NEPA

Figure IX.4 Number of ozone target exceedances at monitoring stations in urban agglomerations in 2019



Source:NEPA

The data presented in the above figures highlights that in urban agglomerations in Romania the main and most important pollutants are particulate matter PM10 and nitrogen oxides, mainly generated by traffic and combustion processes in large thermal power plants or for district heating. The effects of these short-term or long-term pollutants on human health are multiple, affecting respiratory and cardiovascular systems and the provocation of lung diseases, diseases in the ENT sphere, allergic diseases, cardiovascular diseases, etc. The most affected groups are children, elderly people and people with chronic illness.

Exposure of the population from urban agglomerations to flood risk - Floods and health

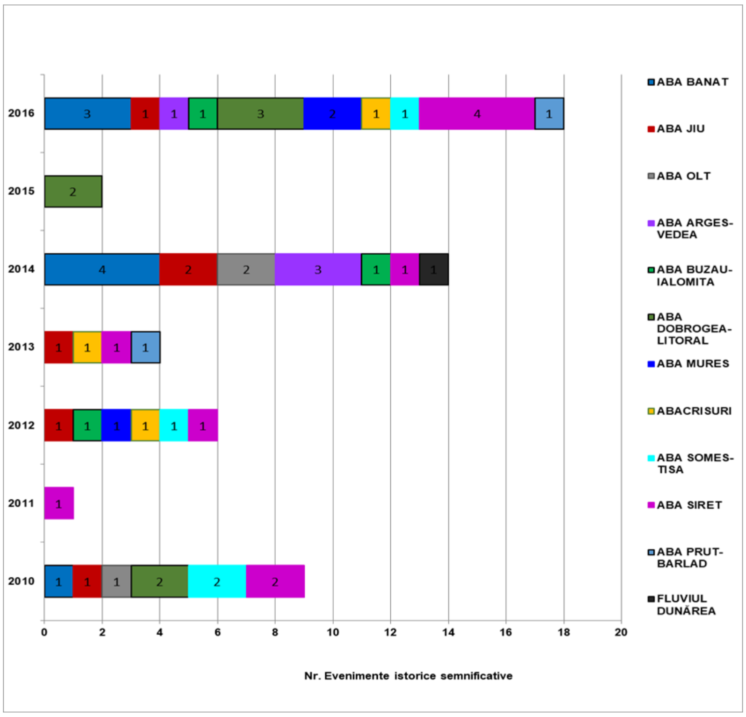
RO 61
Indicator code Romania: RO 61 EEA indicator code: CLIM 46
TITLE: FLOODS AND HEALTH
DEFINITION: This indicator is defined as the number of people affected by floods per million inhabitants. "Affected persons," as defined in the EM-DAT (The International Disaster Database), are those who need immediate assistance during an emergency period, including displaced or displaced persons. The unit of measure is the number of people affected by the floods (deceased, injured, evacuated, destroyed homes, cases of illness due to contaminated water consumption) per million inhabitants.

In the last decade, as a result of climate change and anthropogenic interventions on the environment, there have been intensifications of flood phenomena.

Significant historical floods were selected following the application of hydrological criteria and criteria on the negative effects of the flood on the four categories of consequences mentioned above. Unlike the first cycle, when the historical floods occurred in a much more distant period (1970-2010) than the present moment, for which no very detailed information was held about the negative consequences produced by them, in the cycle II the information regarding the damages produced in the analyzed period, respectively 2010 - 2016, are much better documented. This allowed for a more in-depth analysis of the significant negative consequences of historical floods. Thus, in this cycle, following the application of the hydrological criteria and the criteria regarding the negative effects of the flood, an analysis was performed at a higher degree of detail, following the localities and sectors / river sections / tributaries affected by the significant national / regional event considered. .

For the period 2010 - 2016, at the level of the 11 Administrations, the Water Basins and the Danube River were designated 54 significant historical events of floods presented in figure no. IX.5.

Figure IX.5 Significant historical events of floods at the level of the Basin Water Administration (ABA) and the Danube river for the period 2010 -2016



Source: ANAR

During 2019, a number of 131 urban localities were affected by the floods, the second highest value recorded in the last five years and in the period 2010-2019.
Most cities were affected in Maramureș 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 Botoșani county we have 6 affected cities, in Bacău and Caraș-Severin and Mureș counties there are 5 affected cities, and with 4 affected cities are the counties: Argeș, Olt, Iași, Neamț and Vaslui. In the counties of Brașov, Dâmbovița and Tulcea no urban localities were affected and in the counties of Arad, Cluj, Constanța, Satu Mare, Timiș and Vrancea an urban locality was affected.

Table IX.1 Periods and brief description of the causes of floods in 2019 and affected localities

Nr. crt.		COUNTY (affected localities)	PERIOD (the phenomenon produced)
1		ALBA **42 localities** **Blaj (Tiur), Teiuș, Zlatna (Feneș, Pătrângeni, Valea Mică, Trâmpoiele),** Albac, Bistra, Cetatea de Baltă, Ciugud (Hăpria), Crăciunelu de Jos, Cut, Galda de Jos, Ighiu, Jidvei, Lupșa (Lunca, Mănăstire), Horea, Meteș (Meteș, Ampoița, Lunca Ampoiței, Lunca Meteșului, Poiana Ampoiului, Presaca Ampoiului, Tăuți), Mogoș (Cristești), Pianu (Pianu de Sus, Pianu de Jos, Strungari), Poșaga (Săgagea), Râmeț (Vlădești), Roșia Montană, Săliște, Săsciori (Săsciori, Laz, Leman, Răchita, Sebeșel), Sâncel, Șona (Biia), Șibot (Balomir de Câmp), Șugag (Arti, Bârsana)	**1-15.02.2019** - freeze-thaw phenomenon, water infiltrations in the body of the road, subsidence of the land **1.05-31.05.2019** - heavy rains, puddles -increases in flows on the Târnava Mare river -reflow: pr. Plopilor, pr. Plopilor **1.06.2019** - heavy rains, runoff, -fast flood on the torrents: Valea Mică, Valea Runcului, Valea Doini, Valea Mâciu, Valea Cornii, Valea Leii, Valea Beiului, pr. Oarbei, pr. Socului, pr. Sintea -fast flood on: pr. Răchita, Fr. Cioara, Fr. Freman **2-25.06.2019** - heavy rains, runoff, torrents; -flow fluctuations, rapid floods: pr. Valea Mare, pr. Valea Caselor, pr. Ampoița, pr. Valea Biberetului, pr. Valea lui Voic, pr. Valea Meteșului, pr. Valea Macrii, pr. Sagacea, pr. Valea Cioara, pr. Sarata - overflow: pr. Tiur, pr. Valea Rosie - road body collapse **7.07-4.08.2019** - heavy rains, runoff, torrents; -reflow: r. Albac, pr. Valea Frumoasei, v. Ciorii, pr. Valea lui Voic, pr. Valea Grosiștilor,
2		ARAD **58 localities** **Nădlac,** Bata (Bata, Bacăul de Mijloc, Țela), Bârsa, Bârzava (Bârzava, Bătuța, Căpruța, Groșii Noi, Lalașinți, Slatina de Mureș), Birchiș (Birchiș, Căpălnaș), Beliu, Buteni (Buteni, Berindean, Cuied, Păulian), Conop (Conop, Chelmac), Craiva (Ciuntești, Mărăuș, Stoenești), Dezna (Dezna, Buhăeni, Laz), Dieci (Cociuba, Crocna, Revetiș), Gurahonț (Contișor, Feniș), Hălmăgel (Hălmăgel, Luncșoara, Târnăvița, Tomești, cătun Codrinești, cătun	**1-2.05.2019** - torrential rains, runoff, torrents and streams **6-8.05.2019** - torrential rains, runoff, torrents and streams - fast flood on: valea Beliu **29.05-6.06.2019** - torrential rains, runoff from streams, torrents and streams -reflow: v. Bârzava, v. Lalasint -internal waters **10-11.06.2019** - torrential rains, runoff from streams, torrents and streams -fast flood on the Valea Sebiș

		Ionășești, cătun Vojdogi), Hășmaș (Clit), Ignățești (Manead), Moneasa, Petriș (Petriș, Ilteu, Seliște), Pleșcuța (Dumbrava, Gura Văii, Răstoci, Talagiu), Săvârșin (Săvârșin, Hălăliș, Pârnești, Troaș), Tauț, Vărădia de Mureș (Vărădia de Mureș, Baia, Julița, Nicolae Bălcescu, Stejar)	21-24.06.2019 - torrential rains, runoff from streams, torrents and streams 31.07-1.08.2019 - torrential rains, runoff from the slopes, torrents -fast flood on pr. Petriș, pr. Moneasa
3		**ARGEȘ** **160 localities** **Pitești, Câmpulung, Curtea de Argeș, Topoloveni,** Albeștii de Argeș (Albeștii Pământeni, Albeștii Ungureni, Brătești, Dobrotu, Ungureni), Albeștii de Muscel (Albești), Aninoasa (Aninoasa, Broșteni, Slănic, Valea Siliștii), Babana, Bascov (Bascov, Brăileni, Schiau, Uiasca, Valea Ursului), Bălilești (Băjești, Priboaia, Poienița, Ulița, Valea Mare), Buleți Negrești (Buleți, Zgripcești), Berevoești (Berevoești, Brătia, Gămăcești), Bogați (Bogați, Glambocu, Suseni), Boteni (Boteni, Muscel), Botești (Moșteni Greci), Brăduleț (Brăduleț, Brădetu, Galeșu), Bughea de Sus, Călinești (Călinești, Gorganu, Urlucea, Valea Corbului), Cepari (Cepari Pământeni, Cepari Ungureni, Sendrulești, Urluiești, Valea Măgurii), Ciofrângeni (Burluși, Ciofrângeni Sat, Lacurile, Piatra, Schitu Matei), Cicănești (Cicănești, Bărăști, Urechești), Corbeni (Oeștii Pământeni, Turburea), Cocu (Bărbătești, Groși), Davidești (Davidești, Contești, Voroveni), Dobrești, Dragoslavele (Dragoslavele, Valea Hotarului), Hârsești, Leordeni (Bantău, Glambocata Deal, Glodu, Schitu Stoicești), Mălureni(Mălureni, Păuleasca, Toplița), Micești (Micești, Brânzari, Păuleasca, Purcăreni), Mihăești (Mihăești, Drăghici, Furnicoși, Ruda, Văcarea, Valea Popii), Mioarele (Matău), Merișani (Borlești, Crâmpotani, Dobrogostea, Vâlcele), Mușătești (Robaia, Stroiești, Valea Muscelului), Mozăceni, Negrași, Nucșoara (Slatina), Poienarii de Argeș (Ceaurești), Rătești (Mavrodolu), Rucăr, Sălătrucu, Schitu Golești (Lăzărești, Loturi), Stâlpeni	5-21.05.2019 -heavy rainfall, runoff from the slopes -fast floods on: r. Vâlsan, r. Doamnei, r. Brătia, v. Bădilei, pr. Sub Dos, pr. Păuleasca, pr. Teascului, pr. Teiș, 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 Iașului, pr. Vîrtej, pr. Valea Vanoaiei, -slip, -exceeding the transit capacity of street gutters 1-30.06.2019 - heavy rainfall, runoff from the slopes -fast flood on: r. Bratia, r. Vâlsan, r. Doamnei, r. Argeșel, r. Bughea, r. Cârcinov, r. Topolog, r. Bascov, pr. Nebunului, Valea Moșului, Valea Turbată, pr. Dobrești, pr. Uiasca, pr. Uita, pr. Valea Satului, pr. Făgeanca, Valea lui Bau, pr. Boaba, pr. Valea Seacă, Valea Grecilor, pr. Baboia, pr. Solea, Valea Româneștilor, pr. Râncăciov, Valea Corbului, Valea Cicănești, Valea Urechească, pr. Valea Mare, r. Cârcionovel, Valea Grecilor, Valea Izvorului, Valea Teascului, pr. Purcăreanca, Valea Teișului, Valea lui Alb, Valea Budeasa, Valea Păuleasca, pr. Drăghici, pr. Zamfirești, pr. Mănăstirea, pr. Stoeneasca, Valea Bădilii, pr. Huluba,Valea Ilalei, pr. Cătina, pr. Vetișoara, Valea Ceparilor, Valea Schitului, valea Cicănești, pr. Sub Dos, Valea Badilei,Valea Belului, Valea lui Nuță, Valea Toplița , Valea Iașului, Valea Măgurei, Valea Urluiești -incapacity to transport the sewer exceeding the transit capacity of street ditches -sliding - ANIF channel clogging -clogging Valea Radului channel -storm -hail 1-31.07.2019 - heavy rainfall, runoff from the slopes -exceeding the rainwater collection capacity -clogging the rainwater drainage channel from the ANIF administration -fast floods on: r. Dâmbovița, r. Bughea, pr. Valea Iașului, pr. Valea Frasinului, pr. Valea

		(Stâlpeni, Livezeni, Oprești, Pițigaia, Rădești), Stoenești (Stoenești, Slobozia), Ștefan Cel Mare (Ștefan Cel Mare, Glavacioc), Ștefănești (Enculești, Valea Mare), Titești (Valea Mănăstirii), Tigveni (Tigveni, Bârseștii de Jos, Bârseștii de Sus, Blajul, Vlădești), Uda (Uda, Cotu, Greabăn, Săliștea), Valea Danului (Valea Danului, Bănicești, Bolculești, Borobănești, Vernești), Valea Iașului (Valea Iașului, Borovinești, Cerbureni, Ungureni), Vlădești (Vlădești, Coteasca, Putina), Vedea (Bondoci, Dincani, Vitișoara), Vultureștii (Vultureștii, Bârzești, Huluba),	Naca, pr. Valea Caselor, pr. Valea Hotarului, pr. Valea Stanecii - landslide
4		<u>BACĂU</u> <u>**245 Localities**</u> **Bacău, Moinești, Onești, Comănești, Târgu Ocna,** Ardeoani (Ardeoani, Leonțínești), Bârsănești (Bârsănești, Albele, Brătești, Caraclău), Berești Tazlău (Berești-Tazlău, Bosoteni, Prisaca, Românești, Tescani), Berzunți, Blăgești (Blăgești, Buda, Poiana Negustorului, Țârdenii Mari, Valea lui Ioan, Tardenii Mari), Brusturoasa (Brusturoasa, Buruieniș, Buruienișu de Sus, Cuchiniș, Hăngănești), Buhoci (Buhoci, Bijghir, Coteni), Colonești, Corbasca (Corbasca, Bacioiu, Marvila, Poglet, Rogoaza, Scărişoara, 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,	<u>**6.05-15.06.2019**</u> - torrential rains, significant runoff from slopes, torrents and streams; -exceeding the transport capacity of the riverbed: r. Tazlăul Sărat, pr. Bejenești, pr. Calmuş, pr. Frasin, pr. Ardeoani, pr. Mârzănești, pr. Haţaş, pr. Băhnăşoaia, pr. Drumul Sondei, pr. Dospinescu, pr. Olaru, pr. Velniţa, pr. Tulburea, pr. Zeletin, pr. Seaca, pr. Doftenița, pr. Drăgugești, pr. Valea Rea, pr.Orsa, pr. Negel, pr. Urminiş, pr. Hangani, pr. Păcurilor, pr. Mora, pr. Bahna, pr. Valea Seacă, pr. Păltiniş, pr. Buda, pr. Valea Sosii, pr. Sopa, pr. Fundu Răcăciuni, pr. Sărata, pr. Solonț, pr. Calmuş, pr. Bogdana - flow increases with alluvium transport: river Siret, river Trotuş, pr. Rotii, pr. Berzunţi, pr. Dragomir, pr. Sugura, pr. Docuța, pr. Fulgeriş, pr. Valea Mare, pr. Turbata, pr. Bistricioara, pr. Turbata, pr. Precista, pr. Tulburea, torent Beleu, pr. Boghii, pr. Soci, pr. Vladnic, pr. Petreşti, pr. Tamaşi, pr. Racova, pr. Fuioaga, pr. Văratec, pr. Ruşi, - exceeding the transport capacity of the gutters -clogged riverbeds -shore erosions -blocks in the riverbed <u>**15-30.06.2019**</u> -torrential rainfall, runoff from 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

		Oţeleşti), Lipova (Lipova, Maloşu, Satu Nou, Valea Hogei), Livezi (Livezi, Orasa), Măgireşti (Stăneşti), Măgura (Măgura, Crihan, Sohodol), Mărgineni (Mărgineni, Barati, Luncani, Pădureni, Podiş, Poiana, Trebeş, Valea Budului), Negri (Negri, Călineşti, Poiana, Ursoaia), Nicolae Bălcescu (Nicolae Bălcescu, Galbeni, Valea Seacă), Oituz (Marginea), Onceşti (Onceşti, Barboasa, Dealu Perjului, Onceştii Vechi, Tarniţa, Taula), Orbeni (Orbeni, Scurta), Palanca (Ciugheş, Popoiu), Pângăreşti (Pângăreşti, Bahna, Nicoreşti, Pârâul Boghi, Satu Nou), Panceşti (Panceşti, Fundu Văii, Petreşti, Soci, Răcătău), Parava (Parava, Radoaia, Teiuş), Parincea (Mileştii de Jos, Năstăseni, Valeni, Vladnic), Plopana (Plopana, Budeşti, Dorneni, Fundu Tutovei, Iţcani, Rusenii de Sus, Rusenii Răzeşi, Straminoasa), Podu Turcului (Podu Turcului, Balaneşti, Căbeşti, Fichiteşti, Giurgioana, Lehancea, Plopu, Sârbi), Poduri (Poduri, Cernu, Cornet, Valea Sosii), Prăjeşti, Răcăciuni (Răcăciuni, Fundu Răcăciuni, Gâşteni, Gheorghe Doja), Răchitoasa (Răchitoasa, Barcana, Bucşa, Buda, Burdusaci, Danaila, Dumbrava, Farcaşa, Fundătura, Haghiac, Magazia, Moviliţa, Oprişeşti, Putini,Tochilea), Racova (Ilieşti), Sărata (Sărata, Baltata), Sauceşti (Sauceşti, Schineni, Siretu, Şerbeşti), Solonţ (Solonţ, Sărata), Stănişeşti (Belciuneasa, Crăieşti, Slobozia Nouă, Văleni), Ştefan cel Mare (Bogdana, Gutinaş, Rădeana), Strugari (Strugari, Cetăţuia, Iaz, Nadişa, Pietricica, Răchitiş), Tamaşi (Tamaşi, Chetriş, Furnicari), Târgu Trotuş (Târgu Trotuş, Tuţa, Viişoara), Tătărăşti (Tătărăşti, Cornii de Jos, Cornii de Sus, Drăgeşti, Gherdana, Giurgeni, Ungureni), Traian (Bogdaneşti, Herţioana de Jos, Herţioana Răzeşi, Zapodia), Ungureni (Ungureni, Barteşti, Bibireşti, Boteşti, Gârla Anei, Viforeni), Urecheşti, Valea Seacă (Cucova), Vultureni (Ghilvăneşti, Godineştii de Jos, Lichişteni, Tomozia, Ţigăneşti, Valea Lupului), Zemeş	-increases in level and flow on the Trotuş river and tributaries exceeding the defense quotas
5		BIHOR	22.05-11.06.2019

		<u>130 Localities</u> **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,	- heavy rains, significant runoff from the slopes, - 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 debt: Crişul Negru,pr. Valea Botean - inability to take over the rainwater network - puddles of inland waters <u>16-22.06.2019</u> -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 <u>27-28.06.2019</u> - heavy rains, significant runoff from the slopes, -increases in levels and flows on Crişul Pietros - overflow: Valea Crăiasa, Valea Meziad, Valea Drăgoteni - puddles <u>31.07-1.08.2019</u> -abundant rains, significant runoff from the slopes, -increases in levels and flows -shore erosions -clogged ditches
6		<u>BISTRIŢA-NĂSĂUD</u> <u>82 Localities</u> **Bistriţa (Bistriţa, Unirea)**, **Năsăud (Năsăud, Luşca)**, **Sângeorz-Băi**, Bistriţa Bârgăului (Bistriţa Bârgăului, Miţa), Budacul	<u>15-17.05.2019 şi 20-24.05.2019</u> - Heavy rainfall, runoff from slopes, -activating torrents -overflow of watercourses: r. Someşul Mare, r. Sălăuţa, r. Ilva, r. Rebra, r. Şieu, r. Leşu, pr. Bârgău pr.Brujeni,pr. Secu, pr. Valea Ciorii,

		de Jos (Budacul de Jos, Buduş, Jelna, Monariu, Simoneşti), 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	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 <u>30.05-1.06.2019</u> - Heavy 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, <u>12-16.06.2019</u> - Heavy rainfall, runoff from slopes, -activating torrents - overflow 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: river Şieu, pr. Ivăneasa, pr. Şendroaia, pr. Agrieşel, Valea Lunca, Leşu, Strâmba, <u>22.06-3.07.2019</u> - 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 -reflow: pr. Mălin, Fr. Beudiu -activating torrents: Blidar, Ierboşeaua, Husadis, Valea Boului , Valea lui Samson, Şoimu de Jos, Şoimu de Sus şi Stegea
7		<u>**BOTOŞANI**</u> <u>**129 localities**</u> **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,	<u>6-8.05.2019</u> - precipitation, runoff from slopes, -hail, storms - riverbed overflow <u>15-20.05.2019</u> -heavy rainfall, runoff from the slope, <u>may.2019</u> - repeated floods river Prut <u>24.05-7.06.2019</u> - precipitation, runoff from slopes -hail <u>10-23.06.2019</u> - precipitation, runoff from slopes, -hail <u>2.07.2019</u>

		Ghilănești, Oneaga, Schit Orășeni), Cristinești (Fundu Herții), Curtești (Curtești, Agafton, Hudum, Mănăstirea Doamnei), Dângeni (Dângeni, Hulub, Iacobeni, Strahotin), Dersca, Dobârceni (Dobârceni, Brăteni), Drăgușeni (Drăgușeni, Podriga, Sărata), Frumușica (Frumușica, Boscoteni, Rădeni, Storești, Șendreni, Vlădeni Deal), Gorbănești (Gorbănești, Bătrânești, George Coșbuc, Silișcani, Socrujeni, Vânători), Hlipliceni (Hlipiceni, Dragălina, Victoria), Hudești, Ibănești, Lunca (Lunca, Baznoasa, Stroiești, Zlătunoaia), Manoleasa (Manoleasa, Flondura, Sadoveni), Mileanca (Mileanca, Codreni, Scutari, Seliștea), Mihai Eminescu (Ipotești, Baiasa, Cătămărăști Deal, Cătămărăști, Manolești, Stăncești), Mihălășeni (Mihălășeni, Caraiman, Năstase, Negrești, Păun, Sărata), Mitoc (Mitoc, Horia), Păltiniș (Păltiniș, Cuzlău), Prăjeni (Prăjeni, Câmpeni, Lupăria, Miletin), Rădăuți Prut (Rădăuți Prut, Miorcani, Rediu), Răuseni (Răuseni, Pogorești,Rediu, Stolniceni), Ripiceni, Suharău, Sulița (Sulița, Cheliș, Drăcșani), Todireni (Todireni, Cernești, Florești, Garbești, Iurești), Trușești (Trușești, Drislea), Ungureni (Ungureni, Călugărenii Vechi, Epureni, Mândrești, Sapoveni, Ungureni), Vârful Câmpului (Vârfu Câmpului, Dobrinăuți-Hapai), Vlădeni (Vlădeni, Brehuiești), Vlasinești (Vlasinești, Miron Costin, Sârbi)	- precipitation, runoff from slopes -storms -hail
8		**BRAȘOV** **16 localities** Augustin, Bod, Comăna (Comăna de Jos, Crihalma), Cristian, Hoghiz (Dopca), Homorod (Mercheșa), Jilbert, Mândra (Mândra, Șona), Șercaia (Șercaia, Vad), Voila (Cincșor), Vama Buzăului (Vama Buzăului, Acriș, Buzăiel),	**6-9.05.2019** - heavy rainfall; runoff from slopes, -fast flood on: r. Olt, pr. Comana **1-10.06.2019** - heavy rainfall; leaks from the slopes, -fast floods on: r. Olt, r. Bârsa, r. Buzău, pr. Comăna, pr. Valea Mare, pr. Valea lui Pavel, pr. Homorod, pr. Mândra, pr. Șercaia, pr. Cincu, pr. Acriș, pr. Buzoel
10		**BUZĂU** **68 localities** **Nehoiu (Bâsca Rozilei, Chirlești, Lunca Pripor, Mlajet, Păltineni, Valea Nehoiașului, Vinetișu), Pătârlagele (Pătârlagele, Crâng, Fundăturile, Muscel, Sibiciu de**	**19.05-7.06.2019** - heavy rainfall and runoff from the slopes.

		Sus, Valea Sibiciului), Beceni (Arbanaşi), Bisoca, Bozioru, Brăeşti (Brătileşti, Ivănetu), Calvini (Calvini, Băscenii de Jos, Băscenii de Sus, Frăsinet, Olari), Căneşti (Căneşti, Suchea), Cătina (Cătina, Slobozia, Valea Cătinei, Zeletin), Cernăteşti (Cernăteşti, Aldeni, Băieşti, Fulga, Manasia, Zărneştii de Slănic), Chiliile (Bădeni, Trestioara), Chiojdu (Chiojdu, Bâsca Chiojdului, Cătiaşu, Lera, Pleştioara), Cislău (Buda, Crăciuneşti), Cozieni (Pietraru, Trestia, Tulburea), Gura Ţeghii (Varlaam), Lopătari (Pestriţu, Ploştina,Săreni), Măgura (Măgura, Ciuta), Mânzăleşti (Mânzăleşti, Bâsceni, Poiana Vîlcului), Odăile, Panatău, Pardoşi, Pârscov (Curcănesti, Runcu), Scorţoasa, Tisău (Tisău , Strezeni, Pădureni), Vipereşti (Vipereşti, Tronari),	
11		**CARAŞ-SEVERIN** **77 localities** **Reşiţa, Caransebeş, Oraviţa (Oraviţa, Ciclova Montană), Băile Herculane, Moldova Nouă,** Armeniş (Feneş, Sat Bătrân), Berlişte (Ruscova Nouă), Berzeasca, Bolovaşniţa (Bolovaşniţa, Vârciorova), Brebu (Apadia), Buchin, (Buchin, Poiana), Bucoşniţa (Bucoşniţa, Petroşniţa), Caraşova, Cărbunari , Ciuchici (Macovişte, Nicolinţi, Petrilova), Ciclova Română (Ciclova Română, Ilidia), Constantin Daicoviciu (Cărăvan, Peştere), Copăcele (Zorile), Cornereva (Cornereva, Bojia, Borugi, Costiş, Dobraia, Hora Mare, Izvor, Pogara, Pogara de Sus, Poiana Lungă, Prislop, Rustin, Strugasca, Sub Crâng, Sub Plai, Topla, Zoina), Doclin, Fârliug (Fârliug, Scăiuş), Glimboca, Goruia, Lăpuşnicu Mare, Marga, Măureni (Măureni, Şoşdea), Naidaş, Obreja, Oţelu Roşu, Păltiniş (Cornăţel, Rugi), Ramna (Valea Pai), Sacu (Tincova), Sasca Montană (Sasca Montană, Bogodinţ, Potoc, Slatina Nera, Saca Română), Slatina Timiş (Slatina Timiş, Ilova, Sadova Veche), Şopotu Nou, Târnova, Teregova, Ticvaniu Mare, Turnu Ruieni (Turnu Ruieni, Borlova, Cicleni), Zăvoi, Zorlenţu Mare	**2-4.02.2019** - landslides due to rains and melting snow **1-05.02 şi 11-12.02.2019** - heavy rainfall, rapid snowmelt **18.02. 2019** - snow loads, the repeated freeze-thaw phenomenon **22-23.02 şi 1.03. 2019** - landslides due to the repeated freeze-thaw phenomenon -wind intensifications with the appearance of a storm **26.04-08.05.2019** - heavy rains, runoff from the slopes -increase in flow on: r. Sebeş, r.Caraş, r. Nera, r. Bistra, r. Timiş, pr. Armeniş, pr. Lung, pr. Bolovaşniţa, pr. Valea Mare, pr. Petroşniţa, pr. Vălişor, pr. Goruiţa, pr. Lăpuşnic, pr. Mărguţa, pr.Mânzu, pr. Valea Mare, pr. Boşneag, pr. Zbag,pr. Valea Mare, pr. Valea Radului, pr. Sadoviţa, pr. Iloviţa, pr. Slatina,pr. Valea Stefii - overflow: r. Timiş, r. Bistra, pr. Berzeasca, pr. Valea Satului, pr. Măceşu, pr. Scoarţa, pr. Taif, pr. Slatina, - inability to take over the flow of sewerage networks -activating torrents **15-16.05.2019** -abundant rains, leaks from the slopes **1.05-12.06.2019 şi 16.06.2019** -heavy rains, runoff from the slopes -overflow pr. Măcicaş -flow increase pr. Valea Satului, pr. Teregoviţa

			28.05-4.06.2019 - torrential rains, runoff from the slopes 15.05-5.06 , 23.06 şi 27-28.06. 2019 - torrential rains, runoff from the slopes -storm, strong wind with the appearance of a storm 12.06 , 17.06 şi 19.06. 2019 - torrential rains, runoff from the slopes -storm, hail 13-14.07. 2019 - heavy rains, puddles for long periods -increased flows with exceeding the transport capacity of the riverbed: pr. Secăş, pr. Slatina, pr Ilova - bank erosion 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, Săliște, 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 - heavy rainfall, runoff from the slopes -increasing flows on: pr. Valea Lungii, pr. Valea Vişagului -overflow pr. Valea Lungii -landslide 14.05.2019 - heavy rainfall, runoff from the slopes -increasing flows on: pr. Valea Mare , pr. Şardu 05.-7.05 şi 21.05.2019 - heavy rainfall, runoff from slopes -reflow: v. Chinteni -increasing flows on: r. Someşul Mic, r. Crişul Repede, v. Poicu, v. Egheriște, v. Negrea, v. Semeni, pr. Scurta - lifting the groundwater 20-22.05.2019 - heavy rainfall, runoff from the slopes -increasing flows on: r. Someş, r. Sălătruc, pr. Macău, pr. Suatu, pr. Cătina, pr. Bandău, pr. Mociu -overflow: r. Someş, v. Sub Hăngaş, pr. Bandău, pr. Valea lui Băl -internal waters puddles 29.05-07.06.2019 - heavy rainfall, runoff from the slopes -overflow: pr. Bădeni, pr. Plăieşti -increasing 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 slopes -reflow: pr. V. Grebanului - increase flows on: v. Lodbei, v. Agârbiciu, v. Râşca Mare, pr. Budu, pr. Nearşova, v. Aluniş, v. Ciulii -strong wind

13		<u>CONSTANȚA</u> <u>22 Localities</u> **Hârșova,** Aliman (Aliman, Dunăreni, Florii, Vlahii), Castelu, Ciobanu (Miorița), Costinești, Deleni (Petroșani, Pieleni), Dobromir (Cetate, Lespezi, Văleni), Ghindărești, Grădina, Horia (Horia, Cloșca), Lipnița (Cuiugiuc), Mihai Viteazu (Sinoie), Saraiu, Seimeni (Seimeni, Seimenii Mici),	<u>November 2018-February 2019</u> - coastal erosion due to waves <u>31.05-2.06. 2019</u> - heavy rainfall, runoff, puddles <u>15-25.06. 2019</u> - heavy rainfall, runoff, puddles <u>26-27.09. 2019</u> - heavy rainfall, runoff from the slopes,
14		<u>COVASNA</u> <u>20 Localities</u> **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	<u>6.05-2.06.2019</u> -heavy rainfall, runoff from the slopes -flood 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), Vulcana Băi (Vulcana Băi, Nicolăești, Vulcana de Sus), Vulcana Pandele (Toculești),	<u>11.05.2019</u> -heavy rainfall, runoff from the slopes -the inability of rainwater to be taken over by street ditches and gutters <u>31.05-04.06.2019</u> - heavy rainfall, runoff from the slopes -overflow: pr. Ocnița, pr. Valea Dulce, pr. Cricovul Dulce -increased flows on: r. Dâmbovița, pr Ruda, pr. Strâmbu, pr. Valea lui Nat, pr. Vulcana, pr. Cricovul Dulce, pr. Sticlărie -shore erosion -the inability of rainwater to be taken over by street ditches and gutters <u>10-11.06.2019</u> -heavy rainfall, runoff from the slopes -increased flows on: pr. Bizdidel, pr. Ialomicioara II, Valea Tonțea, Valea Giurculeț -erosions <u>01.08.2019</u> -heavy rainfall, runoff from the slopes -increased flows on: pr. Valea lui Coman, Valea Bîrzii, Valea Leurzii, -landslide -shore erosion
		<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,	<u>30.04-1.05 și 6-7.05.2019</u> -heavy rainfall, runoff from the slopes -inability to take over gutters <u>30.05-9.06.2019</u> -heavy rainfall, runoff from the slopes <u>14-28.06.2019</u> -heavy rainfall, runoff from the slopes -overflow: r. Corozel <u>26-27.09.2019</u> -heavy rainfall, runoff from the slopes

		Şipote), Buciumeni (Buciumeni, Tecucelul Sec, Vizureşti), Cavadineşti (Cavadineşti, Comăneşti, Găneşti, Vădeni), Certeşti (Certeşti, Cârlomăneşti, Cotoroaia), Corod (Corod, Blânzi, Brăteşti, Cărăpăceşti), Cudalbi, Drăguşeni (Adam, Cauieşti, Fundeanu, Ghingheşti, Nicopole, Stieteteşti), Folteşti (Folteşti, Stoicani), Frumuşiţa (Tămăoani), Ghidigeni, Gohor (Gohor, Narteşti), Iveşti (Iveşti, Buceşti), Joraşti (Joraşti, Zărneşti), Lieşti, Matca, Munteni (Munteni, Ungureni), Negrileşti, Piscu (Piscu, Vameş), Poiana (Poiana, Vişina), Priponeşti (Priponeşti, Cioraşti, Priponeştii de Jos), Rădeşti (Rădeşti, Cruceanu) , Schela (Schela, Negrea), Smulţi, Suceveni (Rogojeni), Tuluceşti (Tuluceşti, Siviţa, Tatarca), Ţepu, Valea Mărului (Valea Mărului, Mîndreşti), Vârlezi	
17		GORJ 42 localities **Novaci (Berceşti, Pociovaliştea), Motru (Ploştina), Tismana (Tismana, Celei, Gornoviţa, Pocruia, Racoţi, Sohodol, Topeşti, Vâlcele, Vânăta),** Bălăneşti (Bălăneşti, Glodeni, Voiteştii din Deal), Băleşti (Băleşti, Ceauru, Corneşti, Tămăşeşti), Bengeşti-Ciocadia (Bengeşti), Bustuchin, Godineşti (Arjoci, Chiliu, Ratez), Muşeteşti (Muşeteşti, Arşeni, Stănceşti, Stănceşti Larga), Polovragi (Polovragi, Racoviţa), Samarineşti (Samarineşti, Bazavani, Boca, Duculeşti, Larga, Tirioi, Valea Bisericii, Valea Mică, Valea Poienii), Turburea (Corcova, Poiana, Spahii),	11.02.2019 -heavy rainfall, the release of water from the snow layer 25.02.2019 -heavy rainfall, the release of water from the snow layer - landslide with blocking of the Amaradia river section 8.05.2019 -heavy rainfall, runoff from the slopes -overflow: pr. Vâlceaua -fast floods 6.06.2019 -heavy rainfall, runoff from the slopes -torrent leaks -increasing flow: pr. Ploştina, -strong wind - the inability of the street ditches to take rainwater 5-10.06.2019 -heavy rainfall, runoff from the slopes - landslide reactivation -increasing flow pr. Ratezel -puddles 19-21.06.2019 -heavy rainfall, runoff from the slopes 24.06.2019 -heavy rainfall, runoff from the slopes, torrent activation -increasing 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, Șimonești (Chedaia Mică), Tulgheș (Tulgheș, Hagota), Tușnad (Tușnadu Nou), Vârșag,Voșlăbeni,	29.01-1.02.2019 - heavy rainfall - the release of water from the melting of the snow layer -landslide - ninsori însemnate cantitativ -strong wind 10.03.2019 - heavy rainfall - the release of water from the melting of the snow layer 1-07.05.2019 - heavy rainfall, runoff from the slopes -flood on pr. Cașin -overflow pr. Gubas -landslide 20-31.05.2019 - heavy rainfall, runoff from the slopes -overflow pr. Racu 20.05-06.06.2019 -heavy rainfall, runoff from the slopes -overflow: 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 -overflow: river Olt, pr. Modicea, pr. Groapei, pr. Brădești, pr. Csiszerului, pr. Aluniului, pr. Vinului, pr. Bistricioara 17-23.06.2019 -runoff from the slopes -overflow: pr. Fântâna Mare, pr. Izvoraș, pr. Egerszek, pr. Szentegyhaza, pr. Mortonos, pr. Sadokut, pr. Uz, pr. Ciucani, pr. Bistricioara, pr. Vamanu -increasing flow: r. Olt pr. Sosarok, pr. Fisag, pr. Frumoasapr. Putna, pr. Figheș, pr. Rezu Mare 22-27.06 și 8.07.2019 -runoff from the slopes -overflow: pr. Brădești, pr. Apa Roșie, pr. Keckan, r. Valea Rece, pr. Muhos, r. Baratcos, -strong wind 3-8.07.2019 -heavy rainfall, runoff from the slopes -overflow: pr. Racu -increasing 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 Sus), Lupeni, Orăștie, Simeria (Simeria,Simeria Veche), Uricani, Vulcan,** Baia de Criș (Rîșca, Țebea),	1-8.05.2019 -heavy rainfall, runoff from the slopes -overflow: r. Orăștie, r. Cerna, r. Strei, r. Crișul Alb, pr. Sibișel, pr. Valea Mare, pr. Mihăileasca, pr. Valea Loancii, pr. Sârbi, pr. Dumești -increasing levels: pr. Lăpugiu, pr. Luncanilor, pr. Hondol, pr. Nojag, pr. Vărmaga, pr. Boz, pr. Bărasca, pr. Tămășești,

		Baru (Baru, Livadia, Petros), Băcia (Totia), Bănița (Bănița, Crivadia, Merişor), Beriu (Beriu, Căstău, Sibişel), Boşorod (Boşorod, Alun, Cioclovina, Luncani), Brănişca (Bărăştii Iliei, Boz, Furcuşoara), Buceş (Grohățele, Tarnița, Mihăileni), Bunila (Poienița Voinii), Cârjiți (Popeşti), Certeju de Sus (Certeju de Sus, Nojag, Toplița Mureşului, Vărmaga), Densuş (Densuş, Ştei), 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), Orăştioara de Sus (Costeşti, Grădiştea de Munte, Ocolişu Mic), Pui (Federi, Ohaba Ponor, Ponor, Ruşor, Şerel, Uric), Răchitova (Răchitova, Ciula Mare), Rapoltu Mare (Bobâlna), Sălaşu de Sus (Sălaşu de Sus, Coroieşti, Mălăieşti, Paroş), Şoimuş (Căinelu de Jos, Fornădia), Toplița (Dăbâca, Vălari), Vălişoara (Săliştioara, Stoieneasa), Vața de Jos (Căzăneşti, Vața de Sus), Vețel (Căoi), Vorța (Vorța, Certeju de Jos, Coaja, Dumeşti, Luncşoara, Visca), Zam (Zam, Cerbia, Pogăneşti, Tămăşeşti),	pr. Almaş, pr. Almăşel, pr. Arțan, pr. Valea Satului, pr. Vața, pr. Vățişoara, **20-30.05.2019** -heavy rainfall, runoff from the slopes -overflow:pr. Gujii, -inability to take over the sewerage network **28.05-5.06.2019** -heavy rainfall, runoff from the slopes -overflow: pr. Homorod,pr. Poieni, pr. Valea Fierului, pr. Romos, pr. Valea Satului, pr. Valea Mielului, pr. Ruseşti -water puddles -inability to take over the sewerage network **4-21.06.2019** - torrential rainfall, runoff from the slopes -overflow: pr. Ocoliş, pr. Ruşor, pr. Valea Babii, pr. Valea Ursului, pr. Căoi, pr. Vărmaga, **23-26.06.2019** - torrential rainfall, runoff from the slopes -overflow: r. Bobâlna, r. Cristur, r.Cerna, r. Slivuț, pr. Nojag **07-8.07.2019** - torrential rainfall, runoff from the slopes **31.07-2.08.2019** - torrential rainfall, runoff from the slopes - the undersized sewerage system at Orăştie and Simeria which could not take over the rainwater.
20		**IAŞI** **274 localities** **Iaşi, Paşcani (Paşcani, Blăgeşti, Boşteni, Gâşteşti, Lunca, Sodomeni), Hîrlău (Hîrlău, Pârcovaci), Podul Iloaiei,** A. I. Cuza (A.I.Cuza, Kogălniceni, Volintireşti), Andrieşeni (Andrieşeni, Buhăieni, Drăgăneşti, Fântânele, Glăvăneşti, Spineni), Balş (Balş, Boureni, Coasta Măgurii), Bălțați (Podişu, Sârca, Valea Oilor), Bârnova (Bârnova, Cercu, Păun, Pietrăria, Todirel, Vişan), Belceşti (Belceşti, Liteni, Munteni, Satu Nou, Tansa, Ulmi), Bivolari (Bivolari, Tabăra), Brăieşti (Brăieşti, Albeşti-Rediu, Buda, Cristeşti) Ceplenița (Buhalnița, Poiana Mărului, Zlodica), Ciohorani, Ciorteşti (Ciorteşti, Coropceni, Deleni, Rotăria, Şerbeşti), Ciurea (Ciurea, Curături, Dumbrava, Hlincea, Lunca Cetății, Piciorul Lupului), Coarnele Caprei (Coarnele	**15.01-4.03.2019** -heavy rainfall and runoff from the slopes. - sudden melting of the snow layer **25.01-12.02.2019** -heavy 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 right bank Pietroaia river due to flow fluctuations in Ciohorani locality, - erosion left bank of Bahlueț river, due to flow fluctuations in Costeşti commune, Giurgeşti village - warping c.a.Rediu, Ciric, Vămăşoaia, Sacovăț, Răchitoasa, Călina **18-19.05.2019** - heavy rainfall and runoff from the slopes **24.05-10.06.2019** -heavy rainfall and runoff from the slopes -overflow: r. Miletin, pr. Voineşti, - flooding area dam Prut river bank **17-25.06.2019**

		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, 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	-heavy rainfall and runoff from the slopes 27-28.06.2019 -heavy rainfall and runoff from the slopes 5-6.07.2019 - heavy rainfall and strong wind-storm

		(Scobinţi, Bădeni, Feteşti, Sticlăria, Zagavia), Sineşti (Storneşti, Osoi), Sireţel (Sireţel, Berezlogi, Humosu, Satu Nou, Slobozia), Stolniceni Prăjescu (Stolniceni Prăjescu, Cozmeşti), Strunga (Criveşti, Gura Văii, Fărcăşeni), Şcheia (Şcheia, Căueşti, Poiana Şcheii, Satu Nou), Şipote (Şipote, Chişcăreni, Iazu Nou, Iazu Vechi, Hălceni, Mitoc), Tansa (Tansa, Suhuleţ), Tătăruşi (Tătăruşi, Iorcani, Pietrosu, Uda), Todireşti (Todireşti, Băiceni, Stroieşti), Ţibana (Ţibana, Domniţa, Moara Ciornei, Oproaia, Poiana de Sus, Runcu, Vadu Vejii), Ţibăneşti (Ţibăneşti, Glodenii Gândului, Grieşti, Jigoreni, Răsboieni, Recea, Tungujei, Văleni), Tomeşti (Tomeşti, Chicerea, Goruni, Vlădiceni), Ţigănaşi (Cârniceni, Mihail Kogălniceanu), Ţuţora (Chipereşti), Ungheni (Coada Stâncii, Mânzăteşti), Valea Seacă (Valea Seacă, Conţeşti, Topile), Vânători (Vânători, Criveşti, Hârtoape, Vlădnicuţ), Victoria (Icuşeni), Vlădeni (Vlădeni, Alexandru cel Bun, Borşa, Broşteni, Vâlcele), Voineşti (Voineşti, Lungani),	
21		<u>ILFOV</u> <u>28 localities</u> **Buftea, Bragadiru, Chitila, Măgurele, Pantelimon, Popeşti-Leordeni, Otopeni,** Baloteşti Cernica, 1 Decembrie, Afumaţi, Ciorogârla (Ciorogârla, Dârvari), Corbeanca, Chiajna, Clinceni, Cornetu, Dărăşti-Ilfov, Dobroteşti (Fundeni), Domneşti, Dragomireşti-Vale, Găneasa, Glina, Jilava, Nuci, Periş, Ştefăneştii de Jos, Tunari	<u>mai-iunie 2019</u> -heavy rainfall - inability to take over the sewerage network, ditches and gutters for collecting and evacuating rainwater -blocking the Banu Valley riverbed-uncastrated course -hail
22		<u>MARAMUREŞ</u> <u>71 localities</u> **Baia Mare, Sighetu Marmaţiei, Baia Sprie, Borşa, Cavnic, Dragomireşti, Tăuţii Măgherăuş (Tăuţii Măgherăuş, Buşag, Merişor), Săliştea de Sus, Şomcuta Mare (Şomcuta Mare, Buteasa, Ciolt, 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,	<u>10-11.03.2019</u> - water release from the existing snow layer -runoff from the slopes -overflow r. Dobric <u>1-8.05.2019</u> - heavy rainfall, runoff from the slopes -puddle -overflow: V. Criminesii, V. Satului, V. Cârstea, V: Muntelui, V. Caselor, r. Frumuşeaua, V. Senderchi <u>15-30.05.2019</u> - heavy rainfall, runoff from the slopes -puddle -scouring

		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	-overflow: 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 the sewerage network -warping: v. Şugău, v. Făget, v. Iapa, v. Mare **12-23.06.2019** -heavy rainfall, runoff from the slopes -scouring v. Breaza, v. Vinului, v. Cetăţele, v. Socilor, v. Luncii - inability to take over the sewerage network -overflow: v. Iapa **28.06-8.07.2019** -heavy rainfall, runoff from the slopes -scouring: v. Morii, v. Repedea, **31.07-1.08.2019** -heavy rainfall, runoff from the slopes -inability to take over the sewerage network -overflow Valea Râului **26.09.2019** -heavy rainfall, runoff from the slopes -inability to take over the sewerage network
23		**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),	**15.05-04.06.2019** -heavy rainfall, runoff from the slopes **5 – 18.06.2019** -heavy rainfall, runoff from the slopes **23 - 24.06.2019** -heavy rainfall, runoff from the slopes -overflow: pr. Bistriţa, ogaş Racova, pr. Pleşuva,

		Ponoarele (Ponoarele, Băluța, Bârâiacu, Brînzeni, Ceptureni, Cracu Muntelui, Delureni, Gheorghești, Pritești, Răiculești, Șipotu), Poroina Mare (Poroina Mare, Stignița), Prunişor (Prunişor, Arvătești, Balota, Bâltanele, Dragotești, Gârnița, Ghelmegioaia, Guțu, Igiroasa, Mijarca, Zegaia), Şimian (Cerneţi, Dedoviţa Veche, Dudaşu, Erghevița, Poroina, Valea Copcii), Șișești (Șișești, Corcova, Crăguiești, Noapteșa), Tâmna (Colareț, Cremenea, Valea Ursului), Vlădaia (Vlădaia, Almăjel, Scorila, Ștircovița), Voloiac (Lac, Ruptura, Țițirig, Valea Bună)	
24		<u>MUREŞ</u> <u>70 localities</u> **Târgu Mureș, Reghin, Iernut (Cipău, Lechința, Sfântu Gheorghe), Sărmașu, Ungheni (Ungheni, Şăuşa, Vidraslău),** Adămuș (Cornești, Crăiești, Dâmbău), Aluniș (Aluniș, Fițicău), Band (Fânațe), Batoș (Batoș, Coreni, Debrad, Goreni, Uila), Bălăușeri, Beica de Jos (Beica de Jos, Nadășa), Bereni, Brâncovenești (Brâncovenești, Idicel, Șacalu de Pădure), Coroisânmărtin (Coroisânmărtin, Șoimuș), Cuci (Cuci, Dătășeni, Orosia), Deda (Pietriș), Ernei, Fântânele, Gănești, Glodeni, Gornești, Gurghiu (Orșova), Hodoșa (Hodoșa, Ihod, Isla, Sâmbriaș), 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> -heavy rainfall, runoff from the slopes -overflow: r. Mureș, r. Târnava Mică, pr. Deleni, pr. Bungarului, pr. Idicel, pr. Saca, pr. Siregna, pr. Bisericii, pr. Beica, pr. Hodoșa, pr. Pietriș -overflow: rain ditches and non-permanent valleys -increasing level on pr. Fițicău, pr. Orșova -inability to take over the sewerage network -puddles, wind, hail <u>15.05.-2.06.2019</u> -heavy rainfall, runoff from the slopes -overflow: r. Mureș, pr. Beica, pr. Luieriu, pr. Bodogaia, pr. Lunca, pr. Luț -puddles <u>4.06.-03.07.2019</u> -heavy rainfall, runoff from the slopes -overflow: pr. Luț, -puddle -hail -strong wind <u>11.07.2019</u> -heavy rainfall, runoff from the slopes -hail, strong wind
25		<u>NEAMȚ</u> <u>172 localities</u> **Piatra Neamţ (Piatra Neamţ, Doamna, Văleni), Târgu Neamţ (Târgu Neamţ, Blebea, Humuleştii Noi), Bicaz (Izvorul Muntelui), Roznov (Chintinici),** Alexandru cel Bun (Bistrița, Agîrcia, Scăricica, Vădurele, Viişoara),	<u>11-14.04.2019</u> -heavy rainfall, runoff from the slopes, <u>6-7.05.2019</u> - heavy rainfall, runoff from the slopes, -increasing flows and levels - alluvial transport, tributaries, streams - increase of flows and levels, discharge over the high water discharger at the Crăiești accumulation

		Bahna (Bahna, Băhnişoara, Broşteni, Izvoare, Ţuţcanii din Vale), Bârgăuani (Bălăneşti, Dârloaia, Ghelăieşti, Hârtop, Homiceni, Vlădiceni), Bicaz Chei (Bicaz Chei, Bîrnadu, Gherman, Ivaneş), Bicazu Ardelean (Bicazu Ardelean, Telec), Boghicea (Boghicea, Căușeni, Nistria, Slobozia), Borca (Borca, Pârâul Cârjei, Mădei, Pârâul Pântei, Sabasa, Soci), Bozieni (Crăieşti), Cândeşti (Cândeşti, Bărcăneşti, Pădureni, Ţârdenii 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, Fărcașa (Fărcaşa, Buşmei, Popeşti, Stejaru), Făurei (Făurei, Budeşti, Climeşti), Gâdinţi, Gârcina (Gârcina, Almaş, Cuejdiu), Ghindăoani, Girov (Girov, Boteşti, Căciuleşti, Doina, Gura Văii, Popeşti, Turtureşti), Grinţieş(Grinţieş, Poiana), Grumăzeşti (Grumăzeşti, Curechiştea, Netezi, Topoliţa), Hangu (Hangu, Buhalniţa, Rugineşti), Horia, Icuşeşti (Icuşeşti, Băluşeşti, Spiridoneşti, Tabăra), Ion Creangă (Ion Creangă, 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	-bridge section on DN blocked by floats __18.05.2019__ - heavy rainfall, runoff from the slopes, streams. -increasing flows and levels __28.05-10.06.2019__ - heavy rainfall, runoff from the slopes, streams, - outbursts, erosions -increasing flows and levels __17-26.06.2019__ - heavy rainfall, runoff from the slopes, - increasing flows and levels __3-8.07.2019__ - heavy rainfall, runoff from the slopes, alluvial transport, streams - increasing flows and levels, __15-28.08.201__ - heavy rainfall, runoff from the slopes, alluvial transport - increasing flows and levels

		(Stănița, Chicirea, Ghidion, Poienile Oancei, Veja, Vlădnicele), Şagna (Şagna, Vulpăşeşti), Tarcău (Tarcău, Ardeluța), Taşca, Tazlău, Tupilați (Tupilați, Arămoaia, Totoieşti), Urecheni, Valea Ursului (Bucium, Chilii, Giurgeni), Văleni (Văleni, David, Moreni), Vînători-Neamț (Vînători-Neamț, Lunca), Zăneşti (Zăneşti, Traian)	
26		**OLȚ** **55 localities** **Balş, Corabia, Potcoava** (Potcoava, Fălcoieni, Sineşti, Trufineşti), **Scorniceşti** (Bălțați, Jitaru, Mărgineni-Slobozia, Mihăileşti, Mogoşeşti, Negreni), Bărăşti (Boroeşti, Mereni, Moțoieşti), Corbu (Burduleşti), Cungrea (Cepeşti, Ibăneşti, Oteştii de Jos), Dobroteasa (Dobroteasa, Batia, Câmpu Mare, Vulpeşti), Grădinile (Arvăteasca), Movileni (Movileni, Bacea), Oporelu, Perieți (Perieți, 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** -heavy rainfall, runoff from the slopes **5-17.06.2019** - heavy rainfall, runoff from the slopes -puddles internal waters - raising the groundwater level **1-10.06.2019** - heavy rainfall, runoff from the slopes -overflow pr. Valea Pîrvului, pr. Goța, 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, Urlați (Orzoaia de Jos, Valea Crângului, Valea Nucetului, Valea Pietrii), Vălenii de Munte,** Adunați, 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	**31.05-6.06.2019** -heavy rainfall, runoff from the slopes -torrent activation: pr. Praja, Valea Poienii -overflow: r. Cricovu Sărat, pr. Bertea, pr. Tasica, pr. Lapoş, pr. Nişcov, pr. Zeletin, pr. Plopeanca, pr. Mireş, pr. Valea Stâlpului -puddles internal waters -other causes **21-26.06.2019** -heavy rainfall, runoff from the slopes -torrent activation -overflow: râu Prahova, râu Teleajen, r. Cricovul Dulce, pr. Bălteanca, pr. Drajna, pr. Seaca, pr. Secuianca, pr. Odăii, pr. Plopeanca, pr. Rîncezeanca, pr. Zeletin,

		(Schiulești), Jugureni (Valea Unghiului), Lapoș (Lapoș, Lăpoșel, Glod), Măneciu (Măneciu Ungureni, Costeni, Măneciu Pământeni), Plopu (Plopu, Nisipoasa), Posești (Poseștii Pământeni, Poseștii-Ungureni, Nucșoara de Jos, Nucșoara de Sus, Valea Plopului, Valea Stupinii, Târlești), Poiana Câmpina (Răgman), 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, Știubeiu,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),	
		SĂLAJ **67 localities** **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	**14-30.05.2019** -heavy rainfall, runoff from the slopes -increasing level: r. Someș, r. Almaș, pr. Brăduleț, pr. Valea Canata -strong wind -overflow: pr. Valea Groșilor, pr. Racovița, pr. Valea Mare -puddles internal waters -hail **07-21.06.2019** -heavy rainfall, runoff from the slopes -puddles internal waters -hail

		SATU MARE 18 localities **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),	1-9.02.2019 -heavy rainfall, snow melting -sliding outer slope on a length of about 20-30 m from the body of the left dam of the river Tur near Adrian locality 21.05-2.06.2019 -heavy rainfall, runoff from the slopes -overflow: pr. Tarna Mare, pr. Lechincioara, pr. Vale Strâmbă -accumulations internal waters - failure to provide rainwater drainage sections in the bridge area 21.05-11.06.2019 -heavy rainfall, runoff from the slopes - infiltrations at the right dike crossing pr. Homorodu Nou -overflow: r. Someș, pr. Homorodu Nou, pr. Cerna -accumulations internal waters - insufficient stormwater drainage capacity 1.08.2019 -heavy rainfall, runoff from the slopes, streams - accumulations of rainwater
29		SIBIU 6 localities **Săliște, Tălmaciu** (Tălmaciu, Tălmăcel), Gura Râului, Râu Sadului, Sadu	31.05-2.06.2019 -heavy rainfall, runoff from the slopes -increasing flows on: river Săliște, river Cibin, river Sadu, pr. Tălmăcel 22.07.2019 -heavy rainfall, runoff from the slopes -overflow: pr. Lungșoara, pr. Râușor, pr Valea Mancului, Valea Prejbei, Valea Popii - float blockages
30		SUCEAVA 179 localities **Suceava, Fălticeni, Vatra Dornei (Vatra Dornei, Argestru, Roșu, Todireni), Cajvana (Cajvana, Codru), Liteni (Liteni, Corni, Rotunda, Siliștea), Frasin (Bucșoaia, Plutonita), Solca,** Adâncata (Adâncata, Călugăreni, Fetești), Arbore (Arbore, Clit), Baia (Baia, Bogata), Bălăceana, Berchișești (Berchisești, Corlata), Boroaia (Boroaia, Giulești, Moișa, Săcuța), Botoșana, Breaza (Breaza de Sus, Pârâul Negrii), Cacica (Pârteștii de Sus, Cacica), Calafindești (Calafindești, Botoșanița Mare), Capu Câmpului Ciprian Porumbescu, Comănești (Comănești, Humoreni), Cornu Luncii (Brăiești, Păiseni, Sasca Mare, Șinca), Dărmănești (Dărmănești, Călinești, Călinești-Vasilache, Mărițeia Mică, Măriței), Dolhești (Dolheștii Mici, Valea	March-April 2019 -precipitations, runoff from the slopes 24.04-20.05. 2019 -torrential precipitations, runoff from the slopes -increasing flow: r. Dorna, pr. Moișa, pr. Gligu, pr. Valea Mare, pr. Călimănel, pr. Negru, pr. Buciniș, pr. Mazăre, pr. Zbrâncani, pr. Suha Mică -landslide -erosions active 21.05-4.06. 2019 -torrential precipitations, runoff from the slopes -increasing flow: r. Dorna, r. Sucevița, pr. Jgheaburi, pr. Fundoaia, pr. Brăteasca, pr. Suha, pr. Botușanu, pr. Muncel, pr. Bucovăț, pr. Varvata, pr. Morii, pr. Râșca, pr. Tiganca, pr. Remezeu, pr. Slatina, torenți necadastrat, -overflow: pr. Domnica 6.06. 2019 -torrential precipitations, runoff from the slopes -increasing flow: r. Sucevița, pr. Saca, pr. Solca, pr. Clit, pr. Balcoaia, pr. Isachia, pr.

		Bourei), Dorna Arini (Cozănești, Dorna Arini, Ortoaia, Sunători), Dorna Candrenilor (Dorna Candrenilor, Dealu Floreni, Poiana Negrii), Drăgoiești (Drăgoiești, Mânzănăiești), Dumbrăveni (Sălăgeni), Frătăuții Noi (Frătăuții Noi, Costișa), Frumosu (Frumosu, Deia, Dragoșa), Fundu Moldovei (Botușel), Grănicești (Grănicești, Dumbrava, Iacobești, Românești), Hânțești (Hânțești, Berești), Horodnic de Sus, Horodniceni (Horodniceni, Botești, Mihăiești, Rotopănești), Iacobeni (Iacobeni, Mestecăniș), Ilișești (Ilișești, Brașca), Ipotești (Ipotești, Lisaura, Tișăuți), Marginea, Mănăstirea Humorului (Mănăstirea Humorului, Pleșa, Poiana Micului), Mitocu Dragomirnei (Mitocu Dragomirnei, Dragomirna, Lipoveni, Mitocași), Moara (Moara Nica, Moara Bulai, Moara Carp, Liteni, Frumoasa, Vornicenii Mari), Moldova Sulița (Moldova Sulița, Benia), Moldovița (Moldovița, Argel, Demăcușa, Rașca), Ostra (Ostra, Tărnicioara), Panaci (Panaci, Coverca), Păltinoasa (Păltinoasa, Capu Codrului), Pârteștii de Jos (Pârteștii de Jos, Deleni, Varvata), Poieni Solca, Putna (Putna, Gura Putnei), Râșca (Râșca, Slătioara), Sadova, Satu Mare (Satu Mare, Țibeni), Siminicea (Siminicea, Grigorești), Slatina (Slatina, Găinești), Straja, Stroiești (Stroiești, Zaharești, Vâlcele), Stulpicani (Stulpicani, Gemenea, Negrileasa, Slătioara), Sucevița, Șaru Dornei (Neagra Șarului, Gura Haitii), Șcheia (Șcheia, Florinta, Mihoveni, Sfântu Ilie), Șerbăuți (Șerbăuți, Călinești), Todirești (Todirești, Costâna, Părhăuți, Sârghești, Soloneț), Udești (Udești, Racova, Știrbăț), Ulma (Costileva, Lupcina, Măgura), Vadu Moldovei (Vadu Moldovei, Ciumulești, Ioneasa, Nigotești), Valea Moldovei (Valea Moldovei, Mironu), Vama (Vama, Molid), Vicovu de Jos, Voitinel, Vulturești (Vulturești, Giurgești, Hreațca, Jacota, Merești, Osoi, Pleșești, Valea Glodului), Zamoștea (Cojocăreni, Nicani), Zvoriștea (Zvoriștea, Buda, Poiana, Slobozia)	Valea Morii, pr. Sadova, pr. Suha, pr. Dragoșina, pr. Hulumna, pr. Bocancea - risk of blockage and inability to take over in the sewerage network **17-27.06. 2019** -torrential precipitations, runoff from the slopes -increasing flow: r. Siret, r. Moldova, r. Moldovița, pr. Staniște, pr. Corlata, pr. Hinata, pr. Botușel, pr. Horaiț, pr. Racovăț, pr. Smidești, pr. Roșoșa, pr. Darieni, pr. Demăcușa, pr. Băișescu, pr. Suha, pr. Brăteasca, pr. Muncel, pr. Racova, pr. Șovorâta, pr. Străjii, pr. Ziminel, pr. Gemenea, pr. Hojda, pr. Petruceni, pr. Negrileasa, pr. Slătioara, pr. Adânc, -overflow: pr. Arșanu, pr. Cocoșu, pr. Bursuc, pr. Smidești, pr. Darieni **13.07-1.08. 2019** -torrential precipitations, runoff from the slopes -overflow: pr. Tătarca, pr. Pârâul Negru

31		**TELEORMAN** **41 localities** **Zimnicea, Turnu Măgurele, Videle,** Babaiţa (Babaiţa, Merişani), Beuca, Botoroaga (Botoroaga, Călugăru, Târnava, Tunari, Valea Cireşului), Bujoreni, Ciolăneşti (Ciolăneşti Deal, Ciolăneşti Vale), Dideşti, Dracşeni, Drăgăneşti Vlaşca (Drăgăneşti Vlaşca, Comoara), Frumoasa, Furculeşti, Gălăţeni (Gălăţeni, Bascoveni, Grădişteanca), Izvoarele, Măgura (Măgura, Guruieni), Mereni, Orbeasca (Orbeasca de Sus, Orbeasca de Jos, Lăceni), Piatra, Poieni, Săceni, Segarcea Vale, Tătărăştii de Sus, Trivale Moşteni, Vităneşti (Vităneşti, Purani, Siliştea, Schitu Poenari), Zâmbreasca	**3-19.06. 2019** - precipitations, runoff from the slopes -overflow r. Claniţa, r. Câlniştea, r. Glavacioc, Slătioarelor, v. Suhat, -puddles -hail - collector channel with reduced capacity to take water from the slopes
		TIMIŞ **27 localities** **Făget** (Făget, Bichigi, Povargina), Balint (Balint, Bodo), Bara (Dobreşti, Radmaneşti), Barna (Barna, Drinova), Bethausen (Cladova), Denta, Dumbrava (Dumbrava, Răchita), Fardea, Gavojdia, Margina (Colonie Margina, Coşteiu de Sus), Mănăştiur, Nădrag (Nadrag, Crivina), Ohaba Lungă (Ohaba Română, Dubeşti), Pietroasa (Pietroasa, Crivina de Sus, Fărăşeşti, Poieni), Tomeşti (Luncanii de Sus)	**30.04-4.05.2019** - heavy rainfall, runoff from the slopes -overflow: r. Timiş, pr. Sasa, pr Homa, pr. Saraz **27.05-10.06.2019** - heavy rainfall, runoff from the slopes - reduced capacity of the rainwater collection and management network - flood with considerable increase in the leakage flow and speed: river Bega, pr. Ruginoasa, pr. Sudrias, pr. Saraz, pr. Zopan, pr. Topla -overflow: river Bega, river Cladova, -landslide
32		**TULCEA** **15 localities** Beştepe, Frecăţei (Frecăţei, Poşta), Horia, Mahmudia, Mihail Kogălniceanu (Rândunica), Ostrov, Sarichioi (Sarichioi, Enisala, Visterna),Topolog (Făgăraşul Nou, Măgurele), Valea Nucarilor (Valea Nucarilor, Aghighiol, Iazurile),	**1-31.05.2019** - heavy rainfall; -runoff from the slopes -concentrating leaks on the streets **1-30.06.2019** - heavy rainfall; -runoff from the slopes -concentrating leaks on the streets **1-31.07.2019** - heavy rainfall; -runoff from the slopes **1-31.08.2019** - heavy rainfall; -runoff from the slopes -inability to take over the sewerage network **1.03-31.07.2019** - lack of precipitations -drought, Măgurele village Topolog commune

33		**VASLUI** **295 localities** **Vaslui, Huşi, Murgeni (Cârja), Negreşti**, Albeşti (Albeşti, Corni Albeşti, Crasna, Gura Albeşti), Alexandru Vlahuţă (Alexandru Vlahuţă, Buda, Ghircani, Morăreni), Arsura (Fundătura, Mihail Kogălniceanu), Banca (Stoiseşti), Băcani (Băcani, Drujeşti, Suseni, Vulpaşeni), Băceşti (Băceşti, Armăşeni, Babuşa, Păltiniş, Ţibăneştii Buhlii, Vovrieşti), Bălteni (Bălteni, Bălteni Deal, Chetreşti), Bogdana (Bogdana, Lacu Babei, Verdeş), Bogdăneşti (Bogdăneşti, Horoiata, Hupca, Orgoieşti, Ulea, Unteşti, Vişinari, Vlădeşti), Bogdaniţa (Bogdaniţa, Cârtibaşi, Cepeşti, Coroieşti, Rădeşti, Tunseşti), Boteşti (Boteşti, Gugeşti), Buneşti-Avereşti (Avereşti, 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 (Ghergheşti, 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	**6-7.05.2019** - heavy rainfall, runoff from the slopes -puddles şi internal waters - exceeding the transport capacity of the gutters - exceeding the transport capacity of the Bârlad river **24.05-24.06.2019** - heavy rainfall, runoff from the slopes -puddles şi internal waters - inability to take over the network of canals and street ditches -exceeding the transport capacity of the gutters

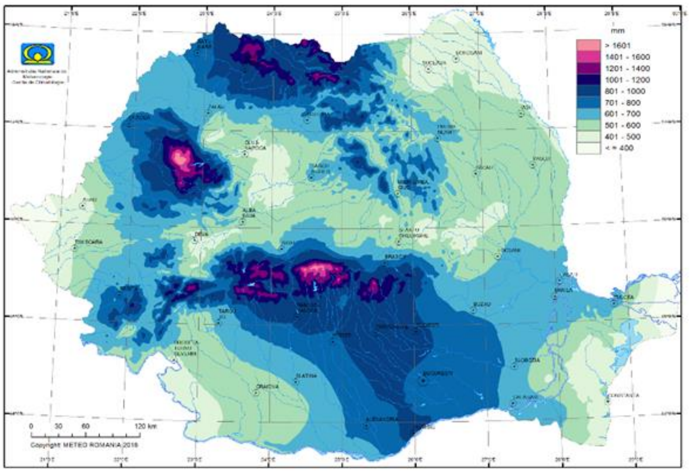
		Mare), Laza (Laza, Bejenești, Râșnița, Sauca), Lipovăț (Lipovăț, Căpușeni, Chitoc, Corbu, Fundu Văii), Miclești (Miclești, Chircești, Popești), Muntenii de Jos (Muntenii de Jos, Băcăoani, Mânjești, Secuia), Oltenești (Oltenești, Curteni, Pahna, Târzii, Vinetești), Osești (Osești, Buda, Pădureni, Vâlcele), Pădureni (Pădureni, Capotești, Davidești, Ivănești, Leoști, Rusca, Văleni), Perieni, Pogana (Pogana, Bogești, Cârjăoani, Măscurei, Tomești), Pogonești (Pogonești, Belcești, Polocin), Poienești (Poienești, Florești, Frasinu, Oprișița), Pungești (Pungești, Armășoaia, Cursești Deal, Cursești Vale, Siliștea, Stejaru, Toporăști), Puiești (Puiești, Călimănești, Cetățuia, Cristești, Fîntînele, Gîltești, Iezer, Lalești, Mocani, Rotari, Ruși), Pușcași (Pușcași, Poiana lui Alexa, Tieșoru, Valea Târgului), Rafaila, Rebricea (Rebricea, Bolati, Crăciunești, Draxeni, Sasova, Rateșu Cuzei, Tatomirești, Tufeștii de Jos), Roșiești (Roșiești, Codreni, Gura Idrici, Idrici, Rediu, Valea lui Darie), Solești (Boușori, Iaz, Șerbotești, Valea Siliștei), Suletea (Suletea, Fedești, Jigalia, Rascani), Ștefan Cel Mare (Ștefan Cel Mare, Bârzești, Brăhăsoaia, Căntălărești, Mărășeni), Tăcuta (Tăcuta, Cujba, Dumasca, Focseasca, Mircești, Protopopești), Tătărani (Tătărani, Bălțați, Crăsneni, Giurgești, Leoști), Todirești (Todirești, Cotic, Drăgești, Huc, Plopoasa, Siliștea, Sofronești, Valea Popii, Viișoara), Tutova, Viișoara (Viișoara, Halta Dodești, Văleni, Viltotești), Vinderei (Vinderei, Brădești, Docani, Docăneasa, Gara Talasman, Obârșeni, Valea Lungă), Voinești (Voinești, Avrămești, Băncești, Mărășești, Obârșeni, Stăncășeni, Uricari), Vulturești (Vulturești, Buhăiești, Voinești), Vutcani (Vutcani, Mălăești, Poșta Vutcan), Zapodeni (Zapodeni, Butucaria, Ciofeni, Delea, Dobroslovești, Macrești, Portari, Telești, Uncești), Zorleni (Zorleni, Popeni, Smila),	

34		<u>**VÂLCEA**</u> <u>**167 localities**</u> **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),	<u>**25-31.01.2019**</u> -heavy rainfall, melting of the snow layer, runoff from the slopes - the inability to take rainwater by street gutters -landslide <u>**21.05-13.06.2019**</u> -heavy rainfall, runoff from the slopes - the inability to take rainwater by street gutters -landslide <u>**19.06-11.07.2019**</u> -heavy rainfall, runoff from the slopes, -fast floods - the inability to take rainwater by street gutters

		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)	
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, Tăbuceşti), Boloteşti (Găgeşti, Pietroasa, Vităneştii de Sub Măgură), Bordeşti (Bordeşti, Bordeştii de Jos), Cîrligele (Cîrligele, Blidari, Dălhăuţi), Chiojdeni (Lojniţa, Luncile, Mărăcini, Tulburea), Coteşti (Coteşti, Budeşti), Dumitreşti (Biceştii de Jos, Blidari, Dumitreştii-Faţă, Lăstuni, Lupoaia, Poieniţa, Siminoc, Tinoasa), Gura Caliţei (Gura Caliţei, Cocoşari, Dealu Lung, Lacu lui Baban, Plopu, Poenile, Şotricari), Gugeşti, Homocea (Homocea, Costişa, Lespezi), Jitia (Jitia, Dealu Sării, Jitia de Jos, Măgura), Mera (Mera, Livada, Milcovel, Roşioara, Vulcăneasa), Negrileşti, Naruja (Naruja, Podu Stoica), Nereju (Nereju, Brădăceşti, Chiricani, Nereju Mic, Sahastru), Nistoreşti (Nistoreşti, Bîţcari, Făgetu, Podu Şchiopului, Româneşti, Vetreşti Herăstrău), Paltin (Paltin, Prahuda, Ţepa), Păuneşti (Păuneşti, Viişoara), Poiana Cristei (Mahriu, Odobasca, Petreanu, Tîrîtu), Pufeşti, Reghiu (Reghiu, Farcaş, Jgheaburi, Raiuţi, Ursoaia), Rugineşti (Rugineşti, Angheleşti, Copăceşti, Văleni), Sihlea (Bogza, Voetin), Soveja (Dragosloveni), Tănăsoaia (Costişa, Vladnic de Sus), Tîmboieşti, Tulnici (Coza, Lepşa), Ţifeşti (Clipiceşti), Urecheşti, Valea Sării (Valea Sării, Colacu, Mătăcina, Prisaca), Vidra (Ireşti, Ruget, Viişoara, Voloşcani),	**December 2018-1.04.2019** - precipitations, runoff from the slopes -snow melting -increasing flows and levels river Putna -erosions at both shores river Putna **2.02-5.02.2019** - precipitations, runoff from the slopes -snow melting -increasing flows and levels: river Milcov, river Râmnicu Sărat, river Trotuş **28.04-3.06.2019** - precipitations, runoff from the slopes -increasing flows and levels: r. Putna, r. Năruja, pr. Tichiriş, tr. Colţea, tr. Ştiubei, pr. Dîlgov, pr. Slimnic, pr. Oreavu, pr. Ochean, pr. Valea Neagră - thalweg erosion -shore erosion **mai-iunie.2019** -heavy rainfall, runoff from the slopes. -increasing flows and levels: r. Milcov, r. Putna, pr. Caciu, r. Zăbala, r. Rîmna, pr. Mera, pr. Vizăuţi, pr. Valea Neagră, pr. Dragomirna, tr. Bodin, tr. Vulcăneasa, pr. Lepşa -shore erosion: r. Putna, r. Zăbala, pr. Caciu, r. Rîmna, pr. Vizăuţi, pr. Dragomira

		Vintileasca (Vintileasca, Bahnele, Tănăsari), Vizantea Livezi (Livezi, Mesteacănu, Piscu Radului, Vizantea Mănăstirească, Vizantea Răzăşească), Vrâncioaia (Vrâncioaia, Bodeşti, Muncei, Ploştina, Poiana, Spineşti)	

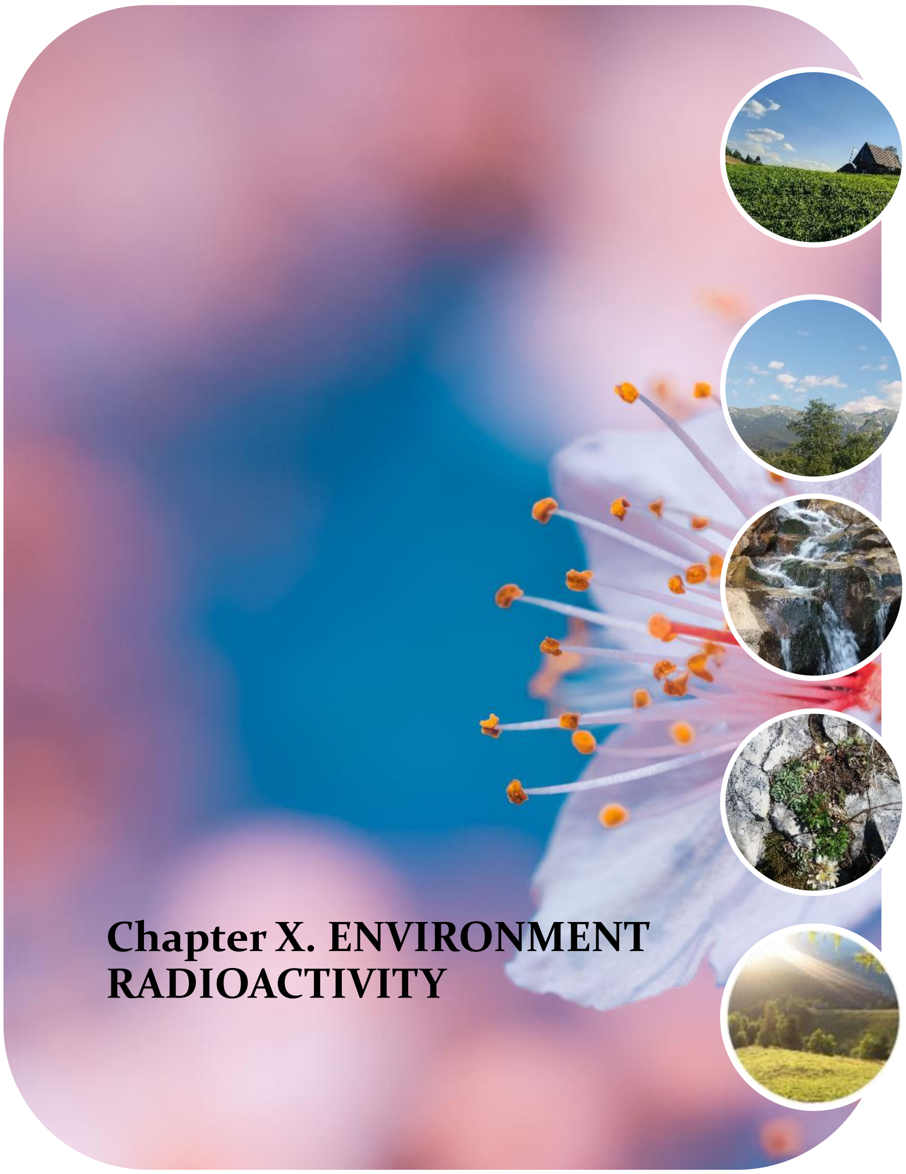
Figure IX.6 Annual amounts of precipitation in the year 2017 (in mm)



Source: www.rowater.ro

Forecast of the effects of climate change on the urban environment

According to Romania's National Strategy on Climate Change 2013-2020, climate change in Romania is part of the global context, taking into account regional conditions: temperature rise will be more pronounced in summer, while in northwestern Europe the most pronounced is expected in winter.
According to the estimates presented in the IPCC AR4, in Romania an increase in the average annual temperature is expected compared to the period 1980-1990 similar to the whole of Europe, there are small differences between the results of the models in the first decades of the XXI century and higher in end of the century:
• between 0.5 ° C and 1.5 ° C for the period 2020-2029;
• between 2.0 ° C and 5.0 ° C for 2090-2099, depending on the scenario (eg between 2.0 ° C and 2.5 ° C for the scenario with the lowest average global temperature increase and between 4.0 ° C and 5.0 ° C in the case with the most pronounced temperature rise scenario).
From a pluviometric point of view, over 90% of the climate models forecast for the period 2090-2099 pronounced droughts during the summer in the area of Romania, especially in the south and south-east (with negative deviations compared to the period 1980-1990 greater than 20%).
In terms of winter precipitation, the deviations are smaller and the uncertainty is higher.
The main impact of climate change on urban areas, infrastructure and construction is mainly related to the effects of extreme weather events, such as heat waves, heavy snowfalls, storms, floods, increasing slope instability.



Chapter X. ENVIRONMENT RADIOACTIVITY

X. MONITORING THE RADIOACTIVITY OF ENVIRONMENTAL FACTORS

X.1. AIR RADIOACTIVITY

X.2.WATER RADIOACTIVITY

X.3. SOIL RADIOACTIVITY

X.4. VEGETATION RADIOACTIVITY

This chapter does not contain specific indicators according to the Order of the Minister of Environment, Waters and Forests no.618/30.03.2015 – the full chapter can be accessed on the link: http://www-old.anpm.ro/upload/150386_ANPM-PC_RSM%202019.pdf)

CONSUMPTION TRENDS

FOOD AND BEVERAGE

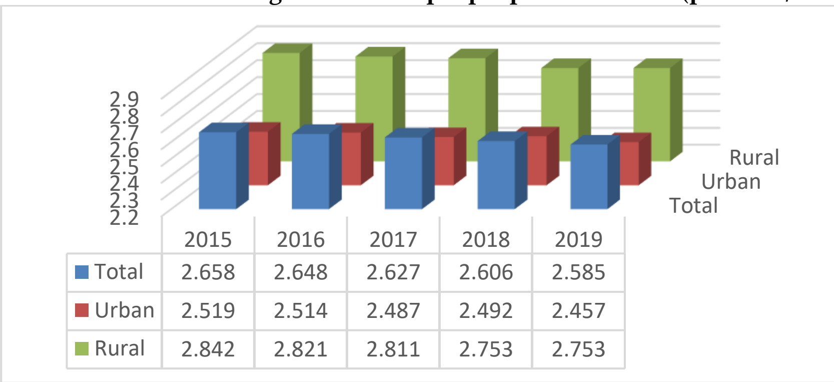
Table XI.1 Average annual consumption per capita, for the main food and beverages

Main food and beverages	Measure Units	Years				
		2014	2015	2016	2017	2018
Cereals and cereal products in grain equivalent	Kg	207	211,2	208,4	208,2	205,4
Cereals and cereal products in flour equivalent	Kg	156,4	159,8	157,6	157,3	155,2
Wheat, rye in flour equivalent	Kg	120,3	122,6	122,2	122,4	161,8
Potatoes	Kg	100,8	98,3	95,5	96,6	95,5
Leguminous grains	Kg	3,1	3,2	2,1	2,4	4.1
Vegetables and vegetable products equivalent to fresh vegetables	Kg	158	158,5	155,8	152,1	173,5
Fruit and fruit products in fresh fruit equivalent	Kg	89,2	87,8	96	96,1	110,8
Sugar and sugar products in sugar equivalent (including honey)	Kg	21,1	25,6	25,5	25,7	25,4
Meat and meat products in fresh meat equivalent	Kg	57,8	63,4	65,5	68,4	73,8
Milk and milk products in milk equivalent 3.5% fat (excluding butter)	Kg	251,5	250,7	253,7	251,4	258,3
Milk and milk products in milk equivalent 3.5% fat (excluding butter)	Liters	244,2	243,4	246,3	244,1	250,8
Eggs	Pieces	246	262	262	255	236
Fish and fish products in fresh fish equivalent	Kg	4,9	5,5	5,9	6,3	6,7
Wine and wine products	Liters	22,6	19	18	21,6	23,8
Beer	Liters	82,2	88,3	88,9	89,5	90,1
Distilled alcoholic beverages (alcohol 100%)	Liters of pure alcohol (100%)	1,2	1,3	1,5	1,5	1,9
Soft drinks	Liters	153,5	179,3	188,6	213,2	209,8
Total alcohol consumption (alcohol 100%)	Liters of pure alcohol (100%)	8	7,9	8,1	8,6	9,2

Source: National Institute of Statistics - until 2019, the data for 2019 have not been processed

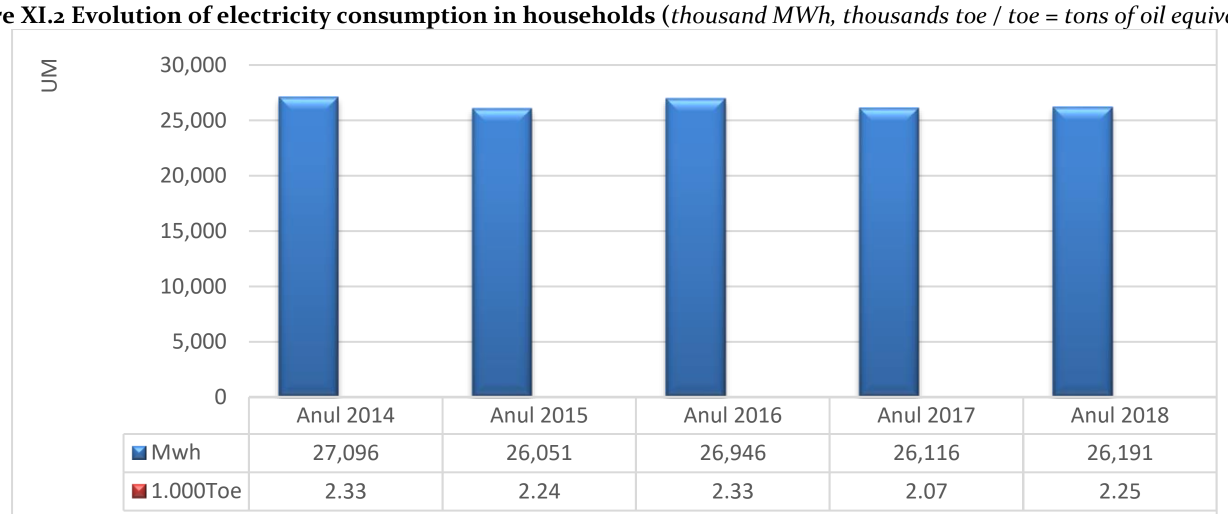
HOUSING

Figure XI.1 Evolution of the average number of people per household (persons / household)



Source: National Institute of Statistics

Figure XI.2 Evolution of electricity consumption in households (*thousand MWh, thousands toe / toe = tons of oil equivalent*)



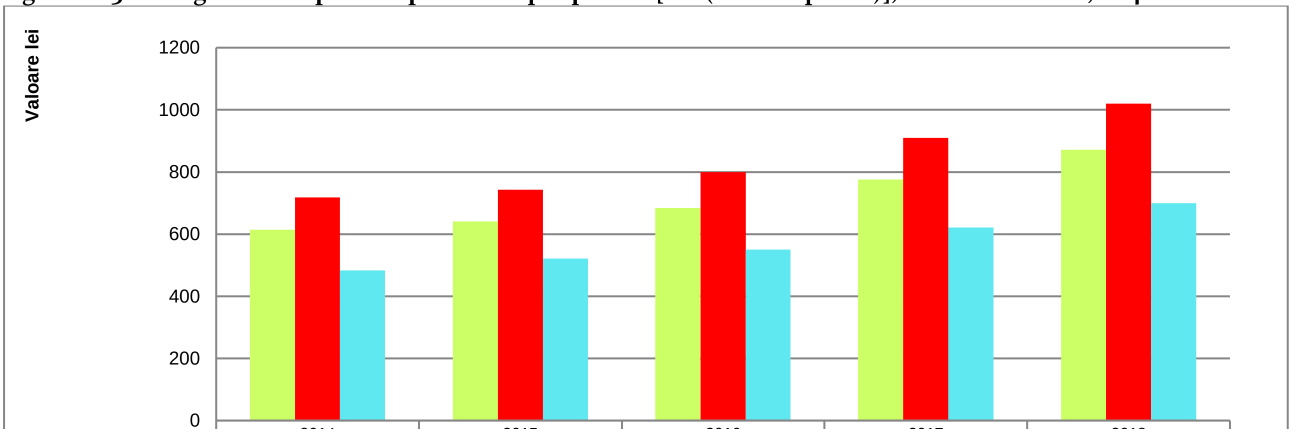
Source: National Institute of Statistics
- until the date of preparation of this I.N.S. did not process the data for 2019

Table XI.2 Average consumption expenditure per person [Lei (current prices)], at national level, 2014 – 2018

Total expenses monthly averages per person - lei -	YEAR 2018	YEAR 2017	YEAR 2016	YEAR 2015	YEAR 2014
TOTAL	871,81	776,07	683,94	640,56	613,97
URBAN	1019,86	909,97	799,35	742,96	717,87
RURAL	699,55	620,81	550,11	521,11	482,86

Source: National Institute of Statistics
- until the date of preparation of this I.N.S. did not process the data for 2019

Figure XI.3 Average consumption expenditure per person [Lei (current prices)], at national level,2014 – 2018



	2014	2015	2016	2017	2018
Total	613.97	640.55	683.94	776.07	871.81
Urban	717.87	742.96	799.35	909.97	1019.86
Rural	482.86	521.11	550.11	620.81	699.55

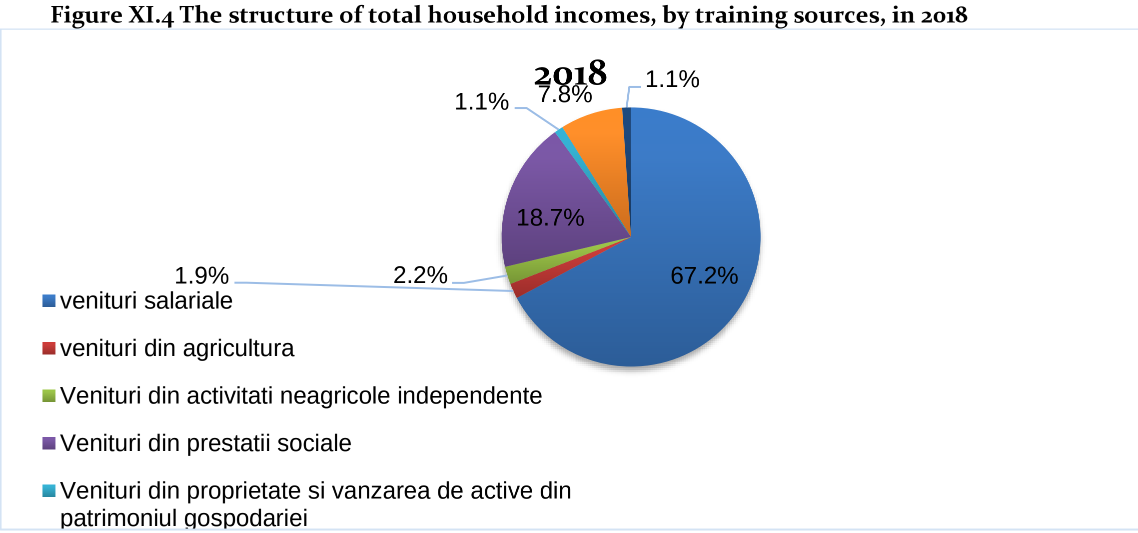
Source: National Institute of Statistics
- until the date of preparation of this I.N.S. did not process the data for 2019

Table XI.3 The structure of total consumption expenditures by destinations, over the years 2018 și 2019, [%]

Structure of total household expenditure	Year 2018 [%]	Year 2019 [%]
Consumption expenses	62,0	61,0
Investment expenses	0,5	0,6
Production expenses	2,4	2,2
Taxes, contributions, etc	31,5	33,0
Other expenses	3,6	3,2
Total expenses [%]	100,0	100,0

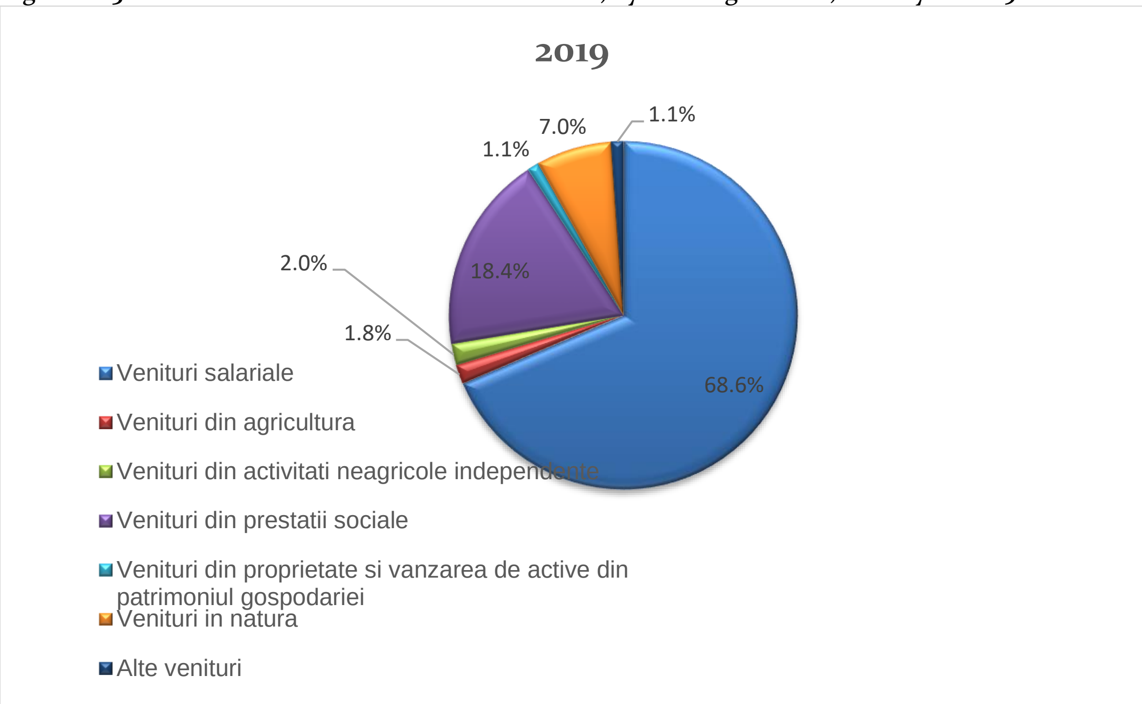
Source: National Institute of Statistics - Press release no. 145 of 5 June 2020
Household income and expenditure in 2019, Statistical Survey of Family Budgets (ABF)

Figure XI.4 The structure of total household incomes, by training sources, in 2018



Source: National Institute of Statistics - Press release no. 145 of 5 June 2020
Household income and expenditure in 2019, Statistical Survey of Family Budgets (ABF)

Figure XI.5 The structure of total household incomes, by training sources, in the year 2019



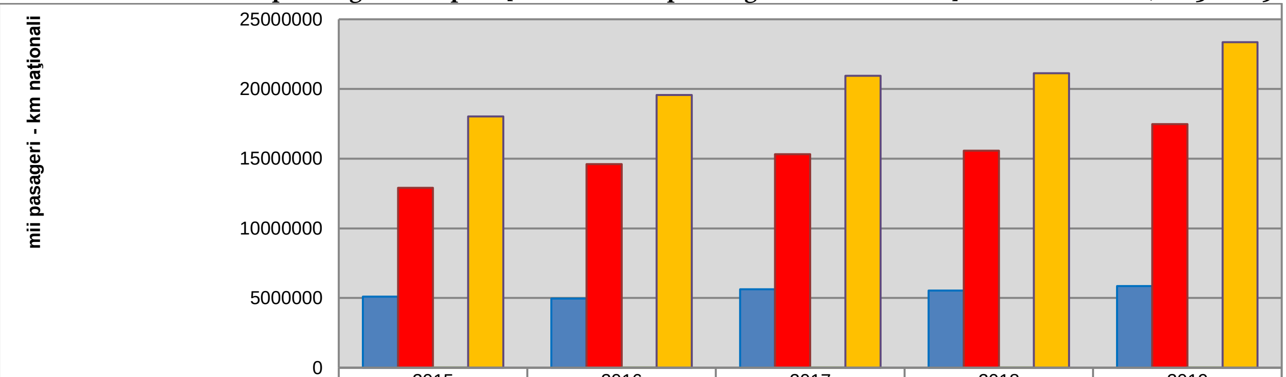
Source: National Institute of Statistics - Press release no. 145 of 5 June 2020
Household income and expenditure in 2019, Statistical Survey of Family Budgets (ABF)

MOBILITY

RO 35
Indicator code Romania: RO 35 EEA indicator code: CSI 35
TITLE: PASSENGER TRANSPORT DEMAND
DEFINITION: Passenger transport demand is defined as the amount of passenger-kilometers traveled each year. Domestic passenger transport includes car, bus and coach transport and trains.

The indicator shows data that refer only to the transport on the national territory, regardless of the nationality of the transport vehicle, for the transport by cars, buses and coaches, respectively by trains (metro & trams and light rail are excluded) for a period of at least 5 years. The variable is calculated from the passenger-kilometer (pkm) indicator, defined as the transport of a passenger over a distance of one kilometer. Figure XI.6 shows the share of passenger modes of transport [thousands of passengers - national km] at national level between 2015 and 2019. Figure XI.7 shows the share of each mode of transport in total number of passengers [% pkm] at national level between 2015 and 2019. There are relatively different variations for the three modes of transport, as follows: in **rail transport** there is an oscillating evolution with a decreasing trend until 2019; in **road transport** the evolution is oscillating with a slight upward trend in 2019; **water transport** has a decreasing trend between 2015 and 2019.

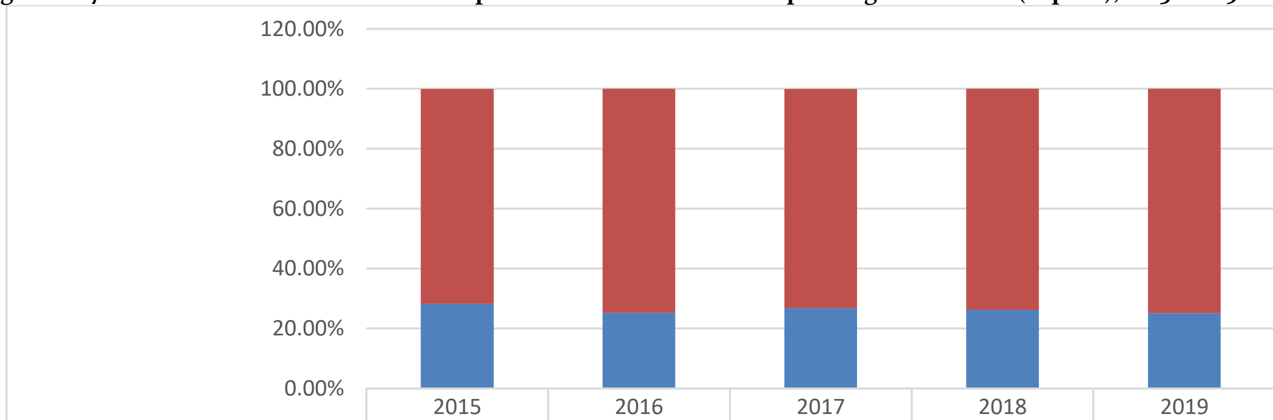
Figure XI.6 Share of modes of passenger transport [thousands of passengers - national km] at national level, 2015 - 2019



	2015	2016	2017	2018	2019
Feroviar	5106514	4952622	5629215	5542677	5866008
Rutier	12914062	14609472	15319994	15573425	17478123
Căi navigabile	9,520	7,650	7,650	6,000	5,572
Total	18030096	19569744	20956859	21122102	23349703

Source: National Institute of Statistics

Figure XI.7 The share of each mode of transport in the total number of passengers traveled (% pkm), 2015 - 2019



	2015	2016	2017	2018	2019
cai navigabile	0.06%	0.03%	0.03%	0.02%	0.02%
rutier	71.63%	74.66%	73.10%	73.73%	74.85%
feroviar	28.32%	25.31%	26.86%	26.24%	25.12%

Source: the Ministry of Transport, www.mt.ro

Use of public transport

The volume of local public passenger transport refers to bus and minibus, respectively metro, trams and trolleybuses. Local public passenger transport includes transport within the administrative - territorial area of a locality, without exceeding its limits. The calculated variable is passenger-km (pkm), defined as the transport of a passenger over one kilometer. Analyzing the **evolution of the use of public transport** (table XI.4 and figure XI.8), a fluctuating trend is observed in the case of trams in 2015-2019, the lowest value in the analyzed period of 2 384 674.6 thousand pkm being registered in 2015. In the case of buses, minibuses, trolleybuses and the metro, there is a tendency to decrease the degree of use of public transport (thousand passengers-km).

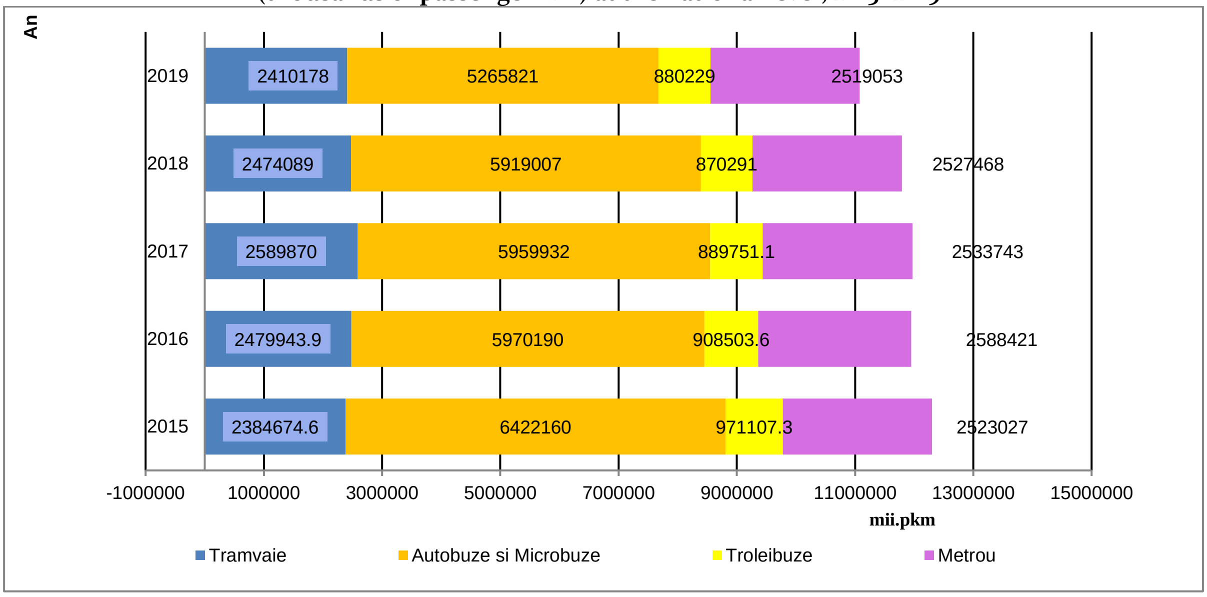
Table no. XI.4 Evolution of the use of public transport (thousands of passengers-km), at national level, 2015 - 2019

thousands of passengers-km

Use of public transport	2015	2016	2017	2018	2019
Trams	2384674.6	2479943.9	2589870.0	2474089	2410178
Buses, minibuses	6422160.0	5979190.0	5959932.0	5919007	5265821
Trolleybuses	971107.3	908503.6	889751.1	870291	880229
Subway	2523027.0	2588421.0	2533743.0	2527468	2519053
TOTAL	12300968.9	11956059.2	11973296.0	11790855	11075281

Source: National Institute of Statistics

Figure XI.8 - The evolution of the use of public transport (thousands of passenger-km) at the national level, 2015 -2019



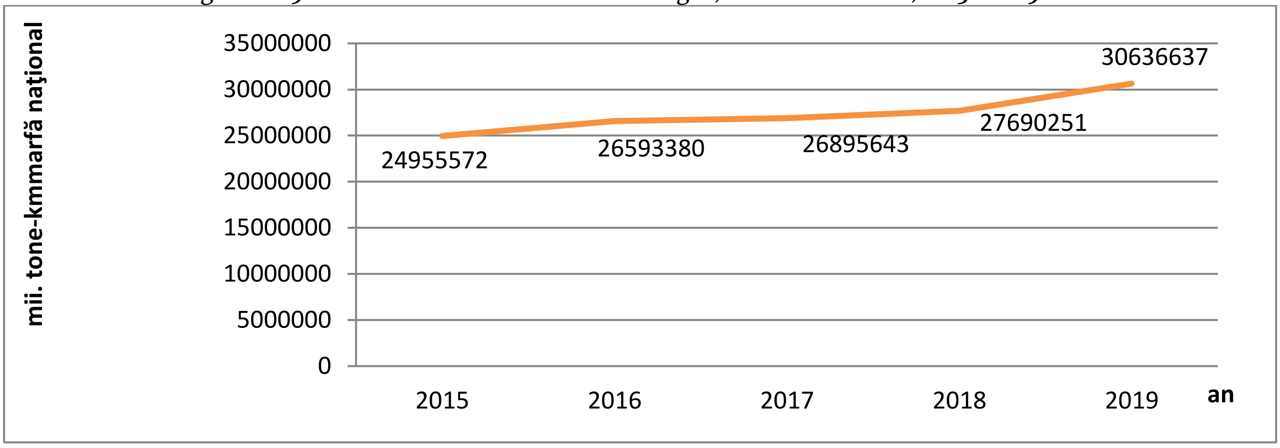
Source: National Institute of Statistics

Transportul de mărfuri

RO 36
Indicator code Romania: RO 36 EEA indicator code: CSI 36
TITLE: FREIGHT TRANSPORT DEMAND
DEFINITION: The demand for freight transport is defined as the amount of internal tonne-kilometers traveled each year. According to the latest metadata, domestic shipping includes road, rail and inland waterways: inland waterways and inland railways are based on national movements ("territoriality principle"), irrespective of the nationality of the vehicle or the ship. Road transport is based on all journeys of vehicles registered in the reporting country.

Road freight transport comprises transport on vehicles registered in the reporting country, and rail and inland waterway transport includes domestic transport, irrespective of the nationality of the transport vehicle, recorded over 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 per kilometer. From the analysis of the evolution of the demand for freight transport (figure XI.9) it is observed that the total route of the goods transported at national level, registers an increase from year to year. In 2019, a maximum value of 30636637 thousand ton-km was reached.

Figure XI.9 Evolution of the demand for freight, at national level, 2015 – 2019

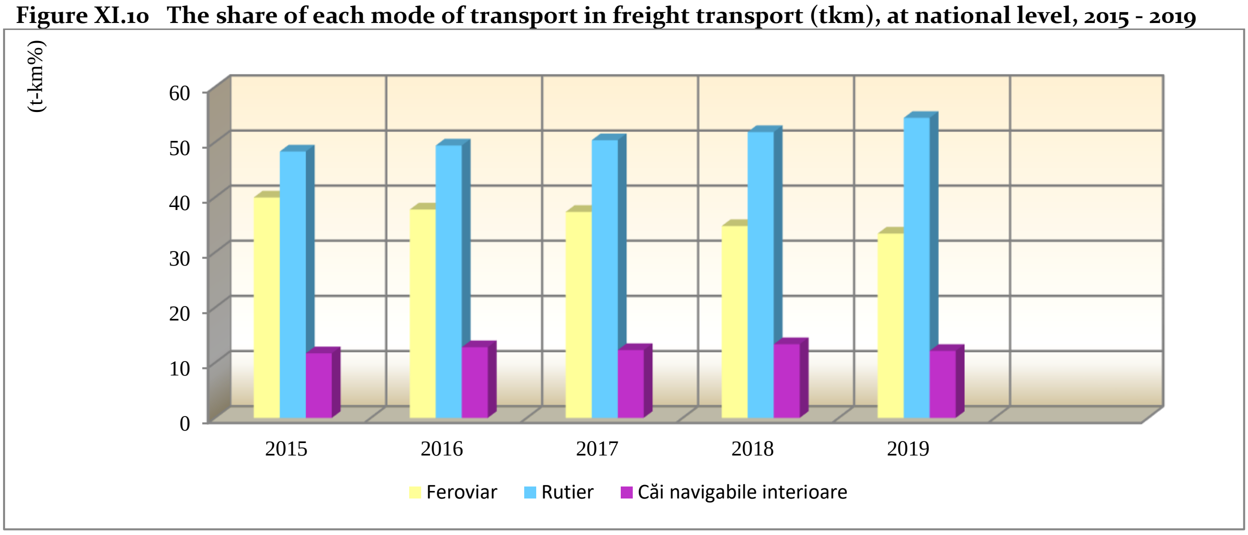


Source: National Institute of Statistics

The share of each mode of transport in freight transport

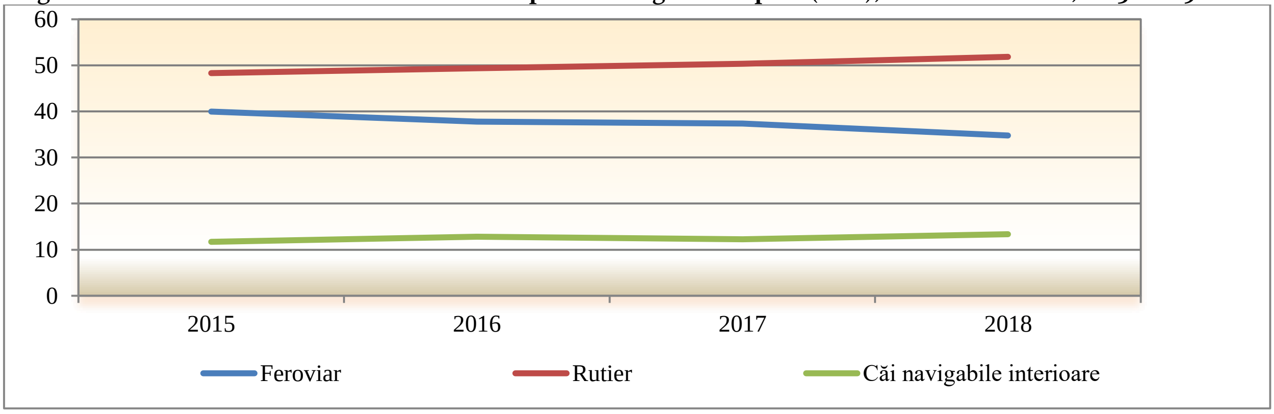
The modes of transport considered are: a) road, b) rail and c) inland waterways. Road freight transport comprises transport on vehicles registered in the reporting country, and rail and inland waterway transport includes domestic transport, irrespective of the nationality of the transport vehicle. The weight is calculated from the *tonne-km (tkm) indicator*, defined as the transport of one tonne of goods per kilometer. It is noted that both in the case of demand for passenger transport and freight transport, a high percentage is held by road transport at the expense of other modes of transport. The objectives of *sustainable mobility* require the transfer of an increasing volume of passenger and freight transport from the road to the rail. Figures XI.10 show the share of each mode of transport in freight transport (tkm) at national level, for the period 2015 - 2019.

Figure XI.10 The share of each mode of transport in freight transport (tkm), at national level, 2015 - 2019



Source: Ministry of Transport, www.mt.ro

Figure XI.10 The share of each mode of transport in freight transport (tkm), at national level, 2015 - 2019

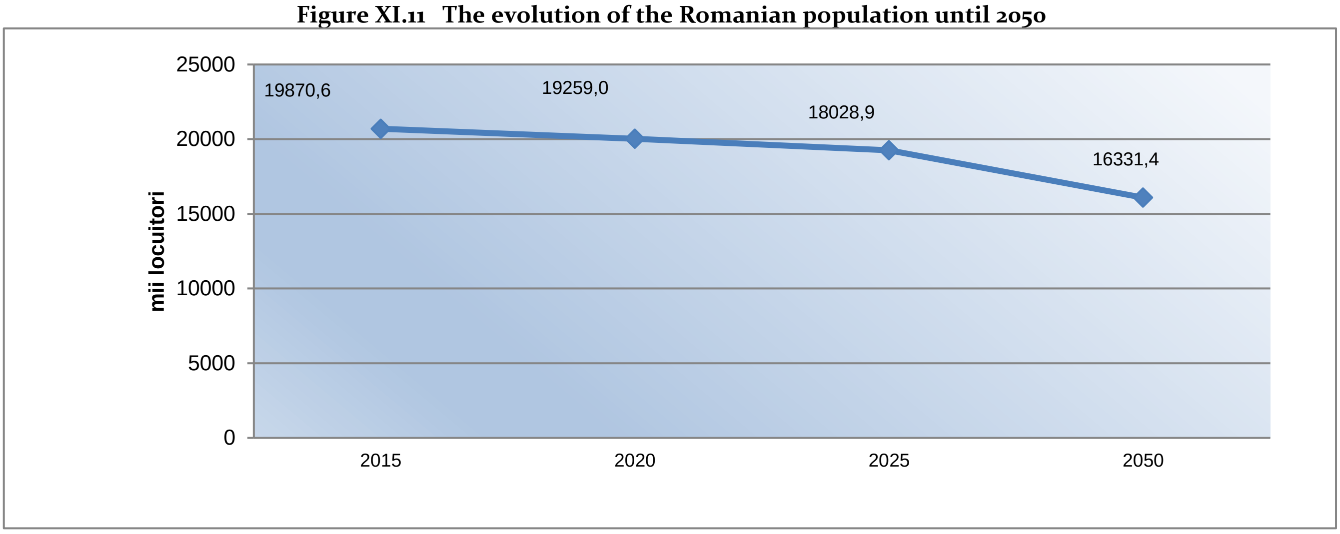


Source: Ministry of Transport, www.mt.ro

FACTORS INFLUENCING CONSUMPTION

The demographic evolution of Romania in the period 2015 - 2019 and its projection until 2025 and 2050 respectively (*figure XI.11*), according to the data provided by the *National Institute of Statistics*, is as follows: the decline in 2016 is higher than that recorded in 2015 , when the resident population in Romania decreased by 110,700 people; at the level of 2017 in Romania there were 19.63 million people, decreasing by 122,000 people compared to January 1, 2016, having as main cause of decrease the negative natural increase (number of deceased persons exceeding the number of live births by 68,061 people) and demographic aging which increased in 2018 (the elderly population over 65 years exceeding by over 434,000 people the young population aged 0-14 years). **On January 1, 2019,** the elderly population numbered 3.674 million people, while the young population represented 3.240 million people. According to the National Institute of Statistics, in 2019, "*The demographic aging process has 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 (0.3 percentage points) 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 following decades, a deepening of Romania's demographic decline is expected. Thus, Romania's population will reach about 16.5 million inhabitants in 2050, according to a report by the United Nations (UN), published in July 2015.** The decrease in population will be due to maintaining a birth deficit in relation to the number of deaths at which will add to the cumulative balance of internal and external migration.

Figure XI.11 The evolution of the Romanian population until 2050



Source: National Institute of Statistics

Table no. XI.5 – 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
UE-28	508401084	515591288	528567808	518798375
Belgium	11208986	11580268	13273155	14189456
Bulgaria	7202198	6954254	5564146	4593415
Czech Republic	10538275	10652407	10478190	9777734
Denemark	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
Ciprus	847008	869041	984402	1004870
Latvia	1986096	1911668	1506005	1284285
Lithuania	1921262	2749762	1957377	1658478
Luxemburg	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
Sueden	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

Data presented by the *European Statistical Office* (*Eurostat*) show that in 2019, in 9 of the 27 Member States of the European Union, including Romania, there was a decline in population, while in 18 EU countries the population increased. The largest increases in population were recorded in Malta (41.7 ‰), Luxembourg (19.7 ‰), Cyprus (13.7.), Ireland (12.1.) And Sweden (9.5.), and the most significant decreases were in Bulgaria (-7 ‰), Latvia (-6.4 ‰), Romania (-5 ‰), Croatia (-4.4 ‰) and Italy (-1.9 ‰). Demographic change in the EU was positive in 2019, with 0.9 million more inhabitants, following net migration. ***Since 2012, the EU has had a negative natural increase, with more deaths than births (4.7 million deaths and 4.2 million births in 2019).*** In 2019, 4.2 million babies were born in the EU, 2.2% less than in 2018. The highest birth rates were in Ireland (12.1 per 1,000 residents), France (11, 2 ‰), Sweden (11.1 ‰), Cyprus (10.9 ‰) and Greece (10.6 ‰), and the lowest in Italy (7 ‰), Spain (7.6 ‰), Greece (7.8 ‰), Finland (8.3 ‰) and Portugal (8.4 ‰). At EU level, the birth rate was 9.3 per 1,000 residents. In 2019, there were 4.7 million deaths in the EU, 0.9% less than in 2018. The lowest mortality rates were recorded in Ireland (6.3 per 1,000 residents), Cyprus (6.8 ‰), Luxembourg (6.9 ‰), Malta (7.3 ‰) and Sweden (8.6 ‰), and the largest in Bulgaria (15.5 ‰), Latvia (14.5 ‰), Lithuania (13.7 ‰), Romania (13.4 ‰) and Hungary (13.3 ‰). At EU level, the mortality rate was 10.4 per 1,000 residents.

The study *"GfK Purchasing Power in Europe 2019"* makes a detailed assessment of the distribution of purchasing power in the Netherlands, France, Italy, Spain, the Czech Republic, Poland, Hungary and Romania *(table no. XI.6)*. A comparison between these countries provides insights into the regional distribution of spending potential. The purchasing power of Europeans is 14,739 Euros per person in 2019, of Romanians 5,881 Euros, approximately 60% below the European average, Romania being on the 32nd place in the European ranking. The city of Bucharest leads in the ranking, with an average purchasing power per capita of 10,452 euros, 78% more money than in the rest of the country. At the other end of the ranking is Vaslui County, with an average purchasing power per capita of 3,706 euros, about 37% below the national average and about 75% below the European average (table no. XI.7). In Romania, the annual net disposable income per capita increased by 18% in 2018, reaching 5,083 euros, from 4,556 euros in 2017 and 4,181 euros in 2016.

Table nr. XI.6 – Comparative assessment of purchasing power distribution, year 2019

Top year 2019 (Top year 2018)	Country	No. of inhabitants	Purchasing power per capita in Euro in 2019	Europe purchasing power index *
14 (15)	Netherlands	17,181,084	20,416	138.5
15 (14)	France	64,468,721	20,306	137.8
16 (16)	Italy	60,359,546	17,799	120.8
	EUROPE (total)	679,425,404	14,739	100.0
17 (17)	Spain	46,722,980	14,636	99.3
24 (23)	Czech Republic	10,649,800	9,959	67.6
29 (29)	Poland	38,411,148	7,589	51.5
30 (30)	Hungary	9,772,756	7,416	50.3
32 (33)	Romania	19,530,631	5,881	39.9

*Source: GfK Europe 2019 purchasing power * per capita index: European average = 100*

Table nr. XI.7 – Top 10 counties in Romania regarding the distribution of purchasing power, year 2019

Top year 2019	County	No.of inhabitants	Purchasing power per capita in Euro in 2019	National index*	Europe index*
1	**București**	**1,827,810**	**10,452**	**177.7**	**70.9**
2	**Timiș**	**701,499**	**7,564**	**128.6**	**51.3**
3	**Cluj**	**704,759**	**7,457**	**126.8**	**50.6**
4	**Ilfov**	**473,445**	**7,312**	**124.3**	**49.6**
5	**Brașov**	**551,183**	**7,079**	**120.4**	**48.0**
6	**Sibiu**	**400,110**	**6,944**	**118.1**	**47.1**
7	**Hunedoara**	**388,600**	**6,336**	**107.7**	**43.0**
8	**Arad**	**419,360**	**6,308**	**107.3**	**42.8**
9	**Argeș**	**585,730**	**6,230**	**105.9**	**42.3**
10	**Prahova**	**725,609**	**6,152**	**104.6**	**41.7**

*Source: GfK Purchasing power Europe 2019 * index: value per capita / average =100*

Table nr. XI.8 – Top 10 countries in Europe on purchasing power distribution, year 2019

Top year 2019 (Top year 2018)	Country	No. of inhabitants	Purchasing power per capita in Euro in 2019	Europe purchasing power index *
1 (1)	Liechtenstein	37,877	67,550	458.3
2 (2)	Switzerland	8,484,130	42,067	285.4
3 (4)	Luxemburg	613,894	35,096	238.1
4 (3)	Iceland	356,991	32,988	223.8
5 (5)	Norway	5,328,212	29,842	202.5
6 (6)	Danemark	5,806,081	26,273	178.3
7(7)	Austria	8,822,267	24,067	163.3
8 (8)	Germany	82,792,351	23,779	161.3
9 (10)	Finland	5,517,919	22,626	153.5
10 (9)	Sweden	10,230,185	21,836	148.2
	EUROPA (total)	679,425,404	14,739	100.0

*Source: GfK Europe 2019 purchasing power * per capita index: European average = 100*

ENVIRONMENTAL PRESSURES CAUSED BY CONSUMPTION

Direct and indirect pressures on domestic final consumption attributed to food and drink, housing use, infrastructure and mobility.

EMISIILE DE GAZE CU EFECT DE SERĂ DIN SECTORUL REZIDENȚIAL

RO 10
Indicator code Romania: RO 10 EEA indicator code: CSI 10
TITLE: GREENHOUSE GAS EMISSIONS TRENDS
DEFINITION: The indicator shows the trends (total and by sectors) of greenhouse gas emissions in relation to the obligations of the Member States to comply with the Kyoto Protocol objectives. The emissions are presented according to their type and are analyzed according to their potential contribution to the amplification of the global warming phenomenon.

The role of the natural greenhouse effect is to regulate the average temperature of the Earth while 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 pass through the atmosphere and heat the earth's surface, which in turn emits infrared radiation with a long wavelength (heat). Changing the radiative balance, or changing the balance between incoming and outgoing radiation from the contour formed by the Earth and its atmosphere, leads to an increase in global temperature (positive change) or a decrease (negative change). Some gases in the atmosphere absorb heat and, by reflecting it back to the earth's surface, heat the atmosphere. These are the so-called greenhouse gases (GESG or GHG - "greenhouse gases") (NEPA, Report on the state of the environment in Romania, 2019). ***The greenhouse gases provided under the UNFCCC*** are: CO_2, CH_4, N_2O, HFCs, PFCs, SF_6 and NF_3. 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).*

Compared to the other sectors of greenhouse gas (GHG) emissions in the National Inventory of Greenhouse Gas Emissions (INEGES), namely Industrial Processes and Product Use (IPPU), Agriculture, Waste and Land Use, Land Use Change and Forestry (LULUCF), the Energy sector is the largest source of anthropogenic GHG emissions in Romania.

In 2018, the energy sector was responsible for approximately 66.32% of total GHG emissions (116,115.12 kt CO_2 equivalent).

According to the IPCC, the Energy sector comprises several subsectors:

- 1.A Combustion of fuels;
  - 1.A.1 Energy industry
  - 1.A.2 Manufacturing and Construction;
  - 1.A.3. Transport;
  - 1.A.4 Other sectors (commercial / institutional, ***residential***, agriculture / forestry / fishing);
  - 1.A.5. Other (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 owner-occupied space and administration of economic agents;
- the supply to the population to produce heat and hot water in central heating, and the

quantities of coal received by the miners as direct allocations (payments) from mining companies;

- the heat supplied to the public for heating and hot water both from the public and from the automotive production sectors.

In the period 1989 - 2018, the total greenhouse gas emissions (table XI.9) registered a decreasing trend, in 2007 they increased by approximately 1.68% compared to the previous year. In the period 2008-2018, greenhouse gas emissions from the residential and commercial sector increased by 5.94%.
The share of total GHG emissions of category 1.A.4.b in sub-sector 1.A.4 (Figure XI.12 and Table XI.10) is approximately 59.34% for the base year 1989 and 67.90 % for 2018.
The contribution of this category is approximately 7,896,997 kt CO2. equivalent in 2018. There is a main contribution of the use of natural gas as fuel in this category of activity, throughout the period 1989-2018.

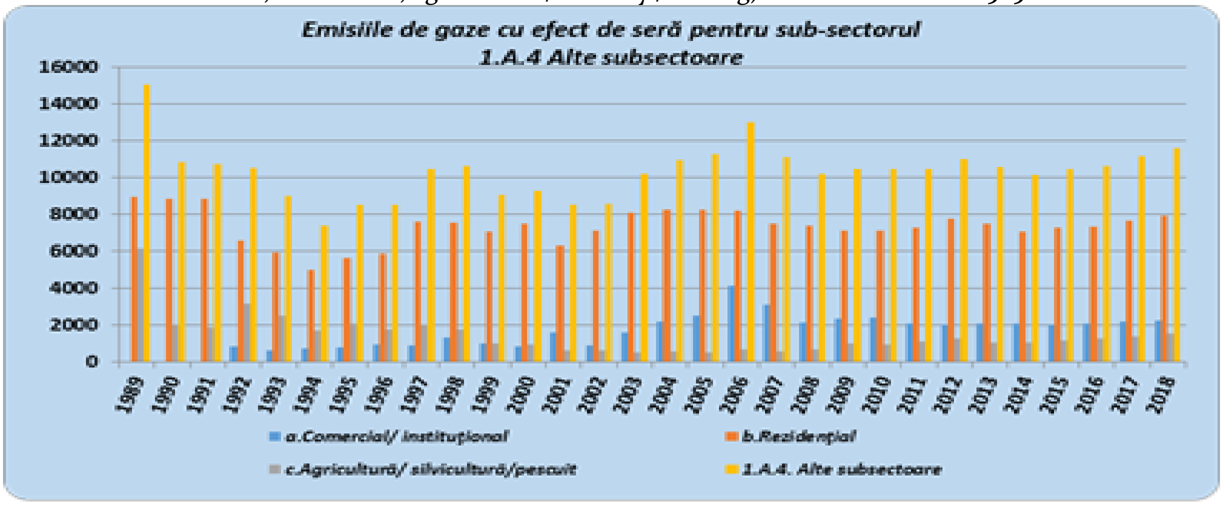
Table XI.9 Greenhouse gas emissions - sub-sector Other subsectors

Greenhouse gas emissions for the subsector "Other subsectors " (kt CO_2 equivalent)				
Year	1.A.4. Other subsectors			
	a. Commercial/ institutional	b.Residential	c.Agriculture/ forestry/fishing	Total
1989	0	8953	6136	15088
1990	0	8842	2005	10847
1991	0	8867	1873	10740
1992	804	6556	3155	10515
1993	617	5898	2487	9002
1994	696	5008	1680	7384
1995	800	5653	2046	8499
1996	916	5881	1739	8537
1997	891	7586	1995	10472
1998	1336	7558	1750	10644
1999	966	7057	1010	9033
2000	836	7510	939	9285
2001	1580	6314	634	8528
2002	879	7091	618	8588
2003	1602	8060	509	10172
2004	2186	8222	542	10950
2005	2522	8262	499	11283
2006	4149	8206	640	12996
2007	3122	7475	539	11136
2008	2142	7403	673	10217
2009	2348	7126	966	10440
2010	2397	7088	960	10445
2011	2091	7279	1084	10454
2012	2012	7756	1265	11033
2013	2066	7471	1064	10601

2014	2062	7070	1017	10149
2015	2013	7284	1176	10473
2016	2067	7341	1235	10644
2017	2174	7668	1347	11189
2018	2215	7897	1518	11630

Source: N.E.P.A

Figure XI.12 The evolution of greenhouse gas emissions in the energy sector - subsector 1.A.4 Other sectors (commercial / institutional, residential, agriculture / forestry / fishing) for the time series 1989 – 2018



Source: N.E.P.A - National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

Table XI.10 GHG emissions share - subsector 'Other subsectors'

Year	Share (%)		
	a.Commercial/ institutional	b.Residential	c. Agriculture/ forestry/ fishing
1989	0,00	2,92	2,00
1990	0,00	3,57	0,81
1991	0,00	4,34	0,92
1992	0,42	3,43	1,65
1993	0,34	3,24	1,37
1994	0,39	2,78	0,93
1995	0,43	3,02	1,09
1996	0,48	3,10	0,92
1997	0,48	4,12	1,08
1998	0,80	4,53	1,05
1999	0,65	4,77	0,68
2000	0,58	5,25	0,66
2001	1,08	4,32	0,43
2002	0,59	4,76	0,41
2003	1,04	5,24	0,33
2004	1,43	5,39	0,36
2005	1,67	5,46	0,33
2006	2,73	5,39	0,42
2007	2,02	4,83	0,35
2008	1,43	4,94	0,45
2009	1,83	5,57	0,75
2010	1,93	5,71	0,77

2011	1,62	5,64	0,84
2012	1,60	6,17	1,01
2013	1,78	6,44	0,92
2014	1,77	6,08	0,88
2015	1,73	6,26	1,01
2016	1,81	6,42	1,08
2017	1,86	6,56	1,15
2018	1,91	6,80	1,31

Source: N.E.P.A

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 quantities of energy supplied to the final consumer for the most diverse energy purposes. It is calculated as the sum of the final energy consumption in all sectors of activity. They are structured in such a way as to include industry, transport, households, services and agriculture.

The assessment of the degree of energy dependence at the sector level is performed by summing the amounts of energy used on activity branches according to the energy balance. The quantities used for the production of other fuels, the consumption of the energy sector and the losses of transport and distribution are not included.

The total energy resources available in 2018 remained at a relatively constant level with those of the previous year, accumulating 43.2 million tons of oil equivalent (toe), the decrease of primary energy production (-1.7%) being offset by the increase in imports of energy resources (+ 4.2%). Among the primary energy resources, more significant variations were registered by the coal resources, which decreased by 455 thousand toe (-8.5%), and those of crude oil and electricity which increased by 269 thousand toe, respectively 147 thousand toe. **Primary energy production** in 2018, of 24979 thousand toe, decreased by 438 thousand toe compared to 2017, due to the decrease of coal production, but continued to maintain its significant share in total energy resources, representing 57.8 % of them. The production of electricity from renewable resources (hydro, wind and solar photovoltaic) registered in 2018 an increase of 8.6% (+178 thousand toe) compared to 2017 (table XI.11).

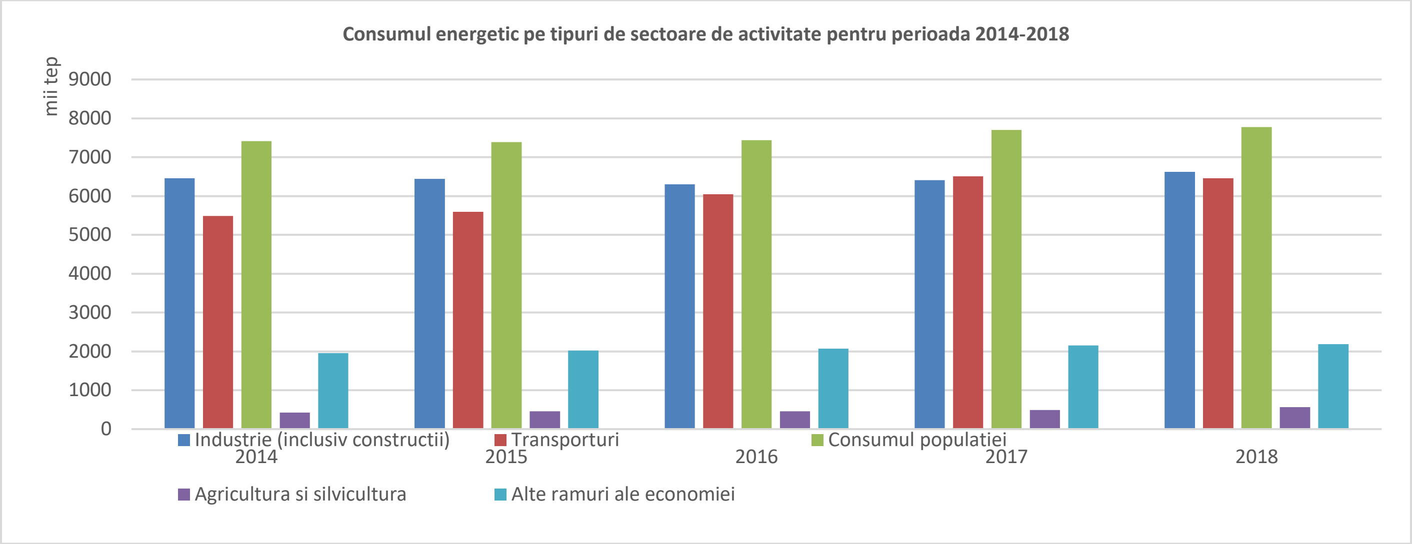
Table XI.11 Energy resources, in structure and on the main assortments

	2017	2018	Differences	
ENERGY RESOURCES- TOTAL	thousand toes	thousand toes	(±)thousand toes	%
	43357	**43238**	**-119**	**99,7**
- Primary energy production (including recovered energy)	**25417**	**24979**	**-438**	**98,3**
- From primary energy resources:				
- coal1) (excluding coke)	5323	4868	-455	91,5
- oil2)	12216	12485	+269	102,2
- usable natural gas 3)	11034	11087	+53	100,5
- imported coke	479	454	-25	94,8
- imported petroleum products	3279	3290	+11	100,3
- hydroelectric, wind, solar photovoltaic and nuclear heat	4897	5044	+147	103,0

1) Conventional fuel with a calorific value of 10000 kcal / kg; 2) including gasoline and ethane from extraction scaffolding; 3) exclusive gasoline and ethane from scaffolding extraction (Source: INSE, Energy Balance 2018)

Figure XI.13 on **energy consumption by type of activity** in the period 2014-2018, shows that the largest share is held by energy consumption in the residential sector, followed by industry and transport activities.

Figure XI.13 Energy consumption by types of activity sectors for the period 2014-2018 (thousand toe)



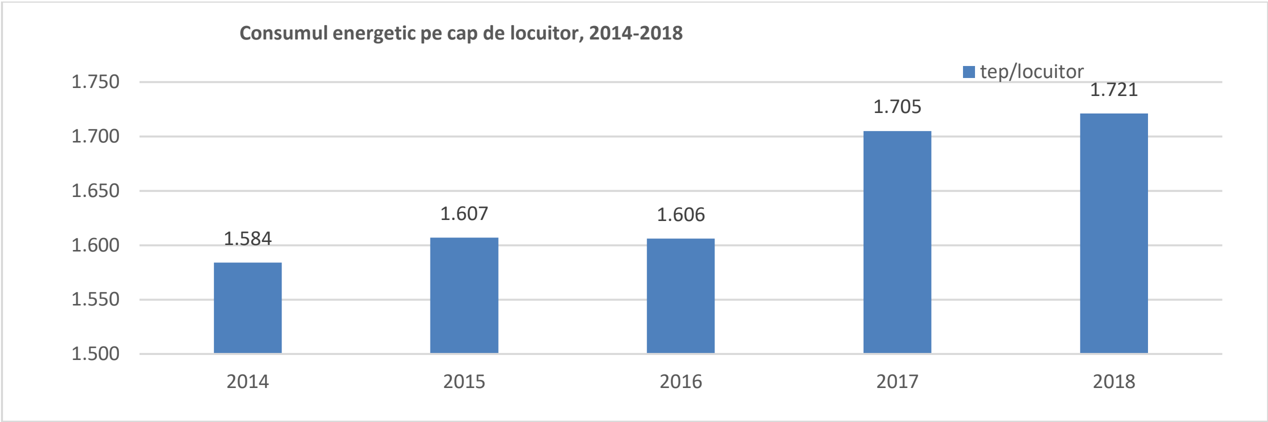
Source: http://www.insse.ro

Gross domestic energy consumption per capita in 2018 was 1,721 toe / place, + 09%, compared to 2017 (1,705 toe / place.) The trend of gross domestic energy consumption per capita in the period 2014-2018 is shown in Figure XI .14, where there is an increase from 1,584 toe / place in 2014, to 1,721 toe / place in 2018, + 8.65% (*acc. INSE, Energy Balance 2018*).

Figure XI.14 Energy consumption per capita, 2014-2018, expressed in tons of oil equivalent (toe / inhabitant)

YEAR	2014	2015	2016	2017	2018
Energy consumption / inhabitant (toe / inhabitant)	1 584	1 607	1 606	1705	1721

Source: http://www.insse.ro

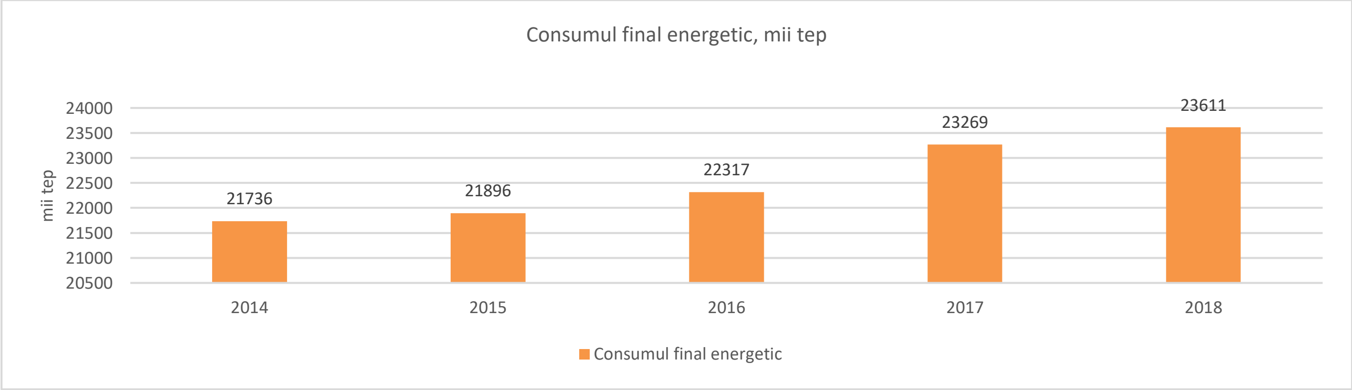


Source: http://www.insse.ro

Final energy consumption in 2018 increased in Romania by 342 thousand toe (+ 1.5%) compared to 2017 (figure XI. 15).

Final energy consumption in industry (including construction) increased by 212 thousand toe (+ 3.3%), mainly due to large industries consuming energy resources, such as the chemical and pharmaceutical industry, rubber products and plastics (+87 thousand toe) and the metal construction, machinery and equipment industry (+101 thousand toe), whose cumulative energy consumption represents 32.3% of final consumption in industry (including construction). In metallurgy, final energy consumption increased by 0.4% compared to 2017 (Source: *http://www.insse.ro*).

Figure XI.15 Final energy consumption 2014-2018, thousand toe



Source: http://www.insse.ro

In addition to industry, the tertiary sector, population and agriculture also contributed to the increase in final energy consumption.

USE OF MATERIALS

Domestic Material Consumption (DMC) - includes the total amount of materials used directly in the economy (domestic extraction used plus imports). The components of DMC are: direct material inputs (DMI) and material export. It provides the calculation elements of the decoupling indicators on the use of resources. ***The indicator Internal Consumption of Materials*** *(figure XI.16)* had a variable trend, registering minimum growth values between 2013-2017 and a significant increase in 2015 *(Source: National Institute of Statistics - until the date of this report , the data for 2018 and 2019 were not processed).*

GREEN ECONOMY

PUBLIC INSTITUTIONS AND COMMERCIAL SOCIETES REGISTERED IN EMAS

RO 70
Indicator code Romania: RO 70
EEA indicator code: SCP 033
TITLE: NUMBER OF ORGANIZATIONS WITH ENVIRONMENTAL MANAGEMENT SYSTEMS REGISTERED UNDER EMAS AND ISO 14001
DEFINITION: The indicator shows the total number of organizations and the total number of sites registered under the Community eco-management and audit scheme EMAS and the number of organizations certified in accordance with the International Standard for Environmental Management Systems ISO 14001.

The EU Environmental Management and Audit Scheme (EMAS) *is a management tool developed by the European Commission for companies and other organizations to assess, report and improve their environmental performance***.** EMAS is open to any type of organization eager 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 organization that already complies with an environmental management system such as ISO14001 to switch to EMAS.

EMAS means:

- *Performance:* EMAS supports organizations in finding the right tools to improve their environmental performance. Participating organizations voluntarily undertake to assess and reduce their environmental impact.
- *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 the environmental statement and internally through the active involvement of employees.

With EMAS, the organization can reduce its impact on the environment, strengthen legal compliance and employee involvement, and save resources and money.

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, leading to increased business opportunities in markets that prioritize organic production processes, better relationships with customers, the local community and regulators,
- ✓ improving environmental risks and managing opportunities, by ensuring full compliance with environmental regulations, reduced risk of fines for non-compliance with environmental legislation, exemption in some situations from obtaining regulatory acts, as well as access to some incentives and contracts publicly,
- ✓ improved environmental and financial performance, high quality environmental management, resource efficiency and cost savings,
- ✓ improving the skills and motivation of employees, by improving the workplace environment, and increased employee engagement in team building,
- ✓ the EMAS logo which is a good marketing tool.

At European level, organizations are increasingly concerned with achieving environmental performance by controlling their own activities, products or services. The systematic adoption and implementation of a set of techniques for environmental management in accordance with ISO 14001 standards can contribute to obtaining 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, with 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 covered, has prepared two documents for each sector: a concise sectoral reference document (SRD) and a detailed technical report on the best environmental management practices ("good practice report"), for different sectors that have been identified as a priority. ***Sectoral Reference Documents (SRDs)*** *on best environmental management practice provide guidance and inspiration to organizations in certain sectors on how to improve environmental performance*. Such documents have been developed *for the following sectors: retail; tourism; food and beverage industry; car production; manufacture of electrical and electronic equipment; Public Administration; agriculture and waste management.* For the *construction* sector, the best practice reports have been completed and the 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 on the scope and development process. Documents for the fields *Manufacture of metal products and telecommunications* are available on the website of the Commission's Joint Research Center (JRC). Through the environmental statements that organizations have to prepare for EMAS registration, they assume the performance of performance indicators, so that at its annual update, the indicators can be evaluated to determine whether the organization has achieved environmental performance.

At the end of 2019, 17 organizations were registered in the EMAS National Register, but 9 of them were deleted, either due to requests from organizations due to lack of funds to verify and validate the environmental statement, or due to non-compliance the requirements of the EMAS III Regulation, and an organization has collective registration at EU level (Figure XI.17). The evolution of the number of organizations in Romania registered in EMAS between 2013 and 2019 is presented in table XI.12.

Table XI.12 The evolution of the number of organizations in Romania registered in EMAS, 2013 – 2019

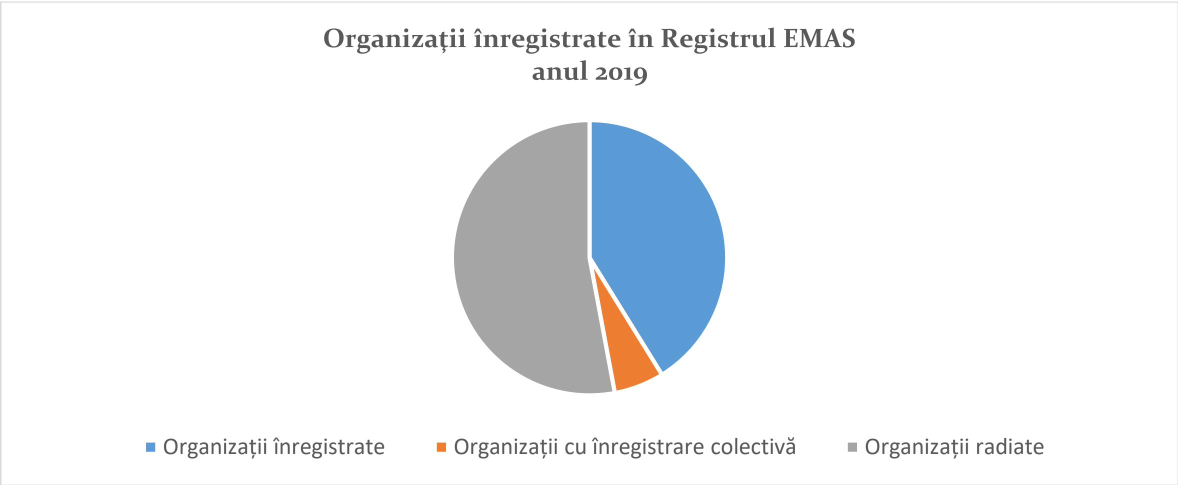
	Year 2013	Year 2014	Year 2015	Year 2016	Year 2017	Year 2018	Year 2019
Total number of organizations EMAS Registered	9	11	15	15	16	17	17
Registered organizations / registration renewal	5	6	10	11	11	7	7
Organizations with collective registration	1	1	1	1	1	1	1
Radiated organizations	3	4	4	3	4	9	9

Source: N.E.P.A

Figure XI.17 Number of organizations in Romania registered in EMAS, year 2019

Total number of organizations EMAS Registered	17
Registered organizations / registration renewal	7
Organizations with collective registration	1
Radiated organizations	9

Source: N.E.P.A



Source: N.E.P.A

PRODUCTS AND SERVICES LABELED WITH THE EUROPEAN ECOLOGICAL LABEL

RO 71
Indicator code Romania: RO 71
EEA indicator code: SCP
TITLE: PRODUCTS AND SERVICES LABELED WITH THE EUROPEAN ECOLOGICAL LABEL
DEFINITION: The indicator shows the number of products and services for which the European Ecolabel has been awarded year by year. The indicator does not provide information on the share of organic products in the total range of consumer goods available to consumers.

WHAT IS EUROPEAN LABELING?

European Eco-labeling is an *optional scheme designed to encourage economic operators to market goods / services with a low environmental impact to more easily identify green products / services and provide them with indisputable proof that the product / service offered meets their requirements and is in line with the quality and safety standards defined in the corresponding certification report. The purpose of introducing the European eco-label for products / services is to promote products / services that have a low impact on the environment, throughout their life cycle, compared to other products / services belonging to the same group*. *European eco-labeling operates on* ***the basis of criteria, by groups of products / services*** *(eco-criteria and performance criteria)*. For all product / service groups, the relevant ecological aspects and the corresponding criteria have been identified on the basis of **comprehensive scientific studies on the environmental aspects related to the whole life cycle of these products**. These criteria are validated after consultation within the European Union Ecolabel Committee.

SYMBOL OF THE EUROPEAN ECOLOGICAL LABEL

HOW THE EUROPEAN ECO-LABELING SCHEME WORKS ?

European eco-labeling operates on the basis of criteria, by product group. A company wishing to obtain the European Ecolabel for one or more of its products must apply to the competent authority - Ministry of the Environment, Water and Forests. An individual product / service must meet all the criteria for the award of the European Ecolabel. *Regardless of the group of products / services, environmental requirements refer to air quality, water quality, soil protection, reduction of waste generated, energy saving, natural resource management, prevention of global warming, protection of the ozone layer, environmental safety, noise and biodiversity*. The criteria underlying the award of the European Eco-label encourage the application of best practices to protect the environment and public health.

CATEGORIES OF PRODUCTS / SERVICES

The European Eco-label covers 24 product groups from different sectors of activity and services, respectively:

DETERGENTS
- **Detergents for dishwashers**
- **Detergents for hand washing dishes**
- **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**
- **TVs**

PAPER PRODUCTS
- **Graphic paper, absorbent paper and absorbent paper products**
- **Printed paper**
- **Processed paper**

CLOTHING AND FOOTWEAR ARTICLES
- **Footwear**
- **Textiles**

HOME PRODUCTS
- **Wood, cork and bamboo floors**
- **Heavy duty clothing**
- **Paints and varnishes**
- **Furniture**
- **Bed mattresses**

CARE PRODUCTS
- **Cosmetics that are removed by rinsing**
- **Hygienic absorbents**

GARDEN PRODUCTS
- **Crop 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 and that investing in compliance with the European Ecolabel is a business opportunity. *In the national legislation, the Government Decision no. 661/2011 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 is applied.*

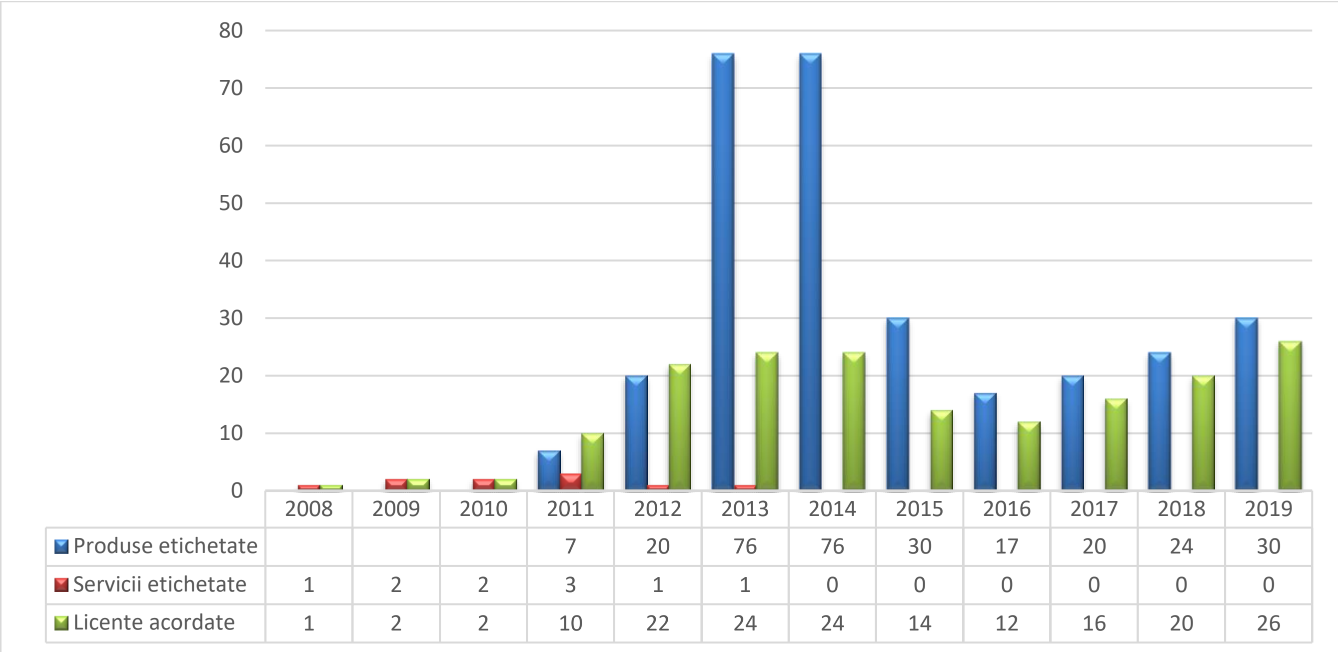
ADVANTAGES OF EUROPEAN ECOLOGICAL LABELING

- **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;**
- **through the level of exigency, the eco-label criteria guarantees a selectivity of the products;**
- **considerably increases the potential in the competitive market for the eco-labeled product;**
- **is a collective product quality certification mark;**
- **improves the image of the manufacturer.**

At EU level, the decrease in the number of licenses granted over 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 Ecolabel must prove compliance with them. In contrast, for 2019, statistics show that the number of European eco-labels awarded for products / services and the number of licenses has gradually increased over the course of this year for several product groups, mainly paints and varnishes, detergents, furniture and tourist accommodation services. This situation can also be observed in Romania for the product groups paints and varnishes, liquid soap, furniture and primer. The indicator shows the cumulative evolution of the number of products and services / number of licenses for which the European Ecolabel was granted in the period 2008 - 2019 (*figure XI.18*).

Figure XI.18 Evolution of the number of products and services labeled with the European eco-label and the number of licenses granted in Romania, in the period 2008 - 2019



Source:M.M.A.P. and N.E.P.A

ENVIRONMENTAL EXPENSES AND TAXES
Environmental protection expenditure

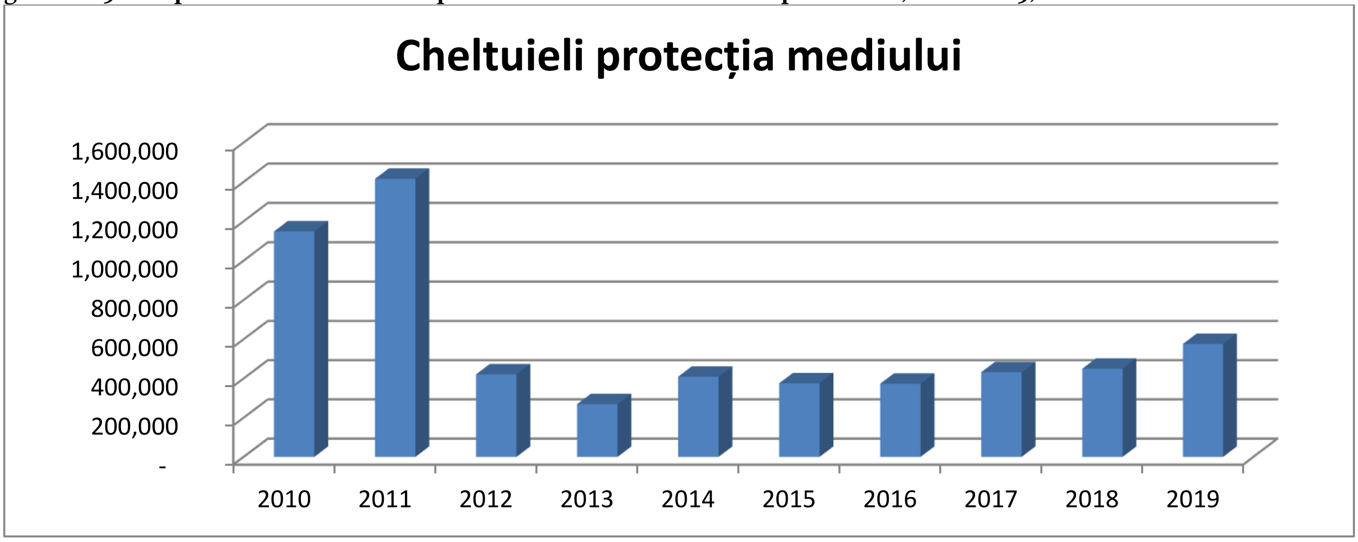
The situation with the expenditures for environmental protection in the period 2010 - 2019 is presented in *table XI.13 and figure XI.19.*

Table XI.13 Situation of environmental protection expenditure 2010 – 2019

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Environmental protection expenditure	1.148.209	1.415.619	420.629	268.668	408.709	375.098	373.104	431.433	438.172	575.715

Source: A.F.M.

Figure XI.19 Comparative situation of expenditures for environmental protection, 2010 - 2019, thousand lei



Source: A.F.M.

Financial support for environmental protection

The use of the Environmental Fund in the period 2010 - 2019 is presented in *table XI.14 and figures XI.20 a and b.*

Table XI. 14 Use of the environmental fund in the period 2010 - 2019

- thousands lei –

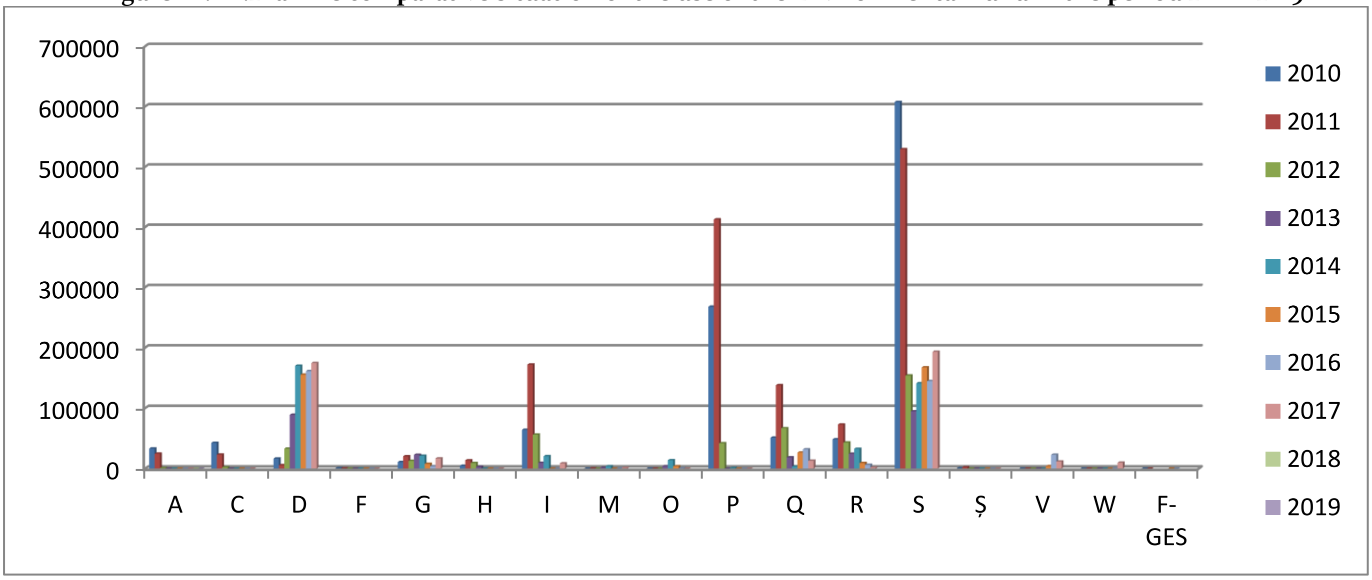
No. crt	Program name	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
1	a) Reducing the impact on the atmosphere, water, soil, including air quality monitoring	33296	24825	907	0	0	0	0	0	2128	15797
2	c) Waste management	42669	23141	2335	0	0	0	0	0	0	0
3	d) Protection of water resources, integrated water supply systems, treatment plants, sewers and sewage treatment plants	16606	5780	33047	89022	170023	155248	161246	174454	91947	48411
4	f) Biodiversity conservation and management of protected natural areas	864	423	0	149	64	166	0	0	0	0
5	g) Afforestation of degraded lands, ecological reconstruction and sustainable forest management	10974	20402	12871	22899	21155	7941	4033	16908	9506	5447
6	h) Education and public awareness on	4751	13812	9367	3197	290	116	0	0	0	0

	environmental protection										
7	i) Increasing the production of energy from renewable sources	64110	171975	56259	9629	20546	0	0	8746	5539	0
8	m) Carrying out monitoring, studies and research in the field of environmental protection and climate change on tasks arising from international agreements, European directives or other national or international regulations, as well as research and development in the field of climate change	0	426	0	1738	4122	0	448	1468	1522	2438
9	o) Closure of tailings ponds in the mining sector	0	0	0	4117	13951	4039	656	0	0	0
10	p) Carrying out work to prevent, remove and / or reduce the effects of extreme weather events	267738	412594	42025	0	1053	0	0	0	0	0
11	q) Installation of heating systems using renewable energy, including replacement or completion of conventional heating systems	51229	137889	66810	18661	3695	26633	31980	13065	37672	302
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
13	s) Program to stimulate the renewal of the National Car Park	607418	529135	153888	94672	141014	167395	144645	193152	261625	414977
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
15	v) Development and optimization	0	0	0	0	0	4180	22943	11823	10021	7469

	program of the National Air Quality Monitoring Network										
16	w) Reducing greenhouse gas emissions in transport by promoting energy-free road transport vehicles	0	0	0	0	12	0	750	9890	16989	194
17	F -GES f) the program regarding the reduction of greenhouse gas emissions in transports, by promoting clean and energy efficient road transport vehicles, 2017-2019 - let. w) of art. 13, para. (1) of GEO no. 196/2005 on the Environmental Fund - Annex 2b BVC	0	0	0	0	0	0	0	0	11349	80680
TOTAL		**1149011**	**1415619**	**420629**	**268668**	**408709**	**375098**	**373104**	**431433**	**438172**	**575715**

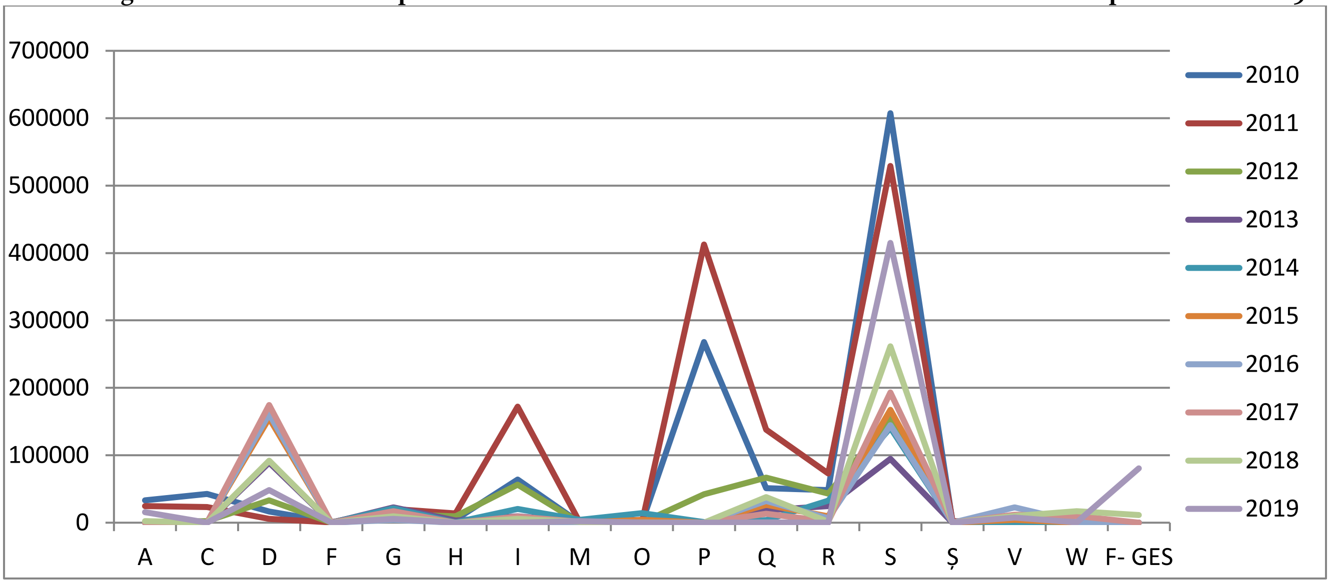
Source: A.F.M.

Figure nr. XI.20a The comparative situation of the use of the Environmental Fund in the period 2010 - 2019



Source: A.F.M.

Figure nr. XI.20b The comparative situation of the use of the Environmental Fund in the period 2010 - 2019



Source: A.F.M.

Income from environmental taxes

The situation of the revenues to the budget of the Environmental Fund in the period 2013 - 2019 is presented in *table XI.15 and figures XI.21 and XI.22.*

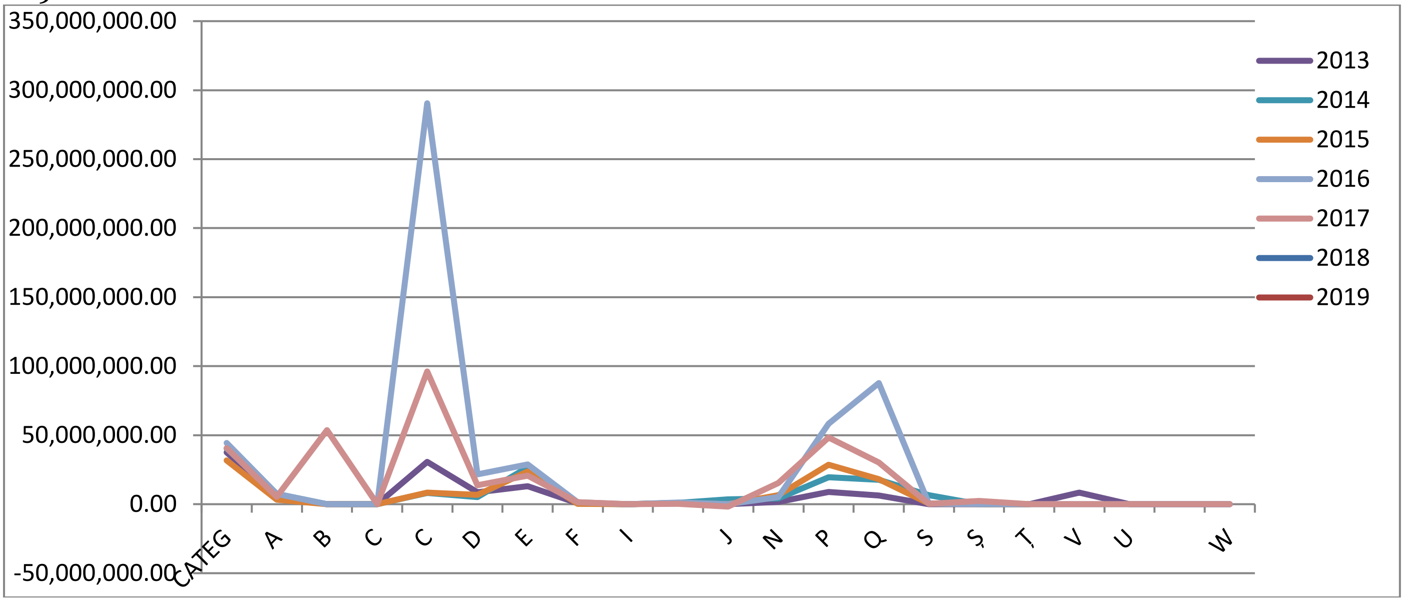
Table XI.15. The situation of the receipts to the budget of the Environmental Fund in the period 2013 - 2019

	Receipts from the budget of the Environmental Fund, of which :	1) pollution tax for motor vehicles / environmental stamp for motor vehicles	2) sources of income according to the O.U.G. 196/2005	3) interests	4) other amounts	5) Revenue from the sale of greenhouse gas emission allowances
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

Source: A.F.M.

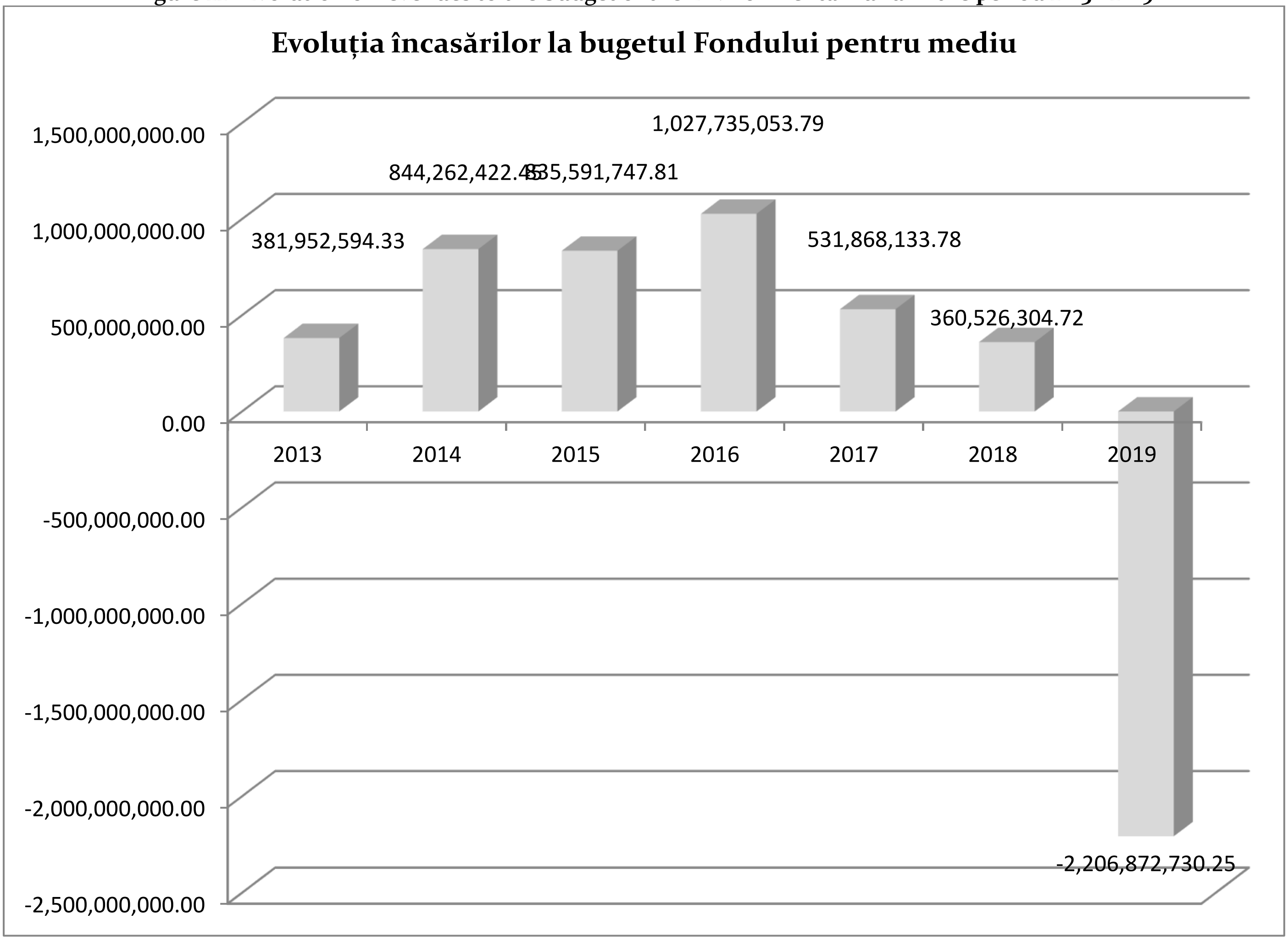
[1] The amount of -2 903 042 489.89 lei represents *the value of the refunds of the special tax for cars and motor vehicles, of the pollution tax for motor vehicles, of the tax for polluting emissions from motor vehicles and of the environmental stamp for motor vehicles, provided by the Government Emergency Ordinance no. 52/2017 on the refund of 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 nr. XI. 21 Evolution of revenues by sources of income to the budget of the Environmental Fund in the period 2013 - 2019



Source: A.F.M.

Figure 22 Evolution of revenues to the budget of the Environmental Fund in the period 2013 - 2019



Source: A.F.M.

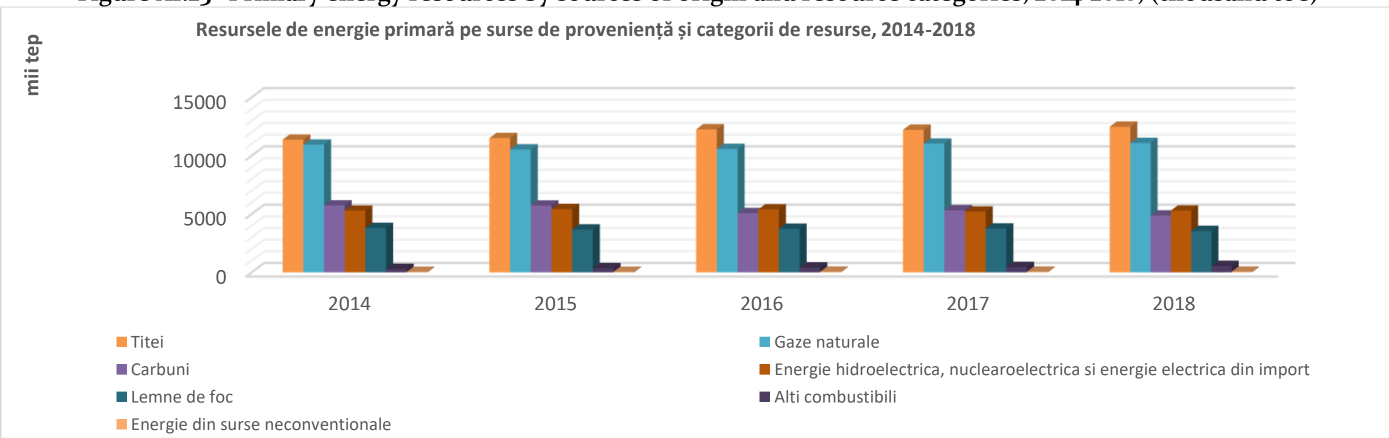
ECO-EFFICIENCY OF THE MAIN ACTIVITY SECTORS
Energy

RO 71
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 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 imports of electricity) of a country

Resources and Primary energy consumption by type of fuel

Primary energy resources in 2018 were 43,238 thousand tons of oil equivalent, down 1178 thousand toe (-2.79%) compared to the previous year. Figure XI.23 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 unconventional sources. The majority share of primary energy production from crude oil and natural gas is observed.

Figure XI.23 Primary energy resources by sources of origin and resource categories, 2014-2018, (thousand toe)

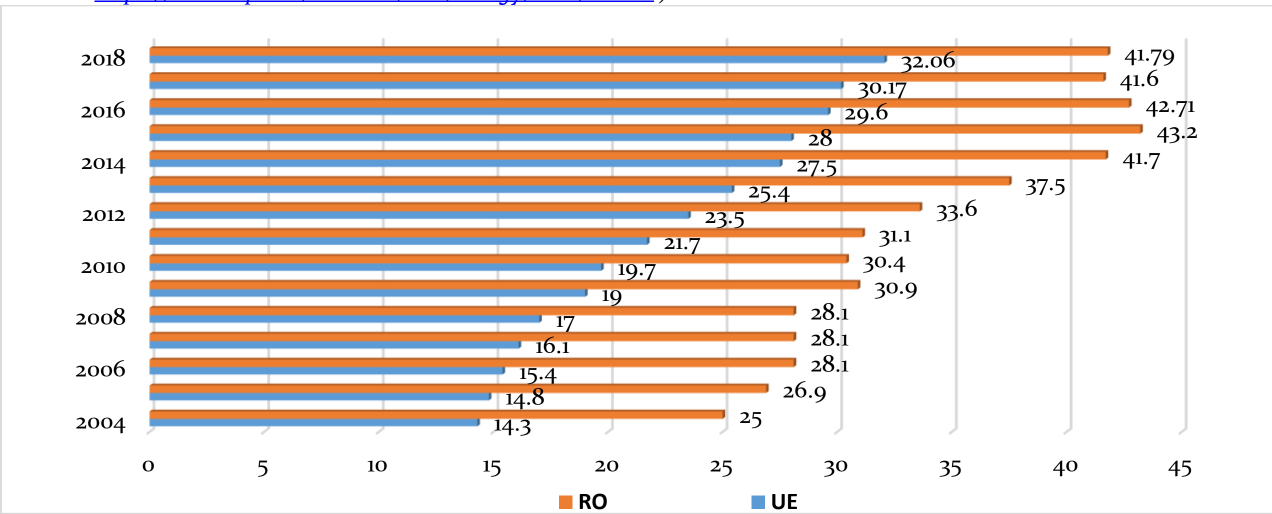


Source: http://www.insse.ro (TEMPO_IND107A_14_8_2018) – no data have been published for 2019

Primary energy production in 2018, of 24979 thousand toe, decreased by 438 thousand toe compared to 2017, due to the decrease in the production of usable coal, crude oil and natural gas, but continued to maintain its significant share in total energy resources, representing 57.8% of them. The production of **electricity from renewable resources** (hydro, wind and solar photovoltaic) registered an increase of 8.6% (+178 thousand toe) compared to the previous year (*Source: National Institute of Statistics*).

At the level of the European Union, **the share of electricity obtained from renewable sources in total electricity** shows for the period 2004-2018 an upward trend, from the value of approximately 14.3% recorded in 2004 to the value of approximately 32.06% recorded in 2018. In 2018, at national level, 41.79% of the total value of electricity was obtained by capitalizing on renewable energy sources (*Figure XI.24*). Supporting environmentally friendly (low environmental impact) solutions for renewable electricity generation contributes to reducing greenhouse gas emissions from the energy sector.

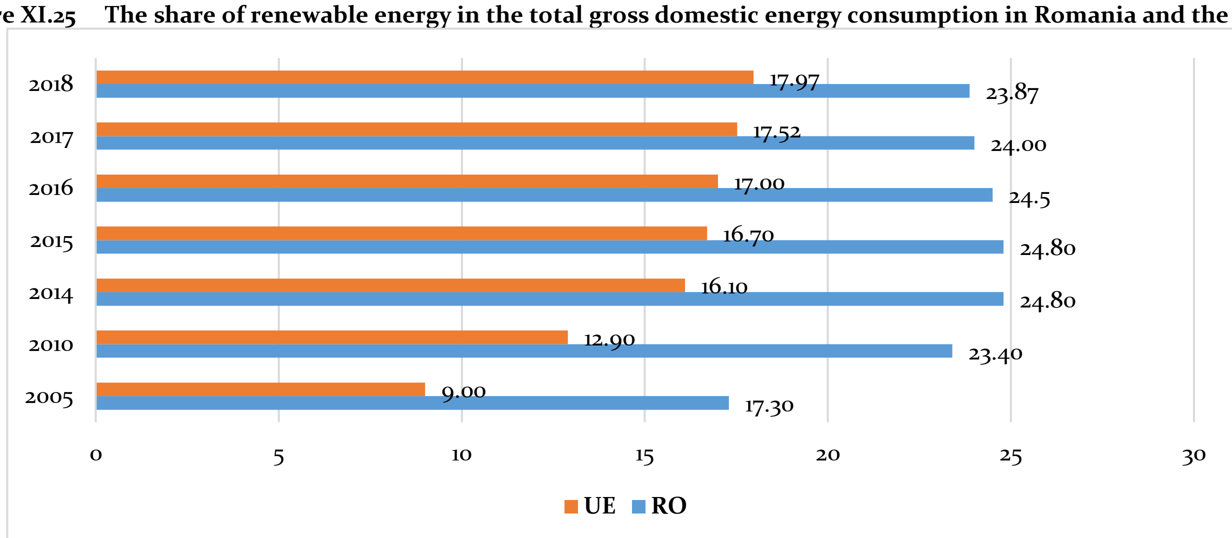
Figure XI.24 Electricity produced from renewable energy sources at national and EU-28 level, for the period 2004-2018
(Source Eurostat https://ec.europa.eu/eurostat/web/energy/data/shares)



The total domestic primary energy consumption was 33510 thousand toe in 2018, increasing by 0.4% compared to 2017 (33391 thousand toe). **Gross domestic consumption (including losses)** increased in 2018, compared to 2017, by 119 thousand toe, representing + 0.4%. By types of energy carriers, the gross domestic consumption of usable natural gas (+225 thousand toe), electricity (+208 thousand toe) and crude oil and petroleum products (+108 thousand toe) increased, while the consumption of coal including coke) decreased by -295 thousand toe (*Source: National Institute of Statistics*).

At the level of the European Union, **the share of renewable energy in the total gross domestic energy consumption** shows for the period 2005-2018 an ascending evolution, from the value of approximately 9% registered in 2005 to the value of approximately 17.97% registered in 2018. Also, at national level, the share of renewable energy in total gross domestic energy consumption shows an upward trend for the period 2005-2018, and in 2018 there was a decrease of approximately 0.54% compared to the value established in the previous year (*figure XI.25*).

Figure XI.25 The share of renewable energy in the total gross domestic energy consumption in Romania and the EU-28



Source: Eurostat https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=t2020_31&plugin=1

Given the current challenge of securing energy resources and the need to reduce CO_2 emissions, as well as environmental protection, investments in energy efficiency and renewable energy, recovery of secondary energy resources and combating energy poverty is a strategic priority for Romania ("Energy Strategy Romania 2016 - 2030").

RO 10
Indicator code Romania: RO 10
EEA indicator code: CSI 10
TITLE: GREENHOUSE GAS EMISSIONS TRENDS
DEFINITION: The indicator shows the trends (total and by sectors) of greenhouse gas emissions in relation to the obligations of the Member States to comply with the Kyoto Protocol objectives. The emissions are presented according to their type and are analyzed according to their potential contribution to the amplification of the global warming phenomenon.

The 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 communicated a target for a reduction in 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'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 targets for reducing GHG emissions in accordance with the provisions of Decision no. 406/2009 / EC, it is necessary to develop at the level of each economic sector strategies and action plans that identify the necessary measures and resources to ensure at the national level the linear emission trajectory in the period 2013-2020.

Environmental policies on climate change are an extremely important step, and Romania must adhere to the European effort to meet the ambitious goals set in EU climate change policy. The national GHG emission reduction policy aims at the European approach, namely on the one hand ensuring that some economic operators participate in the application 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.

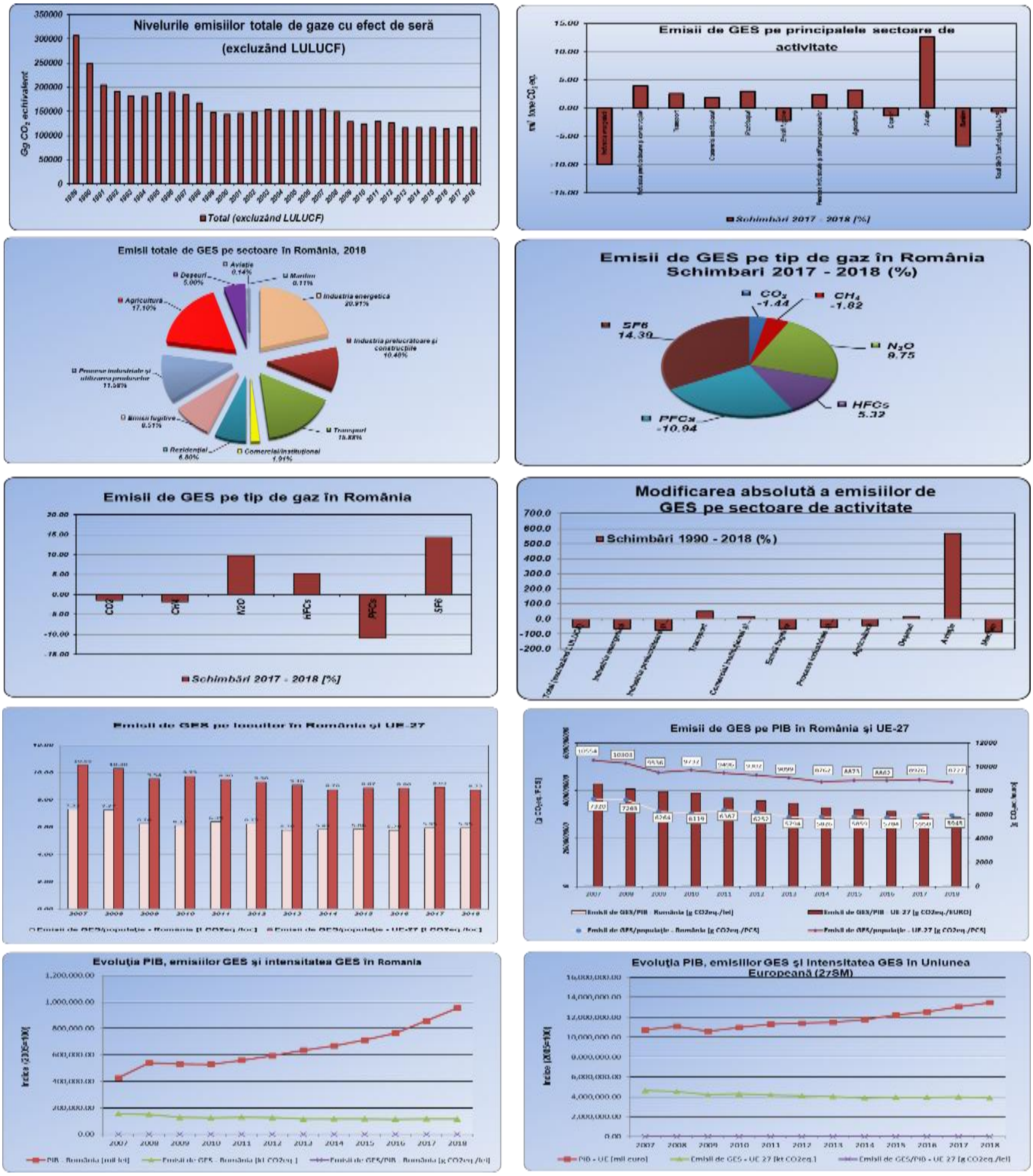
In order to optimize the planning of GHG emission reductions from other sources that are not covered by the EU ETS scheme, it is necessary to correlate the sectoral annual emission plans from the regulated sources by applying Decision no. 406/2009 / EC (non EU ETS), taking into account the emissions 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. Regarding Romania, the CO_2 emissions generated from different activity sectors also highlight the major contribution of the energy and transport sector, which means that these are the areas on which it is necessary to implement measures and actions to reduce CO_2 emissions. According to the National Inventory of Greenhouse Gas Emissions 2020 made by our country, in 2018, GHG emissions related to the Energy sector represent about 84% of the total, including LULUCF and 66.32% of the total, excluding LULUCF. At European Union level, 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 2018, the emissions from the Transport Sector increased by 48.21% compared to the emissions registered at the level of 1990, respectively by 2.56% compared to those from 2017, increases mainly due to the increase of the demand for passenger and goods transport as well as preference for the use of roads as a mode of transport in exchange for other less polluting modes of transport (*table XI.16 and figures XI.26*).

Table XI.16 - The levels of total annual greenhouse gas emissions in the period 2000 - 2018, (thousand tons of CO2 equivalent)

Year	Total emissions (excluding LULUCF)	Total emissions (including LULUCF)
2000	143.154,46	122.242,45
2001	146.187,17	124.377,23
2002	148.897,93	129.146,75
2003	153.779,79	133.657,97
2004	152.551,97	132.706,15
2005	151.387,14	130.480,85
2006	152.110,74	131.661,66
2007	154.670,41	134.993,24
2008	149.918,10	129.828,91
2009	128.031,30	107.968,87
2010	124.173,34	103.455,22
2011	129.010,35	109.533,32
2012	125.638,73	104.815,28
2013	116.001,00	94.683,20
2014	116.214,83	93.878,21
2015	116.418,66	94.488,55
2016	114.287,85	91.182,74
2017	116.875,47	95.195,44
2018	116.115,12	91.656,49

Source: NEPA

Figures XI.26 - *Source: NEPA*

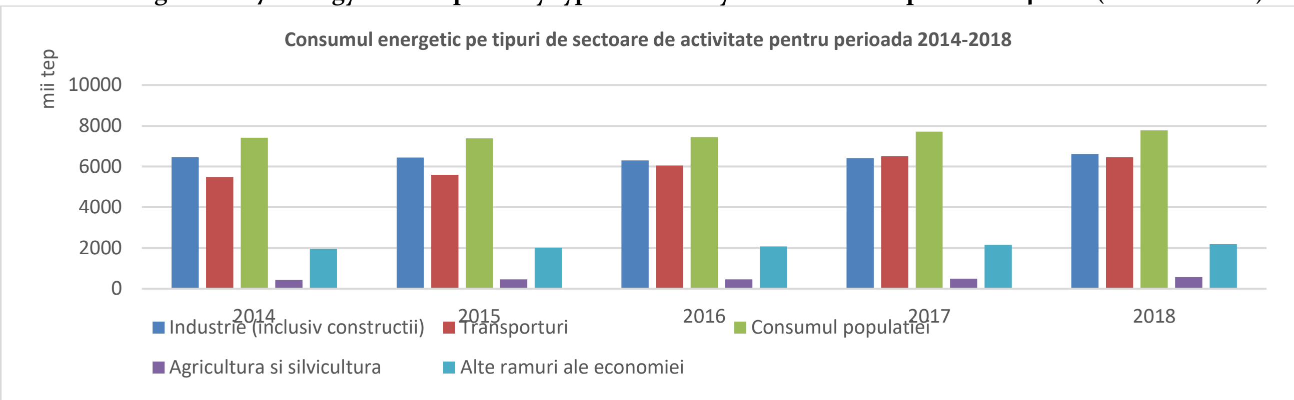


Industry

From the graph in figure XI.27 on the Evolution of final energy consumption by types of activity sectors, 2014-2018 (thousand toe) it is observed that the largest share is held by energy consumption in the residential sector, 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: The final energy consumption covers the energy supplied to the final consumer for the various energy purposes. It is calculated as the sum of the final energy consumption in all sectors of activity. They are structured in such a way as to include industry, transport, households, services and agriculture.

Figura XI.27 Energy consumption by types of activity sectors for the period 2014-2018 (thousand toe)

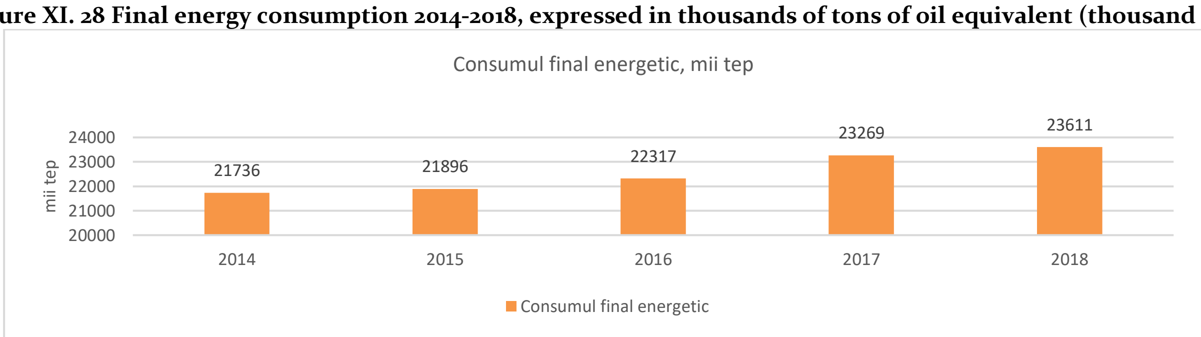


Source: *http://www.insse.ro*

Final energy consumption *in 2018 increased by 342 thousand toe (+ 1.5%) compared to 2017 (figure XI.27).*

Final energy consumption in industry (including construction) increased in 2018 by 212 thousand toe (+ 3.3%), mainly due to large industries consuming energy resources, such as the chemical and pharmaceutical industry, rubber products and plastics (+87 thousand toe) and the metal construction, machinery and equipment industry (+101 thousand toe), whose cumulative energy consumption represents 32.3% of final consumption in industry (including construction). In metallurgy, the final energy consumption in 2018 increased by 0.4% compared to 2017 (*figure XI.28).*

Figure XI. 28 Final energy consumption 2014-2018, expressed in thousands of tons of oil equivalent (thousand toe)



Source: *http://www.insse.ro*

Agriculture

RO 25
Indicator code Romania: RO 25
EEA indicator code: CSI 25
TITLE: GROSS NUTRIENTS' 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.17 The area cultivated in 2019, ha

Area	8.621.500 ha

Source: I.N.S. - DATA: Plant Production in Main Crops, M.A.D.R

Table XI.18 Areas and quantities of chemical and natural fertilizers used in agriculture in 2019

Specification	Area	Quantity	Share in relation to the cultivated area
	hectares, ha	tonnes – 100% active substance	%
Chemical	7.373.689	749.551	85,53
Nitrous	6.104.220	455.964	70,80
Phosphorous	3.726.745	201.329	43,23
Potassic	1.915.470	92.258	22,22
Natural	816.713	15.323.344	9,47

Source: I.N.S. - DATA: TEMPO database - Agri-environment indicators, M.A.D.R

Tabelul XI.19 Suprafețele și cantitățile de pesticide utilizate în agricultură în anul 2019

Specification	Area	Quantity	Share in relation to the cultivated area
	hectares, ha	Kilograms active substance	%
Insecticides	2.270.113	582.794	26,33
Fungicides	2.454.160	1.711.491	28,47
Herbicides	3.778.820	3.052.255	43,83

Source: I.N.S. - DATA: TEMPO database - Agri-environment indicators, M.A.D.R.

Table XI.20 The situation of consumption of plant protection products in the period 2018-20191)

Specification	2018*	2018**	2019
Arable area, thousands of ha	*9376,917****	*9425,126****	*9425,564****
Pesticide consumption			
Total (kg. s.a.), of which:	***5.037.509***	***5.141.207***	***5.346.540***
- insecticides	613.616	641.421	582.794
- fungicides	1.860.468	1.759.968	1.711.491
- herbicides	2.563.425	2.739.818	3.052.255
Corresponding per 1 ha arable			
Total (kg s.a.)	***0,54***	***0,545***	***0,567***
Of which:			
- insecticides	0,069	0,068	0,062
- fungicides	0,198	0,187	0,182
- herbicides	0,273	0,290	0,323

1) I.N.S., M.A.D.R.

**) I.N.S. data available June 2019,*
***) I.N.S. updated data 28.04.2020,*
****) research conducted by M.A.D.R. (for 2018 * data available on June 15, 2019, for 2018 ** updated data 2020)*

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. In 2019, out of the total consumption of plant protection products, 57% represented herbicides, 32% fungicides and only 11% insecticides. In 2019, compared to 2018, there was a slight decrease in the consumption of insecticides and fungicides and a slight increase in the consumption of herbicides. The average consumption of phytosanitary products in our country, at 1 arable hectare, registered a slight increase in 2019 compared to 2018 (*table XI.20*).

Table XI.21 The use of chemical fertilizers in Romanian agriculture during the period 1999 - 2019[1]

Year	Chemical fertilizers used (tonnes of active substance)				$N+P_2O_5+K_2O$ ($kg.ha^{-1}$)		Fertilized surface, ha
	N	P_2O_5	K_2O	Total	Arable	Agricultural	
1999	225000	93000	13000	331000	35,4	22,5	3640900
2000	239300	88300	14600	342200	36,5	23,0	3724578
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	36,4	6574741
2016	344000	126000	44000	514000	54.7	35,1	6491498
2017	381342	144869	55259	581470	61.8	39,7	7272565
2018	547694	227605	66894	842193	89,8	57,7	6740184
2019	455964	201329	92258	749551	79.78	51,23	7373689

1)Source: I.N.S, M.A.D.R

Table XI.22 The quantity of natural fertilizers applied between 1999 - 2019[1]

Year	Total fertilizers		The surface on which it was applied		Share of application area to the arable area	The average quantity per ha to the applied surface		The average quantity per ha to the agricultural surface	
	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
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	630.293	92.7	6,70	23,02	94	0.99	88
2012	13.292.617	80	605.694	89	6,48	21,95	89,5	0,91	81

2013	13.282.877	80	613.563	90	6,53	21,65	88,2	0,91	81
2014	16.261.702	98	795.031	117	8,47	20,45	83,3	1,11	98
2015	15.212.325	91	864.218	127	9,20	17,60	71,7	1,04	92
2016	14.927.000	90	862.330	127	9,18	17,3	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	1,00	88
2019	15.323.344	92	816.713	120	8,69	18,8	76,6	1,05	93

Source: I.N.S, M.A.D.R

Table XI.21 presents the situation of application of chemical fertilizers on agricultural soils during 2005-2019, which shows the maintenance of the trend of application of chemical fertilizers on areas that represent over 57% of the arable land of the country (in 2019 being fertilized approx. 78.5%), but also the increase of the fertilized area in 2019 by 633,505 ha compared to 2018.
Compared to previous years, the following findings can be made:

- the quantities of chemical fertilizers applied (N, P2O5, K2O) remain on an upward trend, but are below values recorded in 2018;
- the applied quantities decreased by about 17% at N, by 12% at P2O5, but the amounts of K2O increased by 38% compared to 2018;
- compared to 1999, the quantities of N and P2O5 applied in 2019 registered increases of over 200%, and those of K2O of over 700%;
- total NPK quantities increased from 35.4 kg in 1999 to 79.78 kg in 2019 on arable land;
- of the total fertilizers used in 2019, those based on N represent 61%, those with phosphorus 27%, and those based on potassium 12%.

The amount of natural fertilizers (Table XI.22) applied in 2019, compared to the one used in 1999, is lower by about 8%, and the area on which natural fertilizers were applied increased slightly compared to 1999 and year 2018, and the average amount applied in 2019 was 18.8 t / ha (**according to MADR - ICPA).**

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 amount of passenger-kilometers traveled each year. Domestic passenger transport includes car, bus and coach transport and trains.

Table XI.23 Volume of domestic passenger transport (expressed as a percentage change from the base year, in the analyzed period, of the value in the current year for passengers-km), 2015 – 2019

2015=100

Percentage (%)	2015	2016	2017	2018	2019
Railway	100	97,0	110,2	108,5	114,9
Road	100	113,1	118,6	120,6	135,3
Waterways	100	80,4	80,4	63,0	58,5
TOTAL	**100**	**108,5**	**116,2**	**117,1**	**129,5**

Source: Ministry of Transport, Infrastructure and Communications

Table XI.24 National passenger transport, 2015 - 2019, thousands of passengers

Thousands of passengers	2015	2016	2017	2018	2019
Railway	66.261,7	64.251,8	68.868,3	66.324,0	69.708,0
Road	272.899,6	300.845,3	323.746,9	358.890,0	355.556,0
Waterways	169,0	153,0	153,0	120,0	111,0
Aerian	1.009,6	1.785,7	2.744,3	2.835,0	2.658,0
TOTAL	**340.339,9**	**367.035,8**	**395.512,5**	**428.169,0**	**428.033**

Source: National Institute of Statistics

Table XI.25 The share of each mode of transport in the total national passenger transport, 2015 – 2019

%	2015	2016	2017	2018	2019
Railway	19,47	17,50	17,41	15,49	16,28
Road	80,18	81,97	81,86	83,82	83,07
Waterways	0,05	0,04	0,04	0,03	0,03
Aerian	0,30	0,49	0,69	0,66	0,62
TOTAL	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**

Source: Ministry of Transport, Infrastructure and Communications

Table XI.26 Volume of local public passenger transport by modes of transport (transport by bus and minibus, by metro, trams and trolleybuses), at national level, 2015 – 2019

Thousands of passengers -km	2015	2016	2017	2018	2019
Trams	2.384.674,6	2.479.943,9	2.589.870,0	2.474.089,0	2.410.178
Buses, minibuses	6.422.160,0	5.979.190,0	5.959.932,0	5.919.007,0	5.265.821
Trolleys	971.107,3	908.503,6	889.751,1	870.291,0	880.229
Subway	2.523.027,0	2588421,0	2.533.743,0	2.527.468,0	2.519.053
TOTAL	**12.300.968,9**	**11.956.059,2**	**11.973.296,1**	**11.790.855,0**	**11.075.281**

Source: National Institute of Statistics

Table XI.27 Volume of passenger transport (passenger route) at national level, 2015 - 2019

Thousands of passengers -km	2015	2016	2017	2018	2019
Railway	5.106.514,0	4.952.622,0	5.629.215,0	5.542.677,0	5.866.008,0
Road	12.914.061,7	14.609.472,1	15.319.994,1	15.573.425,0	17.478.123,0
Waterways	9.520,0	7.650,0	7.650,0	6.000,0	5.572,0
TOTAL	**18.030.095,7**	**19.569.744,1**	**20.956.859,1**	**21.122.102,0**	**23.349.703,0**

Source: National Institute of Statistics

RO 36

Indicator code Romania: RO 36

EEA indicator code: CSI 36

TITLE: DEMAND FOR TRANSPORT OF GOODS

DEFINITION: The demand for freight is defined as the amount of internal tonne-kilometers traveled each year. According to the latest metadata, domestic shipping includes road, rail and inland waterways: inland waterways and inland railways are based on national movements ("territoriality principle"), irrespective of the nationality of the vehicle or the ship. Road transport is based on all journeys of vehicles registered in the reporting country.

Table XI.28 Goods transported, at national level, by rail, road and inland waterway, 2015 - 2019, thousand tons

thousand tons	2015	2016	2017	2018	2019
Railway	43.431,3	41.761,7	44.260,6	44.210,0	48.747,0
Road	167.447,0	172.957,0	174.134,0	181.831,0	200.180,0
Waterways	13.246,0	14.697,0	14.632,0	16.140,0	33.261,0
TOTAL	**224.124,3**	**229.415,7**	**233.026,6**	**242.181,0**	**282.188,0**

Source: National Institute of Statistics

Table XI.29 Freight route by national rail, road and inland waterway transport, thousands of tonnes - km

thousand tons - km	2015	2016	2017	2018	2019
Railway	9.956.856,0	10.048.493,0	10.044.636,0	9.631.141,0	10.238.466,0
Road	12.067.769,0	13.139.575,0	13.547.658,0	14.357.536,0	16.674.176,0
Waterways	2.930.947,0	3.405.312,0	3.303.349,0	3.701.574,0	3.723.995,0
TOTAL	**24.955.572,0**	**26.593.380,0**	**26.895.643,0**	**27.690.251,0**	**30.636.637,0**

Source: National Institute of Statistics

Table XI.30 The share of each mode of transport in the total internal transport of goods (road, rail, inland waterways) at national level, 2015 - 2019

Percentage (%)	2015	2016	2017	2018	2019
Railway	19,38	18,20	18,99	18,25	17,27
Road	74,71	75,39	74,73	75,08	70,94
Waterways	5,91	6,41	6,28	6,67	11,79
TOTAL	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**

Source: Ministry of Transport, Infrastructure and Communications

Housing

RO 27

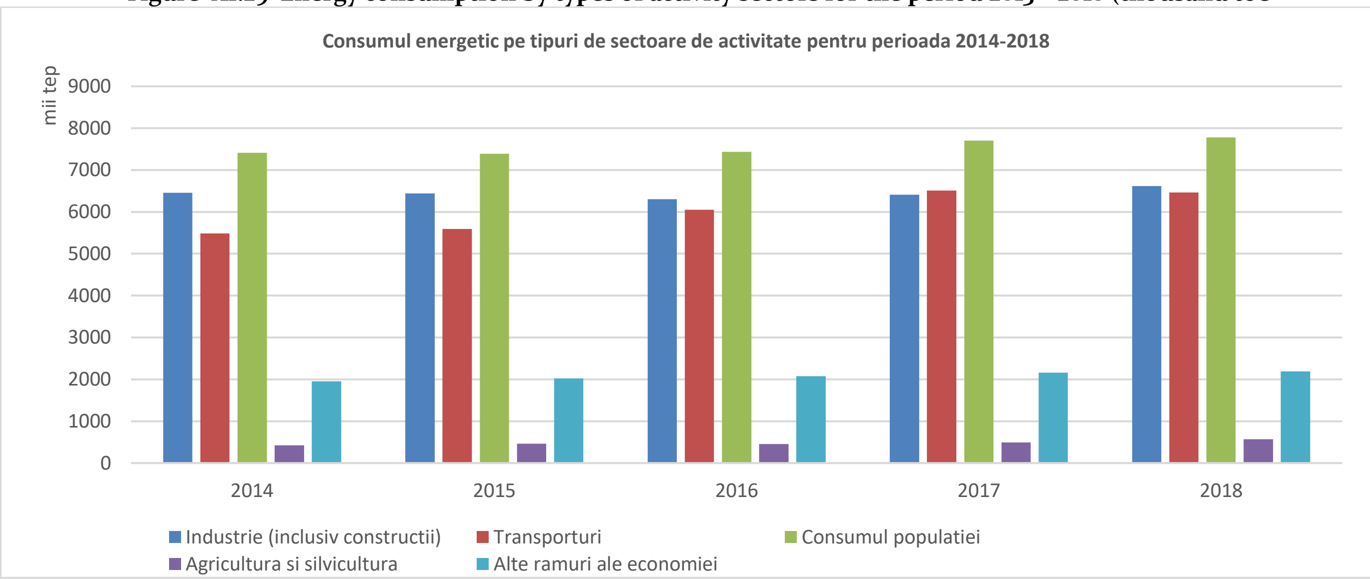
Indicator code Romania: RO 27

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.

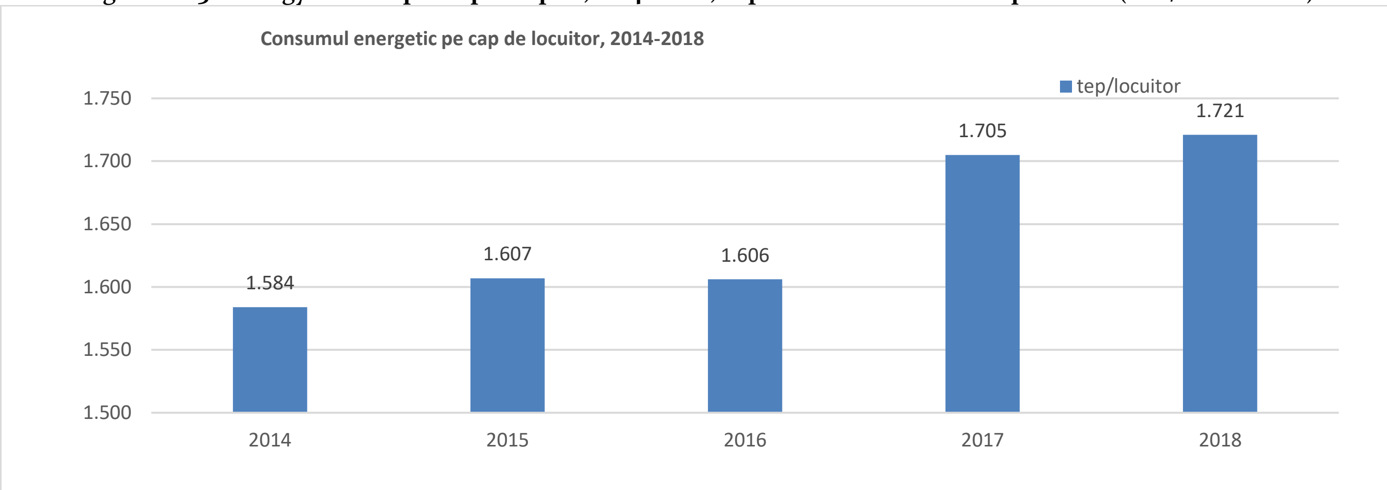
Figure XI.29 Energy consumption by types of activity sectors for the period 2013 – 2018 (thousand toe



Source:http://www.insse.ro

Figure XI.29 on energy consumption by type of activity in the period 2014-2018 shows that the largest share is held by energy consumption in the residential sector, followed by industrial activities and transport activities. **Gross domestic energy consumption per capita** in 2018 was 1,721 toe / place, + 09%, compared to 2017 (1,705 toe / place.) The trend of gross domestic energy consumption per capita in the period 2014-2018 is shown in Figure XI .30, where there is an increase from 1,584 toe / place in 2014, to 1,721 toe / place in 2018, + 8.65%.

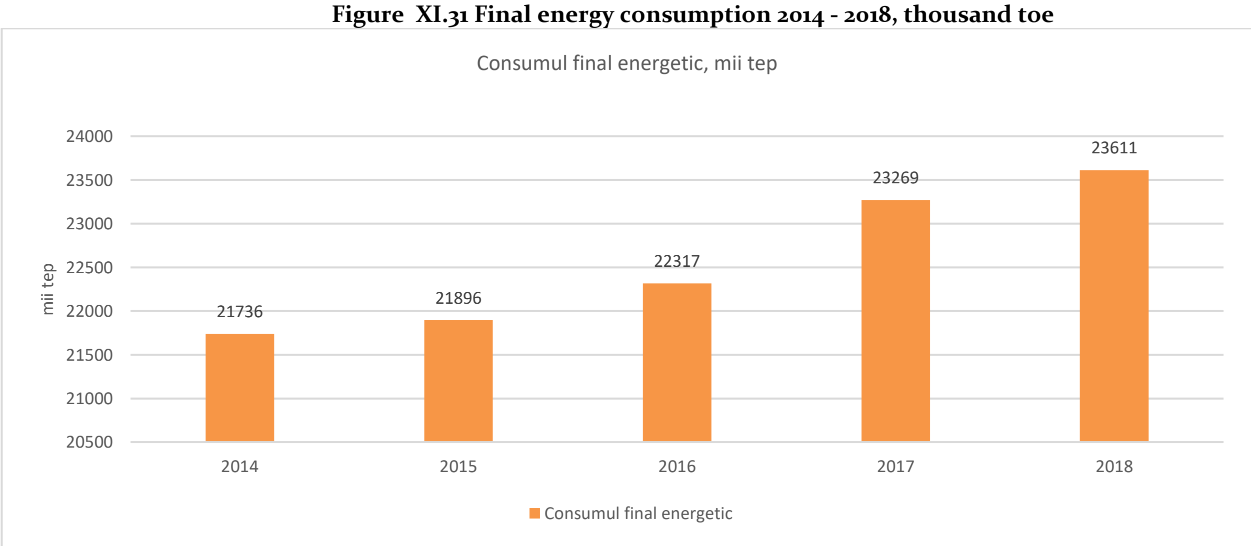
Figure XI.30 Energy consumption per capita, 2014 - 2018, expressed in tons of oil equivalent (toe / inhabitant)



Source :http://www.insse.ro

Final energy consumption in 2018 increased by 342 thousand toe (+ 1.5%) compared to 2017 (figure XI.31) due to large industries consuming energy resources, the tertiary sector, population and agriculture.

Figure XI.31 Final energy consumption 2014 - 2018, 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 demand segments does not show major changes in energy consumption by demand segments and by sectors of activity, but there will be important changes in the energy mix, especially in the demand for different types of energy at sectoral level and in terms of technologies used (*Source: Romania's Energy Strategy 2019 - 2030, with a view to 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 (total and sectoral) greenhouse gas emissions trends in relation to Member States' obligations to comply with the Kyoto Protocol objectives.

Since 2002, Romania has been submitting annually 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); In addition, as a Member State of the European Union, since 2007, Romania has been sending the inventory to the European Commission and the European Environment Agency. INEGES is administered in accordance with the associated legal provisions, provisions at international level, of the European Union and at national level; Inventory management is supported by the implementation of the National Inventory Arrangements (NSAs) and the arrangements associated with the National System for Estimating Anthropogenic Emissions from Sources or Seizure Detections of All Greenhouse Gases (SNEEGES). From a methodological point of view, INEGES is carried out using the applicable IPCC methodologies: Guidelines for National Inventory of Greenhouse Gas Emissions, document developed by IPCC in 2006 (IPCC 2006), Revised Supplementary Methods and Guidelines associated with Good Practice Derived from the Kyoto Protocol, a document prepared by the IPCC in 2013 (KP Supplement) and the Supplement to the Guidelines for the National Invention of Greenhouse Gas Emissions developed by the IPCC in 2006, a document prepared by the IPCC in 2013: Wetlands (Wetlands Supplement). *INEGES is a tool for reporting anthropogenic greenhouse gas emissions and retentions. INEGES contains the elements in the Common Reporting Format - "CRF" (CRF tables and "xml" database) and the INEGES Report - "NIR". The report to INEGES presents in detail the way in which the inventory was prepared 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 2018 by approximately 0.65%, compared to the level of emissions recorded in 2017 (*Table XI.31*). The share of greenhouse gas emissions from the Energy sector in total greenhouse gas emissions (excluding the contribution of the sector - LULUCF) for 2018 was approximately 66.32%, respectively the contribution of the sub-sectors attributed to the Energy sector is as follows : Energy Industry 31.53%; Manufacturing and Construction Industry 15.80%; Transport 23.94%; Fugitive emissions 12.83%; Other sub-sectors 15.91%. The contribution of the other sectors of INEGES for 2018 is represented as follows: Industrial Processes and Product Use (IPPU) is approximately 11.58%; Agriculture represents 17.10%; Waste is 5.00%.

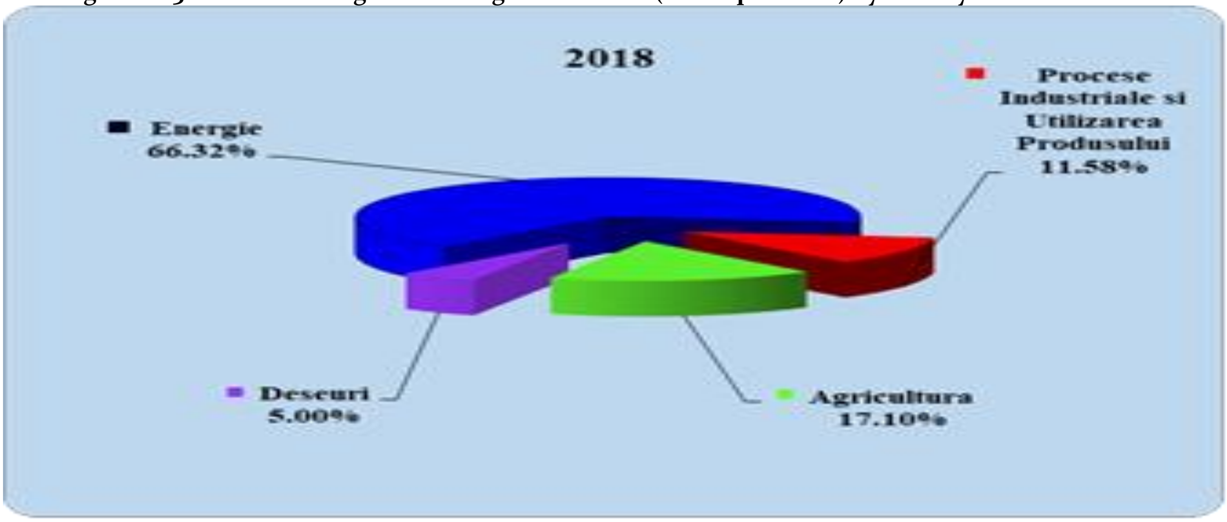
Table XI.31 Greenhouse gas emissions by activity sectors

No. crt.	Sector/Sub-sector - INEGES	Emissions (kt CO_2 equiv.)		Trend (%)	
		2017	2018		
1	**Energy**	78.616,58	77.005,99	-2,05	↘
	-Energy industry	26.963,32	24.277,16	-9,96	↘
	-Manufacturing and construction	11.702,01	12.165,49	3,96	↗
	-Transport	17.975,64	18.435,22	2,56	↗
	-Institutional commercial	2.173,88	2.214,79	1,88	↗
	-Residential	7.668,43	7.897,00	2,98	↗
	-Fugitive emissions	10.100,69	9.878,62	-2,20	↘
2	**Industrial processes and product use**	13.129,11	13.445,65	2,41	↗
3	**Agriculture**	19.238,14	19.854,03	3,20	↗
4	**Waste**	5.891,63	5.809,44	-1,39	↘
5	**Total GHG (excluding LULUCF)**	116.875,47	116.115,12	-0,65	↘

Source: NEPA

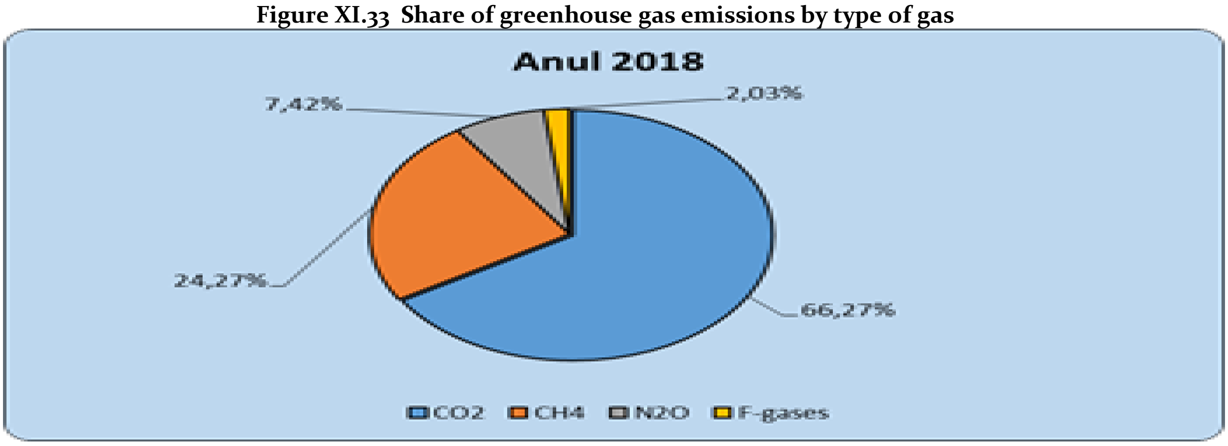
Figure XI.32 shows the share of emissions related to 2018 by activity sectors. Figure XI. 33 presents the share of greenhouse gas emissions by type of gas at the level of 2018, respectively, the changes at the level of greenhouse gas emissions for 2018 compared to 2017, expressed in percentages.

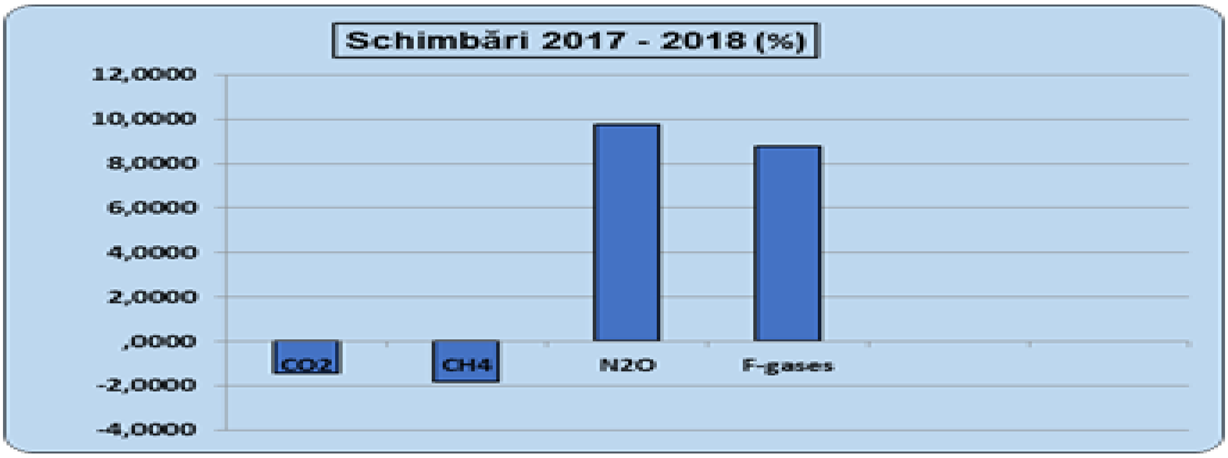
Figure XI.32 The share of greenhouse gas emissions (CO2 equivalent) by activity sectors for 2018



Source: NEPA - National Emissions Reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

Figure XI.33 Share of greenhouse gas emissions by type of gas

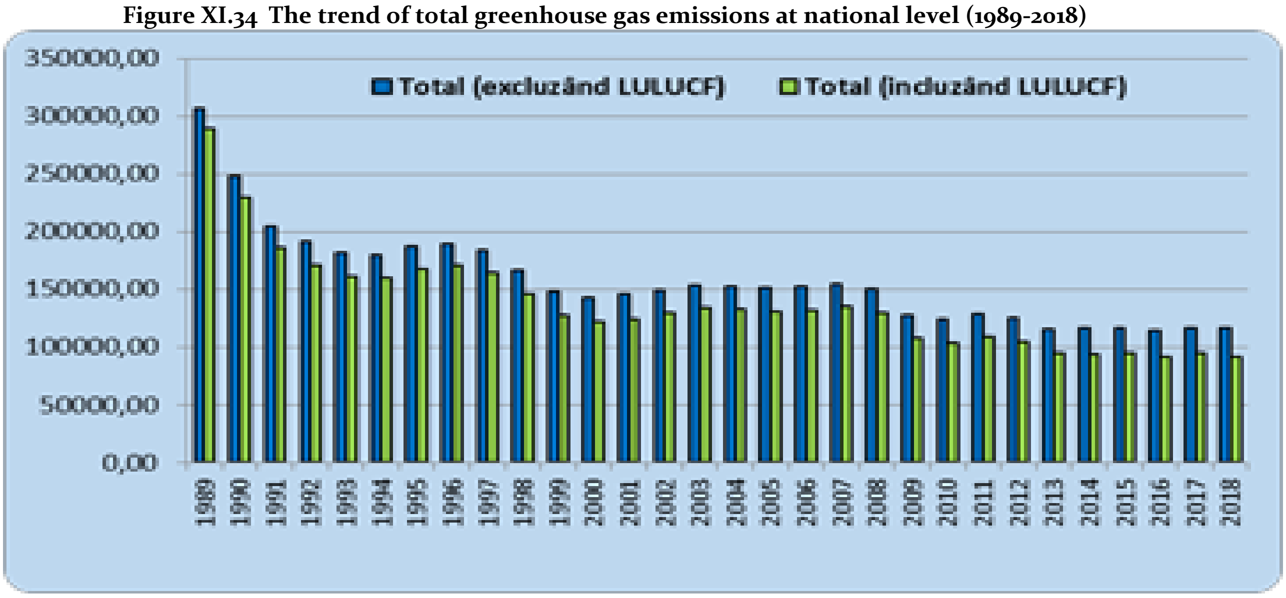




Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

In 2018, total greenhouse gas emissions (excluding the contribution of the sector "Land use, land use change and forestry - LULUCF) decreased by 62.10% compared to the level of emissions in 1989, while net GHG emissions / retentions (taking into account CO_2 retentions) decreased by 68.32% (figure XI.33). Total greenhouse gas emissions in 2018, with the exception of retention by absorbers, amounted to 116,115.12 kt CO_2 equivalent. The trend of emissions reflects the changes in this period characterized by the transition to a market economy; the period can be divided into three sub-periods: 1989-1999, 2000-2008 and 2009-2018. The decline in economic activity and energy consumption between 1989 and 1992 directly led to a 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 began to rise until 1996, following the revitalization of the economy. Given the start of operation of the first reactor at the Cernavoda nuclear power plant (1996), emissions decreased again in 1997. The decline continued until 1999. The level of emissions increased after 2000 and reflects the economic development during 2000- 2008. The limited decrease in GHG emissions in 2005, compared to the levels of 2004 and 2006, was caused by the hydrological year positively influencing the production of energy in hydroelectric power 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.34).

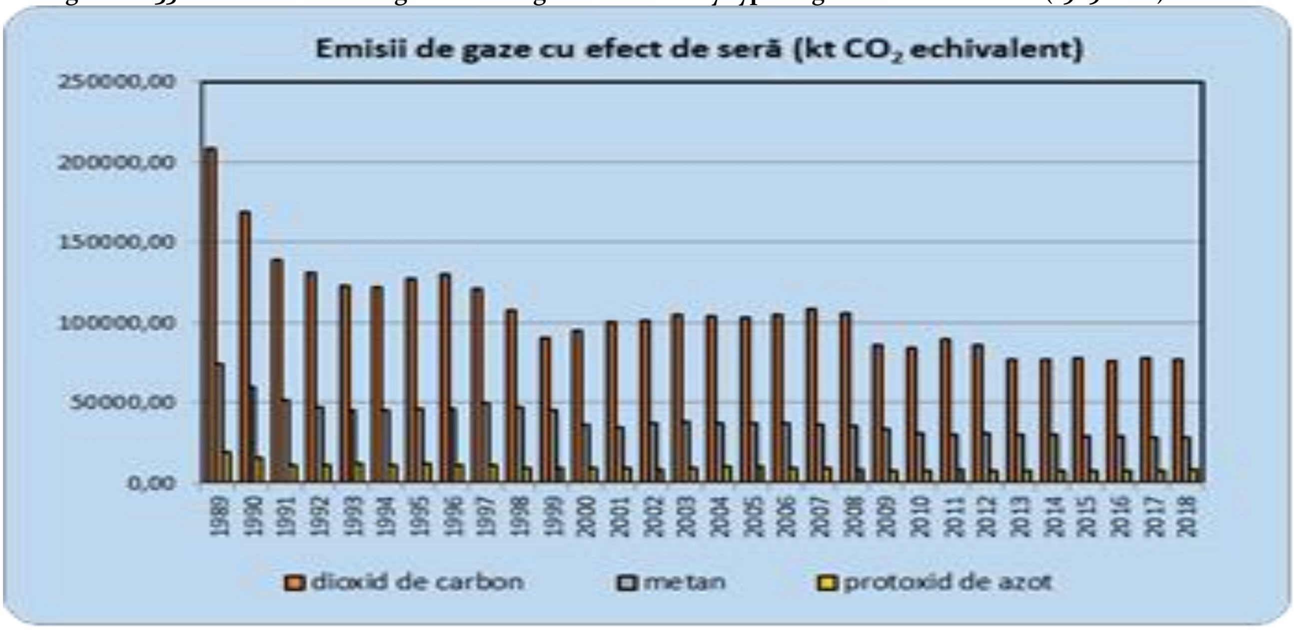
Figure XI.34 The trend of total greenhouse gas emissions at national level (1989-2018)



Source: NEPA - 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 XI.35). Carbon dioxide (CO_2) is the most important anthropogenic greenhouse gas. The decrease of CO_2 emissions in 2018 by 63.12% compared to 1989 (from 208,648.62 kt in 1989 - 68.10% to 76,951.22 kt in 2018 - 66.27%) is caused by the decrease in the amount of burned fossil fuels 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 (CH_4) emissions, mainly related to fugitive emissions from the extraction and distribution of fossil fuels and livestock, decreased in 2018 by 61.95% compared to 1989 (from 74,073.58 kt CO_2 equivalent in 1989 to 28,183.63 kt CO_2 equivalent in 2018). The decrease in CH_4 emissions in agriculture is due to the decrease in the level of animal husbandry. Nitrogen oxide (N_2O) emissions are mainly generated in agricultural soil activities in the agricultural sector and in 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 decreased in 2018 by 55.17% (from 19,222.94 kt CO_2 equivalent in 1989 to 8,618.21 kt CO_2 equivalent in 2018).

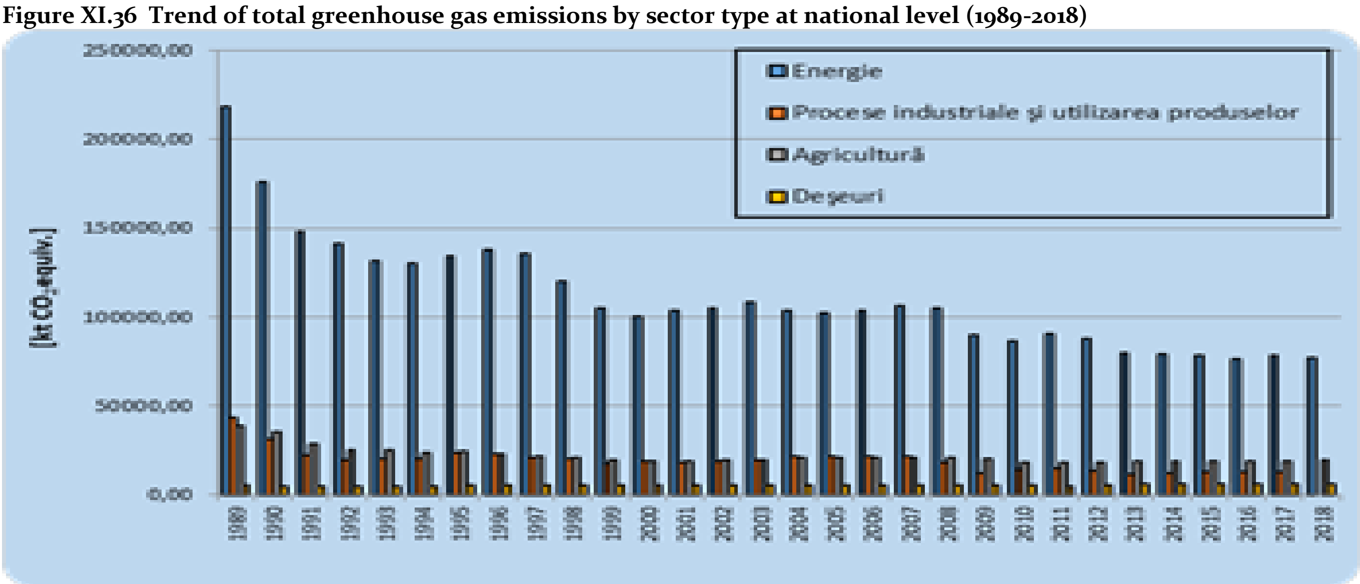
Figure XI.35 The trend of total greenhouse gas emissions by type of gas at national level (1989-2018)



Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

Figure XI.36 represents the trends of GHG emissions in each sector of INEGES, excluding the LULUCF sector. GHG emissions from the energy sector decreased by 64.74% compared to the base year 1989. A significant decrease of 69.25% of GHG emissions was recorded in the Industrial Processes and Product Use sector in 2018, 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 2018 by 49.26% compared to 1989 emissions, this fact being based on the following causes: the decline of the livestock sector, the decrease of agricultural production, the decrease of fertilizers N-based synthetics applied to the ground. In the Waste sector, emissions increased in 2018 by 13.12%, compared to the level of 1989.

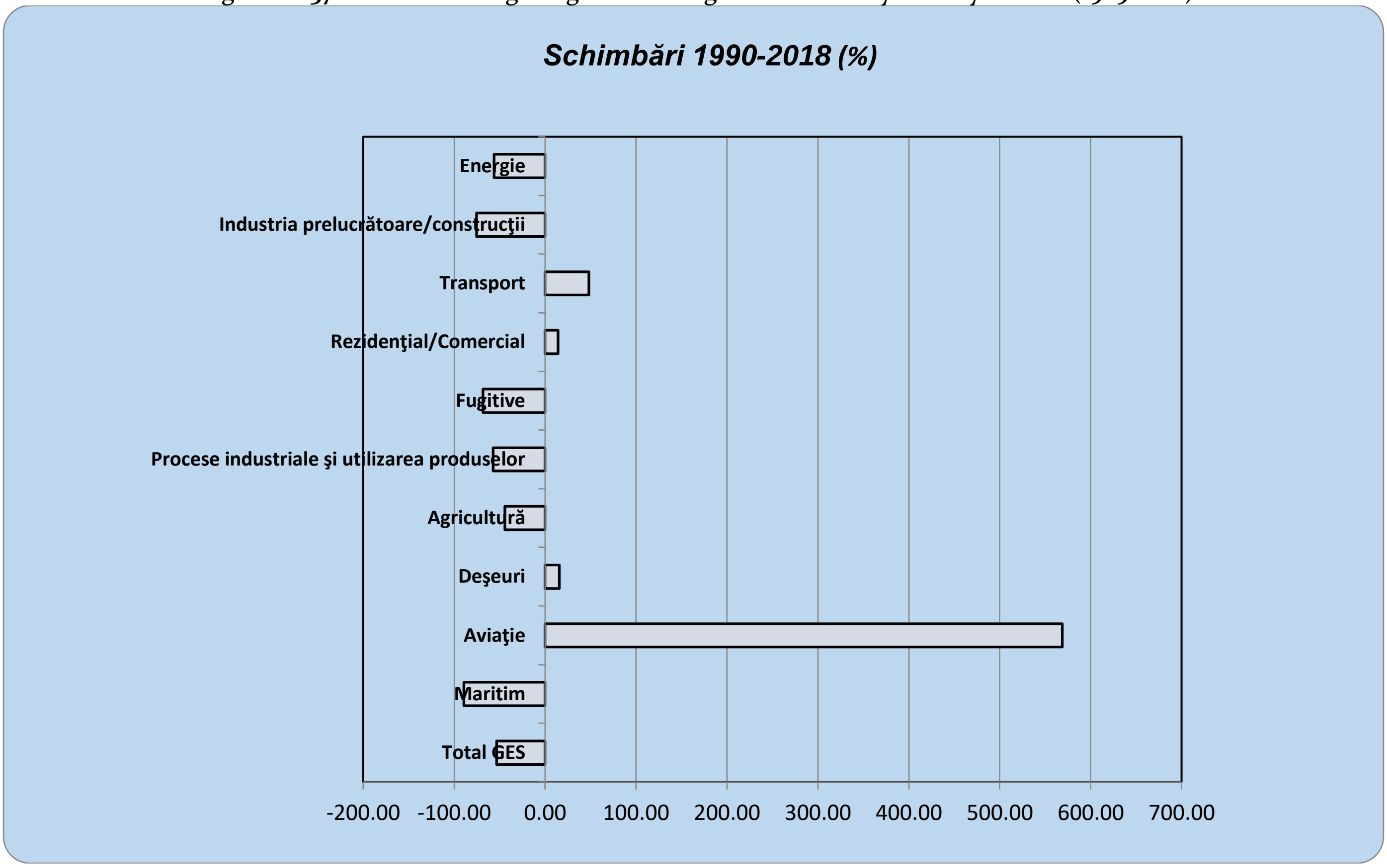
Figure XI.36 Trend of total greenhouse gas emissions by sector type at national level (1989-2018)



Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

Figure XI.37 represents the changes of GHG emissions, on each sector of INEGES, at the level of 2018 compared to 1990.

Figure XI.37 Absolute change in greenhouse gas emissions by activity sectors (1989-2018)



Source: National emissions reported under the European Union Monitoring and Reporting Mechanism for Greenhouse Gas Emissions

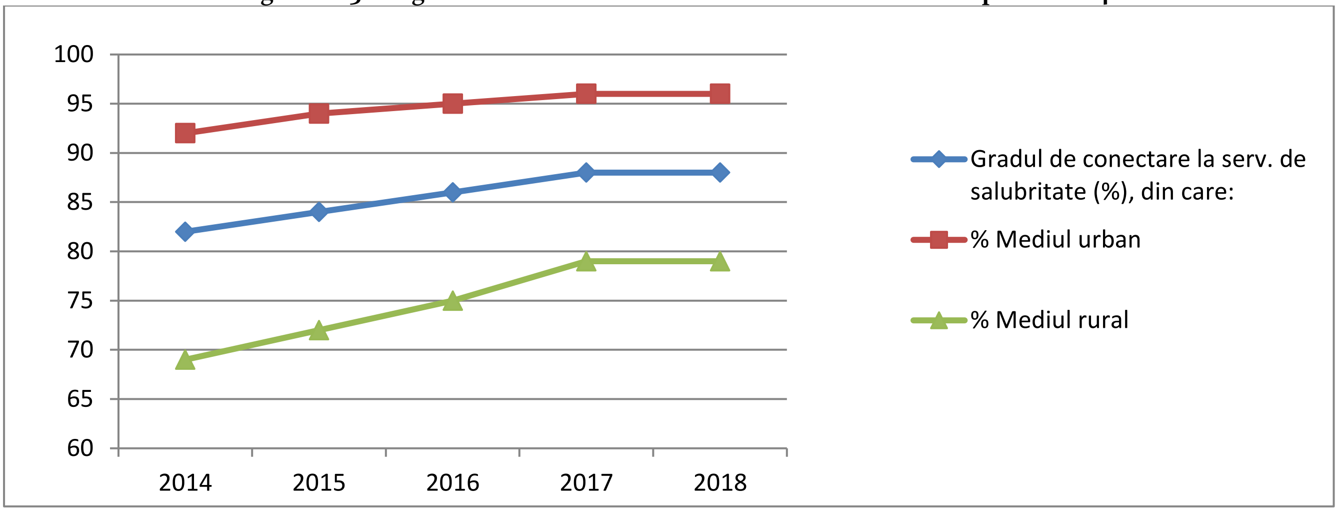
RO 16
Indicator code Romania: RO 16
EEA indicator: CSI 16
TITLE: MUNICIPAL WASTE GENERATION
DEFINITION: The indicator expresses the total amount of municipal waste generated per capita (kg per capita and year.)

According to the provisions of the National Plan on Waste Management, approved by H.G. no. 942/2017, "*municipal wastes are household wastes and other wastes, which, by nature or composition, are similar to household wastes*". According to Decision 2011/753 / EU establishing norms 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.

Municipal waste collection is the responsibility of the municipalities, who can carry out these tasks either directly (through the specialized services within the Local Councils) or indirectly (by delegating this responsibility on a contract basis, to specialized and authorized companies to perform the sanitation services).

At national level, municipal waste collection is not widespread. The figure below shows the evolution of the degree of connection to the sanitation service in the period 2014-2018.

Figure XI.38 Degree of connection to the sanitation service in the period 2014-2018



Source: National Environmental Protection Agency

The degree of connection of the population to the sanitation service is maintained around 88%. The quantities of waste generated by the population that is not served by sanitation services are calculated using 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. Municipal waste management involves 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 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 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). Municipal waste is disposed of exclusively by landfill. To date, no municipal waste incineration plants have been put into operation in Romania. At the end of 2018, 43 compliant landfills for municipal waste were authorized for operation.

Sustainable development indicators on municipal waste

In accordance with the recommendations of EUROSTAT (Guide on data collection on municipal waste), municipal waste is household and assimilated waste, generated from households, institutions, businesses and economic operators. 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. According to the collection method, the municipal waste is: - Collected by or on behalf of the 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 following are excluded: - Sludges from urban wastewater treatment; - Construction and demolition waste. Sustainable development indicators on municipal waste refer to: - Municipal waste generated; - Municipal waste treated by: energy recovery, storage, recycling (excluding composting and anaerobic digestion), composting. The EUROSTAT guide also recommends that recyclable waste streams (paper, plastic, metal, etc.) resulting from sorting plants and which are subsequently sent to recycling facilities be considered as recycled. In view of the above, the following indicators on municipal waste have been calculated at national level:

- ***Municipal waste generated - 5296239 tons in 2018***
  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, 4680085 tonnes;
- household waste generated and not collected by sanitation operators, 314022 tons;
- recyclable waste from the population, collected through authorized economic operators, other than sanitation operators (paper and board, metals,

plastics, glass, wood, textiles, WEEE – preliminary data, waste batteries and accumulators), 302132 tonnes.

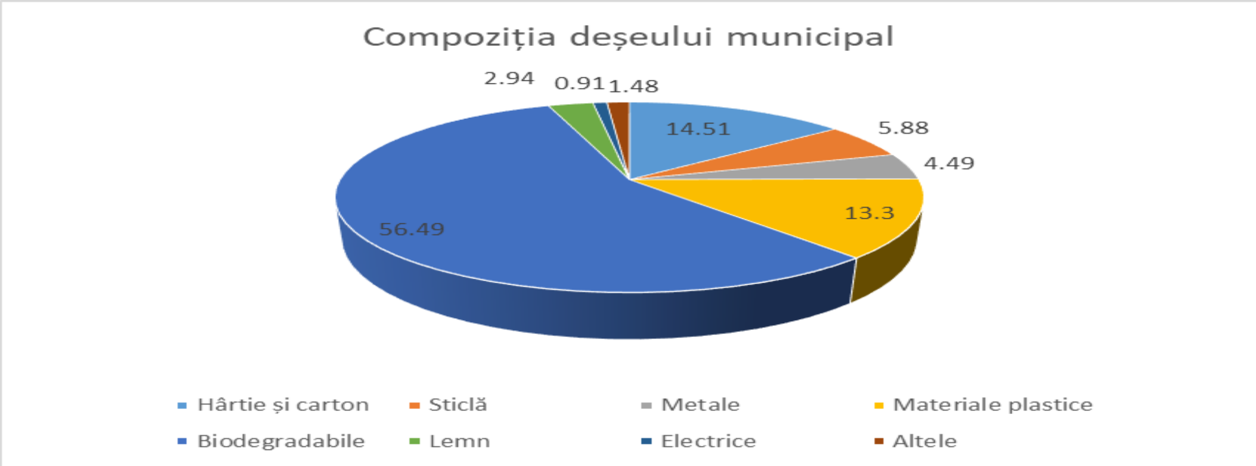
- ***Recycled municipal waste (including composting) - 586406 tons in 2018***

The value was calculated by summing the quantities recycled for the following types of waste:

- household and similar waste and from municipal services 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, biodegradable, textiles, WEEE - preliminary data, waste batteries and accumulators).

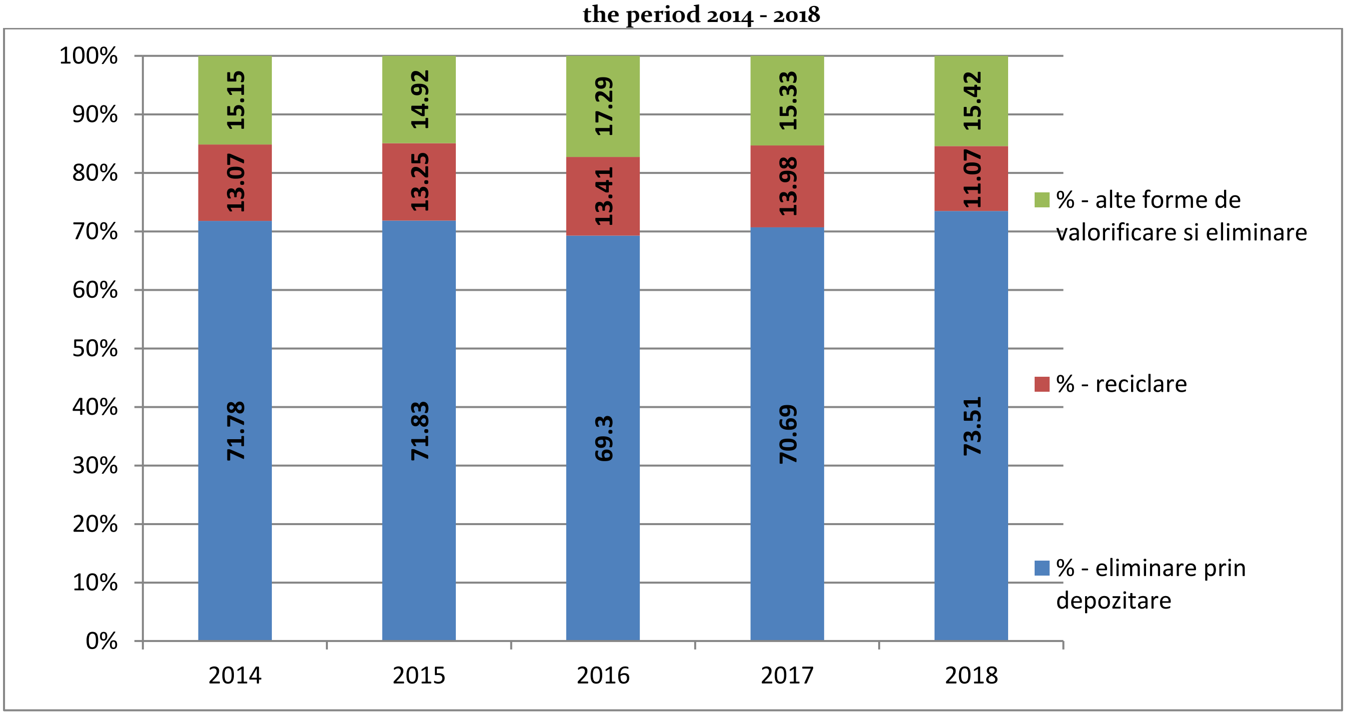
The recycling rate achieved for municipal waste in 2018 was 11.08%.

Figure XI.39 The composition of municipal waste for 2018



Source: National Environmental Protection Agency

Figure XI.40 The share of the main municipal waste management activities, related to the amount of waste generated, in the period 2014 - 2018



Source: National Environmental Protection Agency

Note: The decrease in the share of recycled waste in 2018 is determined by the change of calculation methodology - for this year, the amount of individually composted biodegradable waste was no longer considered recycled, taking into account the provisions of PNGD and European legislation.

From the above it is observed that starting with 2016 the amount of waste stored has an increasing trend, which is inconsistent with the principles and objectives adopted by the EU through the legislative package on the circular economy. The main causes that lead to an increase in the amount of waste stored are:

- waste management facilities developed under integrated waste management systems are not operational or are not operating at the planned capacity and efficiency;
- lack of infrastructure for separate waste collection or malfunction,
- non-implementation of the system "pays for how much you throw away",

weak involvement of sanitation operators and local public administration in the separate collection of waste and their transport to treatment facilities for recovery.

Municipal waste recycling rate, according to Law 211/2011 on the waste regime, republished, with subsequent amendments and completions and Directive 2008/98 on waste, with subsequent amendments and completions.

The Waste Directive 2008/98, as subsequently amended and supplemented, as well as the national legislation transposing it, provide for recycling targets for municipal waste and construction and demolition waste.

In order to verify the achievement of the objective of preparation for reuse and recycling of at least 50% of the total mass generated, at least for waste paper, metal, plastic and glass from household waste or, as the case may be, from other sources, to the extent waste streams are similar to household waste, for the reference year 2018 method 2 of Commission Decision 2011/753 / EU laying down the rules and calculation methods for verifying compliance with the objectives set out in Article 11 (2) of the Directive 2008/98 / EC of the European Parliament and of the Council. This method is used in accordance with the provisions of H.G. no. 942/2017 on the approval of the National Waste Management Plan. Only the quantities of **waste paper, metal, plastic, glass and wood** from household and similar waste, including public services, shall be taken into account for the purpose. ***As a result of the application of calculation method 2, a recycling rate of municipal waste of 15.74% resulted.***

FORECASTS, POLICIES AND MEASURES CONCERNING CONSUMPTION AND THE ENVIRONMENT

Romania's National Sustainable Development Strategy sets concrete objectives for the transition, within a reasonable and realistic time frame, to the high value-added generating development model, driven by the interest for knowledge and innovation, aimed at continuously improving people's quality of life and of the relations between them in harmony with the natural environment.

According to the National Sustainable Development Strategy of Romania, the strategic objectives, in the short, medium and long term, are:

- Horizon 2013: Organic incorporation of the principles and practices of sustainable development in all public programs and policies of Romania as an EU member state.
- Horizon 2020: Reaching the current average level of European Union countries at the main indicators of sustainable development.
- Horizon 2030: Romania's significant approximation of the average level of EU member states in that year in terms 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 and social gaps between Romania and the other member states of the European Union. In view of the synthetic indicator by which the real convergence process is measured, respectively the gross domestic product per capita (GDP / place), to the standard purchasing power (PCS), the application of the Strategy created the conditions for GDP / place expressed in PCS to exceed, in 2013, half of the European Union average at that time, to approach 80% of the European Union average in 2020 and be slightly higher than the European average 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 the electoral cycles and the conjunctural political preferences.
Ensuring the efficient and safe operation of the national energy system, reaching the current EU average in terms of energy intensity and efficiency; fulfilling the obligations assumed by Romania within the legislative package "Climate change and energy from renewable sources" and at international level following the adoption of a new global agreement in the field; promoting and implementing measures to adapt to the effects of climate change and respecting the principles of sustainable development.

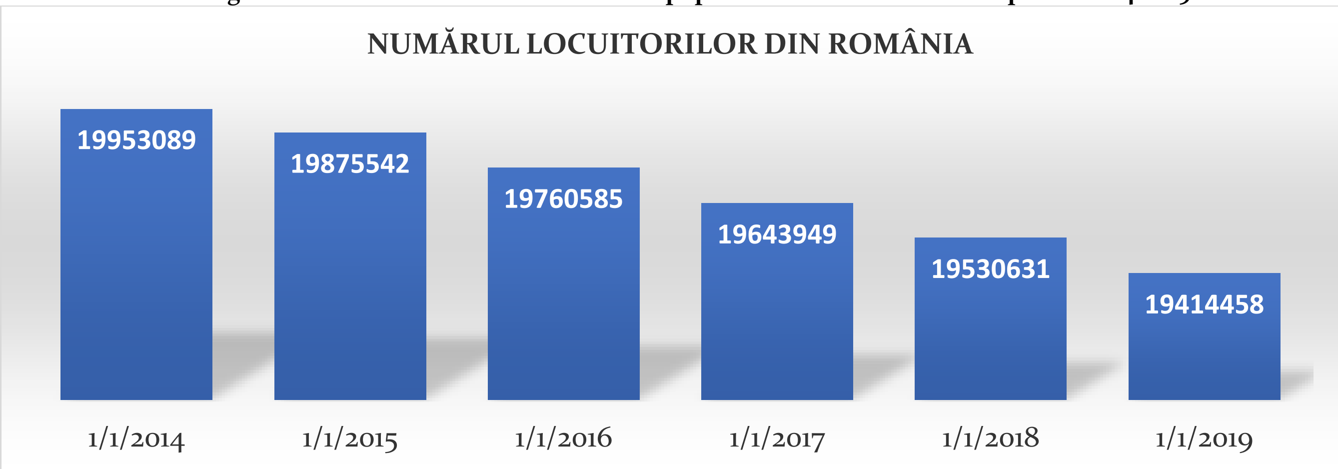
The transport policy is found in the Sustainable Transport Strategy for the period 2007 - 2013, 2020 and 2030 and the Intermodal Transport Strategy in Romania 2020 developed by the Ministry of Transport. The general objective of the Sustainable Transport Strategy is the balanced development of the national transport system to ensure a modern and sustainable transport infrastructure and services, the sustainable development of the economy and the improvement of the quality of life. Achieving this goal will directly contribute to ensuring the sustainable development of the transport sector, economy and environment, increasing Romania's accessibility, ensuring the inter-modality of the transport system, promoting the balanced development of all modes of transport and improving quality and service efficiency. The general objective of the Intermodal Transport Strategy in Romania - 2020 is the development of the national system of intermodal freight transport in order to streamline freight transport and improve the impact of transport on the environment and traffic safety in Romania. Achieving this goal will directly contribute to increasing Romania's accessibility by decongesting national roads and protecting road infrastructure, promoting the balanced development of all modes of transport and improving the quality and efficiency of services, reducing emissions and minimizing adverse effects. on the environment.
According to the Energy Strategy of Romania, updated for the period 2011 - 2020, the general objective is to meet the energy needs both now and in the medium and long term, at a low price, adequate to a modern market economy and a standard of energy. civilized life, in conditions of quality, food security and respecting the principles of sustainable development.

TRENDS AND CHANGES IN ROMANIA

SOCIAL

EVOLUTION OF POPULATION NUMBER AT NATIONAL LEVEL AND IN URBAN AGGLOMERATIONS

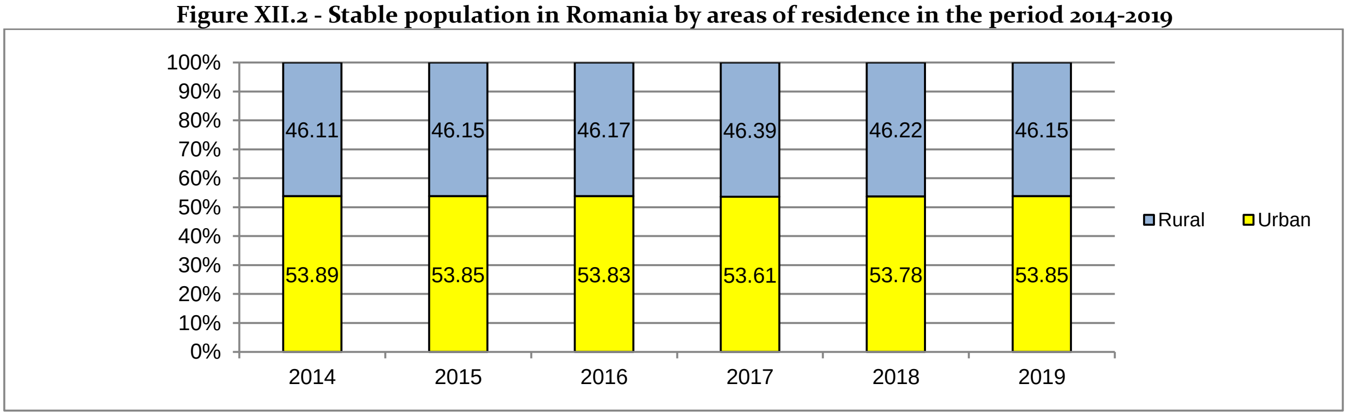
Figure XII.1 - The evolution of the stable population in Romania in the period 2014-2019



Sources: INS, Tempo online database

POPULATION DISTRIBUTION BY RESIDENCE AREA

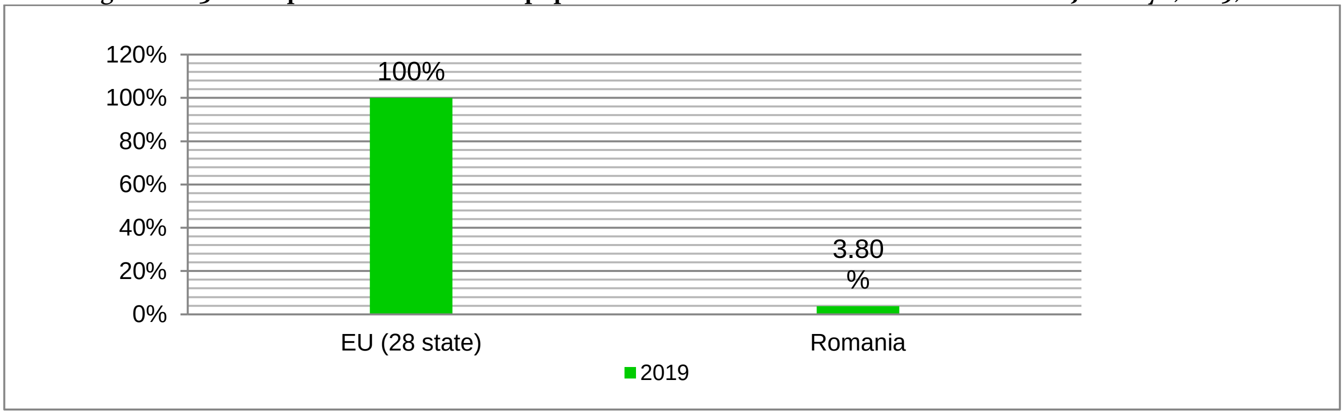
Figure XII.2 - Stable population in Romania by areas of residence in the period 2014-2019



Sources: INS, Tempo online database

***On January 1, 2019, the population of Romania represented 3.80% of the total population registered by the EU 28, decreasing by 0.01% compared to 2018 (3.81%)** (figure XII.3).*

Figure XII.3 – Comparison between the population of Romania and that of the EU 28 on January 1, 2019, %



Source: www.ec.europa.eu/eurostat/

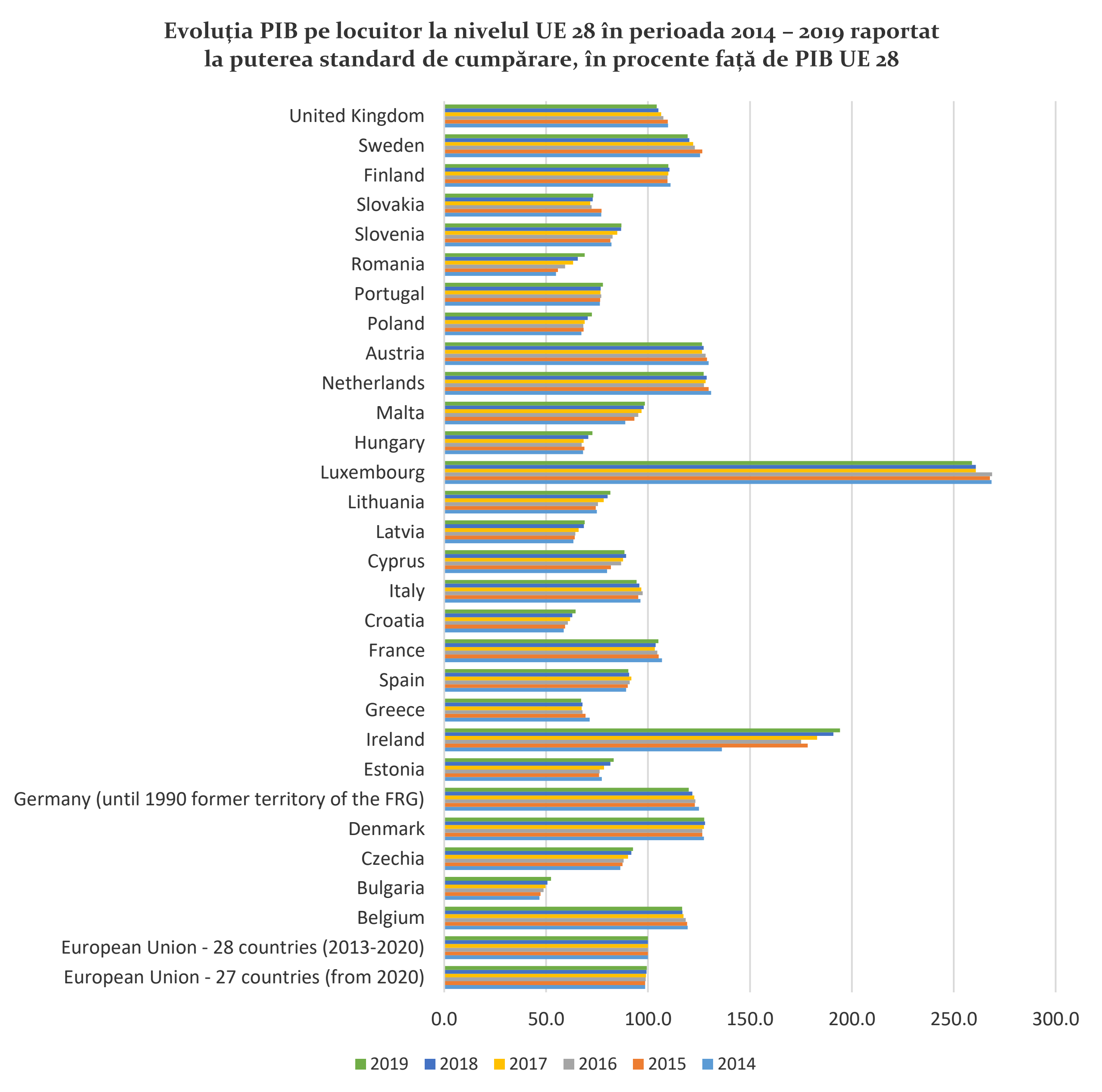
ECONOMICS

GDP EVOLUTION ON NATIONAL LEVEL AND MAIN ACTIVITY SECTORS

To assess living standards, GDP per capita in terms of purchasing power standards (PCS) is used, in other words adjusted to the size of an economy in terms of population and also in terms of price differences between countries (figure XII.4). In 2019, GDP per capita, expressed in the purchasing power standard, varied between 52.4% of the EU average in Bulgaria and 258.9% in Luxembourg. A number of 11 countries recorded a level of GDP per capita above the EU average in 2019, with 194.2% in Ireland, 127.6% in Denmark, 127.3% in the Netherlands, 126.5% in Austria , 120% in Germany, 119.5% in Sweden, 116.7 in Belgium, 110% in Finland, 105.1 in France and 104.3.2% in the United Kingdom.

In the European Union, according to preliminary data displayed by Eurostat for 2019, actual ***individual consumption per capita*** varies between 59% and 135% of the European average. In 2019, in the European Union ***the actual individual consumption (AIC) per capita expressed in PPS (standard purchasing power parity)*** ranged from 59% of the EU average for Bulgaria, 67% for Hungary and 79% for the EU average for Romania, up to 135% for Luxembourg and 123% for the EU average for Germany. Romania reached 79% of the EU average living standard in 2019, according to the effective individual consumption indicator (AIC) published by Eurostat, surpassing the group formed by Hungary, Croatia and Bulgaria. The advance between 2015 and 2019 was 16 percentage points.

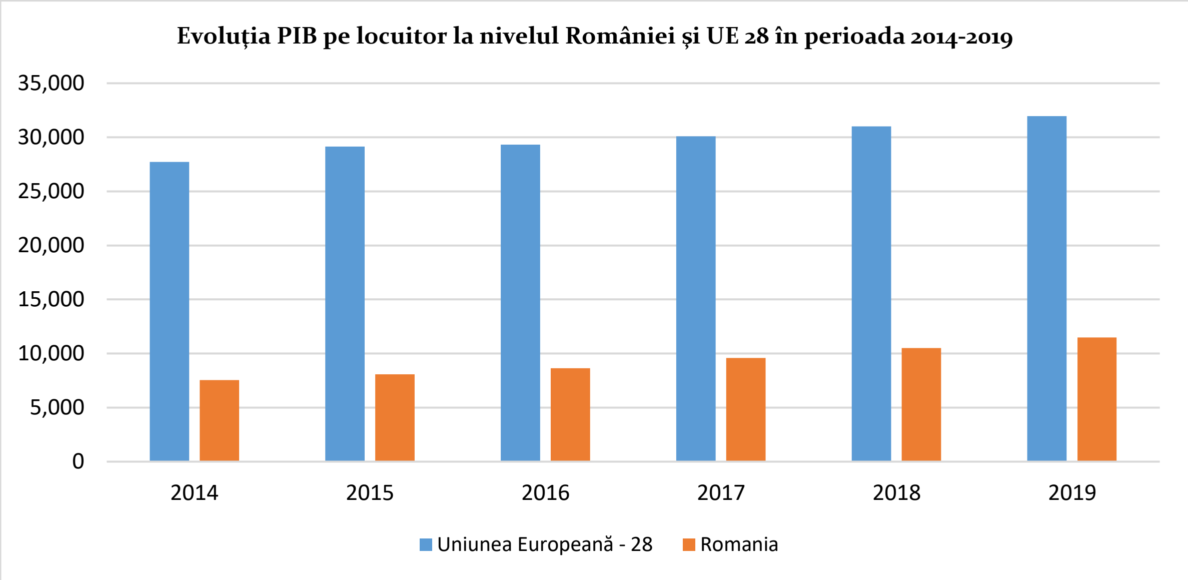
Figure XII.4 - Evolution of GDP per capita at EU level 28 in the period 2014 - 2019



Source: Eurostat, statistical database, http://ec.europa.eu/eurostat/

GDP per capita (value of Gross Domestic Product per capita expressed in standard purchasing power parity - PPS) in 2019 was 52.4% of the EU average for Bulgaria, 64.5% for Croatia, 68.9% ***in the case of Romania,*** 72.7% (figure XII.5) in the case of Hungary and up to 258.9% in Luxembourg and 120% in Germany.

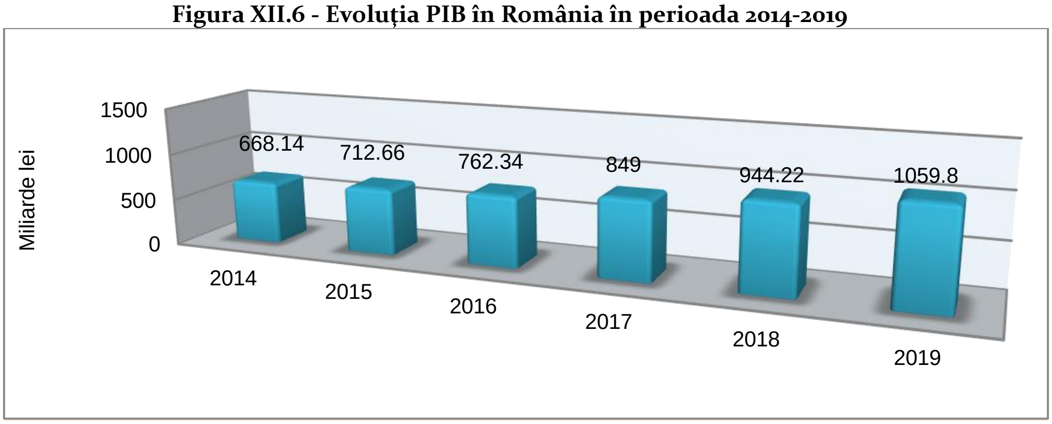
Figure XII.5 - Evolution of GDP per capita in Romania and EU 28 in the period 2014-2019



Source: Eurostat, statistical database, http://ec.europa.eu/eurostat/

The 2019 value of the gross domestic product is 1059.8 billion lei current prices, by 391.66 billion lei higher than in 2014, increasing - in real terms - by 4.1% compared to 2018 *(figure XII.6).*

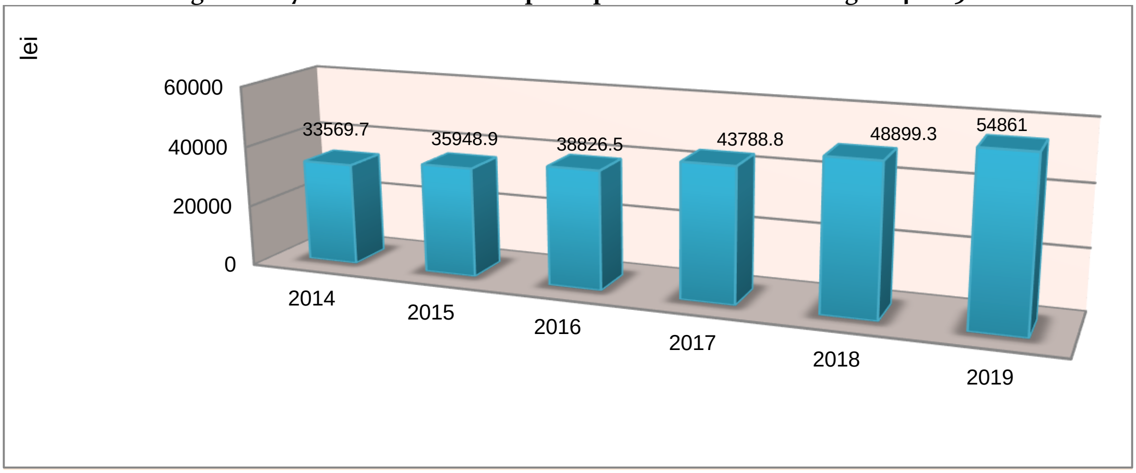
Figura XII.6 - Evoluția PIB în România în perioada 2014-2019



Source: INS Tempo online database

In Romania, in 2019 the ***actual individual consumption****, which measures the well-being of the population, is 21 percentage points below the European average, while the GDP per capita is 31 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..

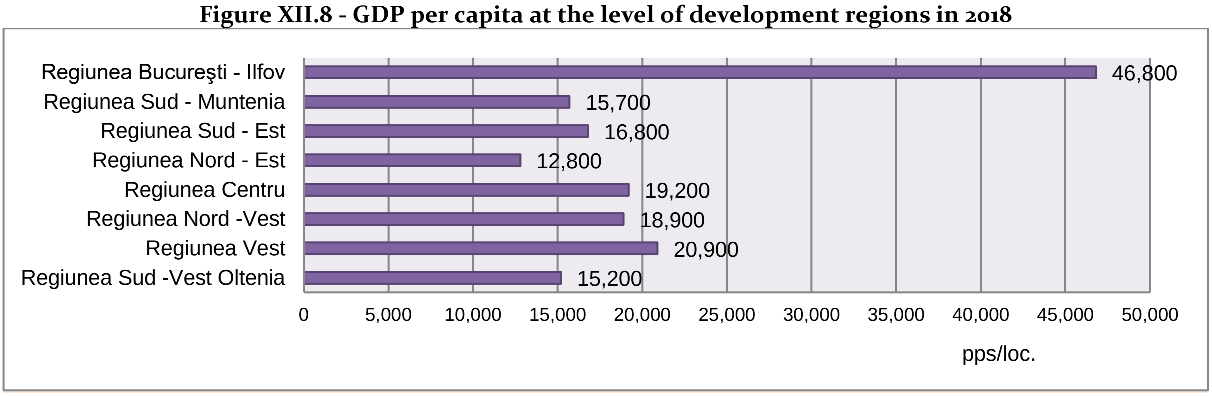
Figure XII.7 - Evolution of GDP per capita in Romania during 2014-2019



Source: http://statistici.insse.ro/shop/

According to data published in 2020 by the European statistical office Eurostat, in 2018 two regions, respectively North-East and South-West Oltenia in Romania had a GDP per capita below 50% of the European Union average. The North-East region is still one of the poorest regions with 41.3% of the EU28 average, but increasing by 2.3 percentage points compared to 2017. It was ahead of the South-West Oltenia Region by 49% of the EU average . The South-Muntenia region rose in 2018 to 50.65% of the EU average. At the opposite pole was the Bucharest-lfov region, which registered a GDP / inhabitant of 150.97% of the EU average, followed by the West Region with 67.42% (*figure XII.8*).

Figure XII.8 - GDP per capita at the level of development regions in 2018

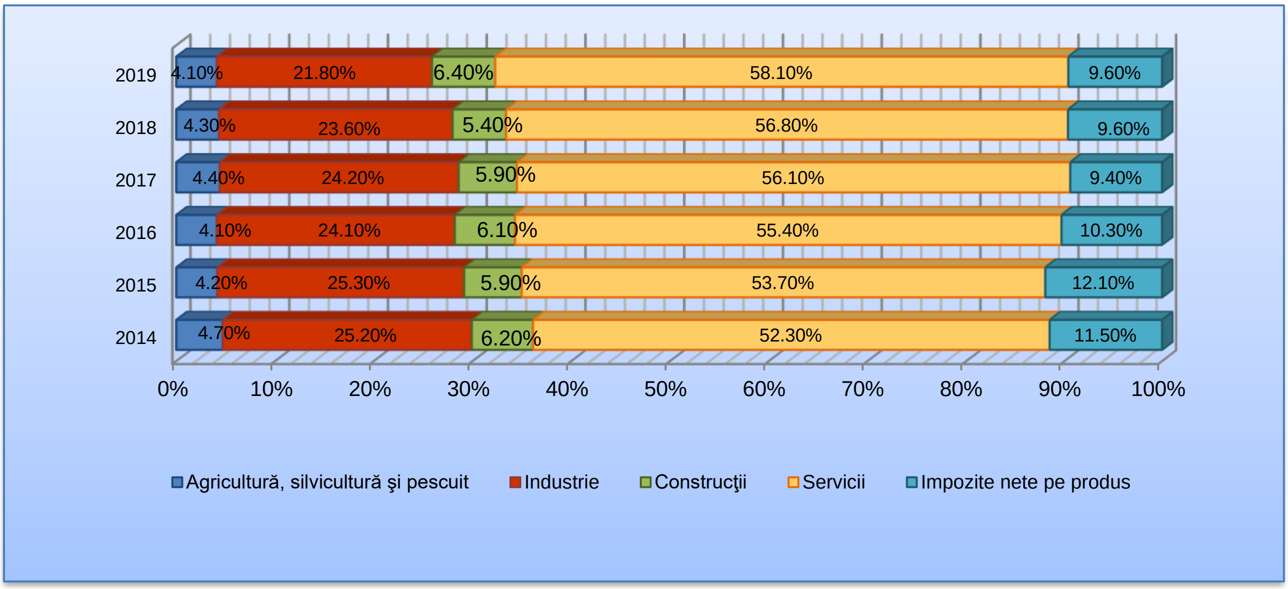


Sources: Eurostat, statistical database, http://ec.europa.eu/eurostat/ data available in August 2020

GDP evolution by main activity sectors

In the period 2014-2019, 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 2014-2019, the "*Agriculture*", "*Construction*" and "*Industry*" sectors registered decreases of the GDP weights compared to 2013, while the "*Services*" sector registered an increase. In 2019, 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 58.1% in 2019, holding the first place in the share of GDP formation. In second place, as a share in GDP, was the "*Industry*" sector, with 21.80%, but in a trend of gradual decline in the last 5 years (*figure XII.9*).

Figure XII.9 - The evolution of the contribution of the main branches of activity to the achievement of the GDP in Romania, period 2014 - 2019



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

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.

At the end of 2019, 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 (table XII.1 and figure XII.10) was as follows:

- **out of a total of 11650 environmental actions**:
- 6333 were made (54,36%);
- 714 made in advance (6,13%);
- 2142 are under construction (18,39%);
- 2181 unrealized actions (18,72%);
- 159 postponed actions (1,36%);
- 121 actions canceled (1,04%)

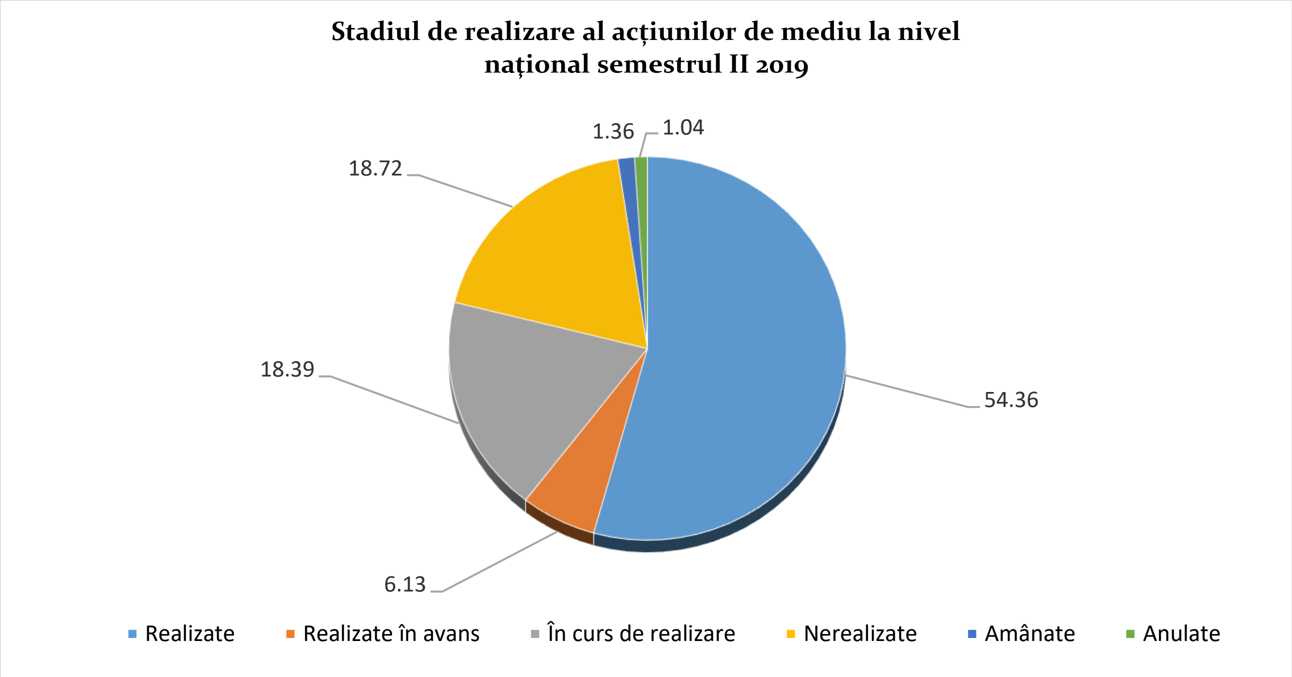
Table XII.1 - The situation of monitoring the actions for fulfilling the objectives proposed in the environmental action plans on the 8 Development Regions - year 2019

REGION	Number of actions performed	Number of actions performed in advance	Number of actions in progress	Number of actions not performed	Number of postponed actions	Number of actions cancelled	Total actions
REGION 1 NORTH- EAST	710	34	248	394	26	8	1420
REGION 2 SOUTH-EAST	551	1	304	59	39	5	959

REGION 3 SOUTH MUNTENIA	1911	467	284	1290	6	8	3966
REGION 4 SOUTH-WEST OLTENIA	367	6	127	38	36	6	580
REGION 5 WEST	619	11	260	24	14	17	945
REGION 6 NORTH-WEST	936	188	625	206	19	73	2047
REGION 7 CENTER	684	7	244	88	18	4	1045
REGION 8 BUCHAREST ILFOV	641	0	40	80	0	0	761
Total	6333	714	2142	2181	159	121	11650
PERCENT (%)	54,36%	6,13%	18,39%	18,72%	1,36%	1,04%	100%

Source: National Environmental Protection Agency

Figure XII.10 - The stage of accomplishment of the environmental actions at national level, year 2019



Source: National Environmental Protection Agency

Agenda 21, a concept first introduced in 1992 at the World Conference on Environment and Development in Rio de Janeiro, is the framework for implementing the concept of sustainable development**. In Romania, *Local Agenda 21* has taken over the general goals of Agenda 21 and translated them into concrete plans and actions for the local community**. In this process, local authorities collaborate with other sectors of the community, involving the population in a broad process of public consultation, to develop *concrete action plans, which are the basis of the National Sustainable Development Strategy*. **Local Agenda 21 aims to integrate environmental protection issues into the decision-making process at the local level in the social and economic sectors, thus forming a strategic partnership.**

Local Agenda 21 consists of:

- Local Sustainable Development Strategy which includes an analysis of the current situation of the respective locality from a social - economic and environmental point of view;
- The Local Action Plan that represents the materialization of the objectives and scenarios by establishing the priorities and the steps to be followed, the financial evaluation of the actions and the establishment of the resources and the ways to access external financing;
- The Portfolio of Priority Projects that includes the major projects resulting from the analysis and the coherent strategy regarding the medium and long term development of the city.

Table XII.2 - The stage of accomplishing the Local Agenda 21 in Romania, by Development Regions, in 2019

NO. CRT.	LOCALITY	NO. ACTIONS		
		ACCOMPLISHED	ONGOING	UNACCOMPLISHED
REGION 1				
1.	NEAMȚ COUNTY	6	8	5
2.	SUCEAVA COUNTY	-	-	-
REGION 2				
3.	GALAȚI COUNTY	2	-	5
4.	CONSTANȚA COUNTY	37	30	-
5.	TULCEA COUNTY	16	3	7
REGION 3				
6.	ARGEȘ COUNTY	7	6	1
1.	PRAHOVA COUNTY	-	1	-
2.	TELEORMAN COUNTY	-	1	-
REGION 4				
3.	GORJ COUNTY	2	10	1
4.	VÂLCEA COUNTY	18	-	-
REGION 5				
REGION 6				
5.	BISTRIȚA NĂSĂUD COUNTY	17	1	6
6.	MARAMUREȘ COUNTY	9	1	-
REGION 7				
7.	ALBA COUNTY	34	10	8
8.	BRAȘOV COUNTY	-	2	-
9.	HARGHITA COUNTY	27	1	-
10.	MUREȘ COUNTY	19	9	-
	TOTAL	194	83	33

Source: National Environmental Protection Agency

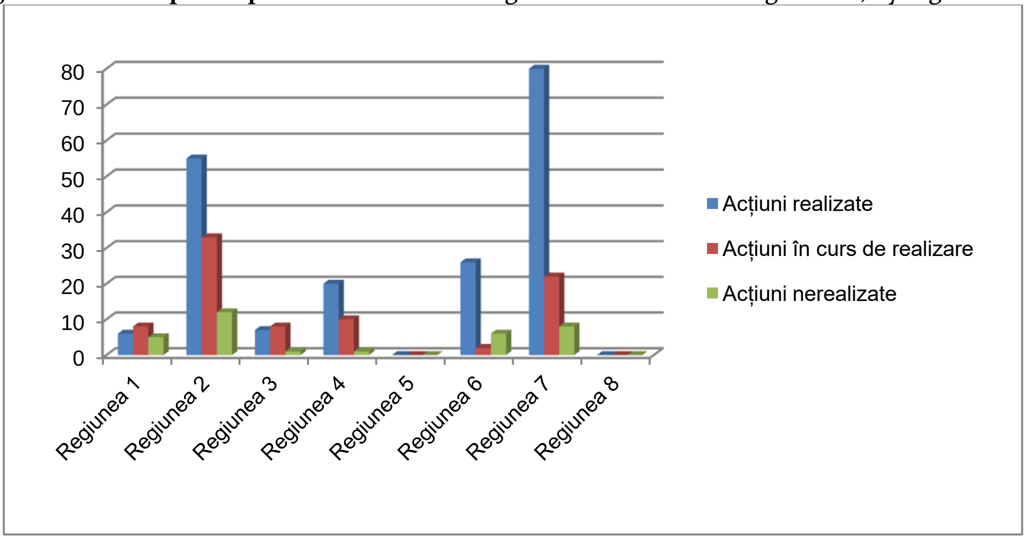
Table nr. XII.3 - The situation of monitoring the actions included in Local Agenda 21, by regions, in 2019

REGION	ACCOMPLISHED ACTIONS	ONGOING ACTIONS	UNACCOMPLISHED ACTIONS
REGION 1	6	8	5
REGION 2	55	33	12
REGION 3	7	8	1
REGION 4	20	10	1

REGION 5	0	0	0
REGION 6	26	2	6
REGION 7	80	22	8
REGION 8	0	0	0
TOTAL	194	83	33
100 %	62,58 %	26,77 %	10,65 %

Source: National Environmental Protection Agency

Figure XII.11 - Graphic representation of the stage of actions in Local Agenda 21, by regions - 2019



Source: National Environmental Protection Agency

ASSESSMENT OF ENVIRONMENTAL PERFORMANCE OF ROMANIA

GHG EMISSIONS INTENSITY AND EMISSIONS OF GHG PER CAPITA

RO 10
Indicator code Romania: RO 10 EEA indicator code: CSI 10
TITLE: TRENDS OF GREENHOUSE GAS EMISSIONS
DEFINITION: The indicator represents the (total and sectoral) greenhouse gas emissions trends in relation to Member States' obligations to meet the Kyoto Protocol targets.

The 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 reported a 20% reduction in 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.

Environmental policies on climate change are an extremely important step, and Romania must adhere to the European effort to meet the ambitious goals set in EU climate change policy. The national GHG emission reduction policy aims at the European approach, namely on the one hand ensuring that some economic operators participate in the application 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..

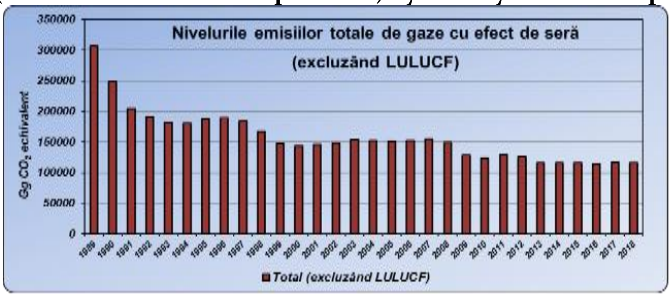
In order to optimize the planning of GHG emission reductions from other sources that are not covered by the EU ETS scheme, it is necessary to correlate the sectoral annual emission plans from the regulated sources by applying Decision no. 406/2009 / EC (non EU ETS), taking into account the emissions 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. Regarding Romania, the CO_2 emissions generated from different activity sectors also highlight the major contribution of the energy and transport sector, which means that these are the areas on which it is necessary to implement measures and actions to reduce CO_2 emissions. According to the National Inventory of Greenhouse Gas Emissions 2020 made by our country, in 2018, GHG emissions related to the Energy sector represent about 84% of the total, including LULUCF and 66.32% 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 2018, the emissions from the Transport Sector increased by 48.21% compared to the emissions registered at the level of 1990, respectively by 2.56% compared to those from 2017, increases mainly due to the increase of the demand for passenger and goods transport as well as preference for the use of roads as a mode of transport in exchange for other less polluting modes of transport (*Table XI.4 and Figures XI.12*).

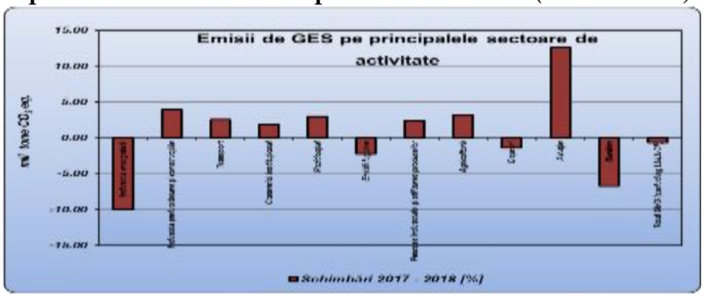
Table XII.4 Levels of total annual greenhouse gas emissions in the period 2000 - 2018, thousands of tons of CO_2 equivalent

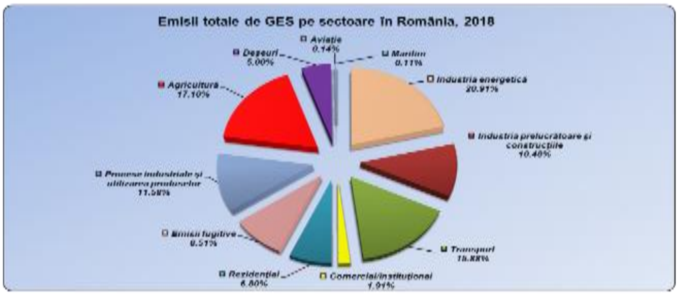
Year	Total emissions (excluding LULUCF)	Total emissions (including LULUCF)
2000	143.154,46	122.242,45
2001	146.187,17	124.377,23
2002	148.897,93	129.146,75
2003	153.779,79	133.657,97
2004	152.551,97	132.706,15
2005	151.387,14	130.480,85
2006	152.110,74	131.661,66
2007	154.670,41	134.993,24
2008	149.918,10	129.828,91
2009	128.031,30	107.968,87
2010	124.173,34	103.455,22
2011	129.010,35	109.533,32
2012	125.638,73	104.815,28
2013	116.001,00	94.683,20
2014	116.214,83	93.878,21
2015	116.418,66	94.488,55
2016	114.287,85	91.182,74
2017	116.875,47	95.195,44
2018	116.115,12	91.656,49

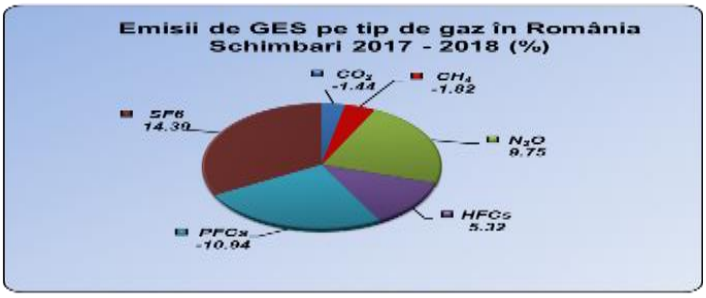
Source: NEPA

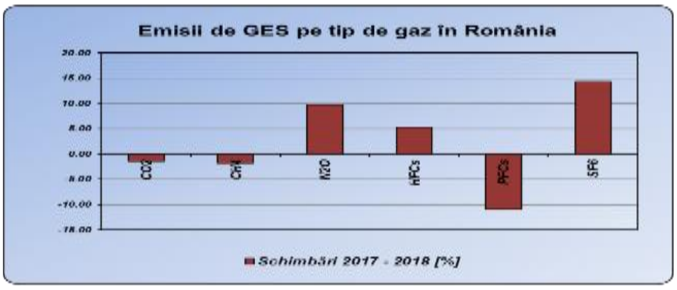
Figure XII.12 Graphic representation of the levels of total annual greenhouse gas emissions in the period 2000 - 2018 (thousand tons of CO2 equivalent) by activity sectors and per capita in Romania and compared to the EU 28 (*Source: NEPA*)

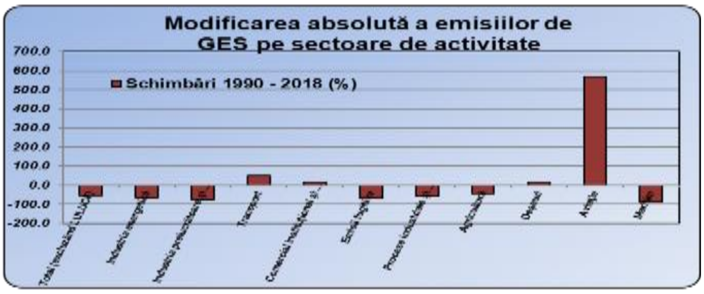


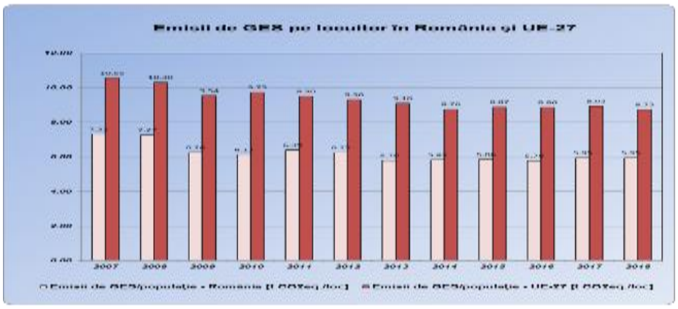


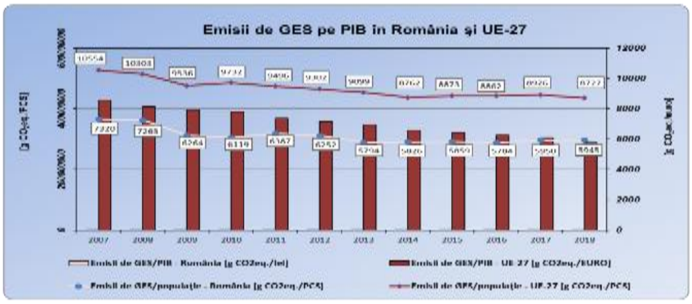


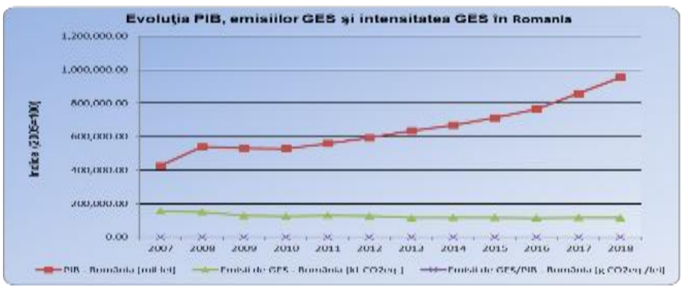


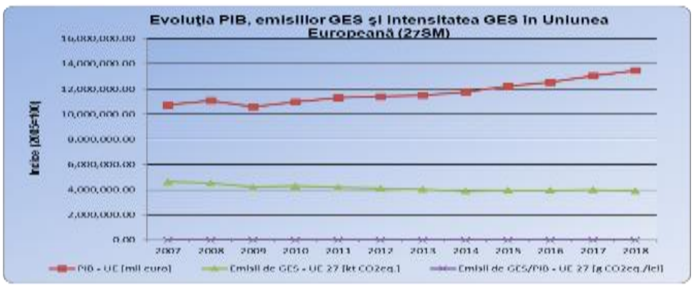












PRIMARY ENERGY INTENSITY AND TOTAL CONSUMPTION OF ENERGY PER CAPITA

RO 28
Indicator code Romania: RO 28 EEA indicator code: CSI 28 / ERNER 017
TITLE: TOTAL PRIMARY ENERGY INTENSITY
DEFINITION: The indicator is the ratio between gross domestic energy consumption and gross domestic product (GDP), calculated over a calendar year.

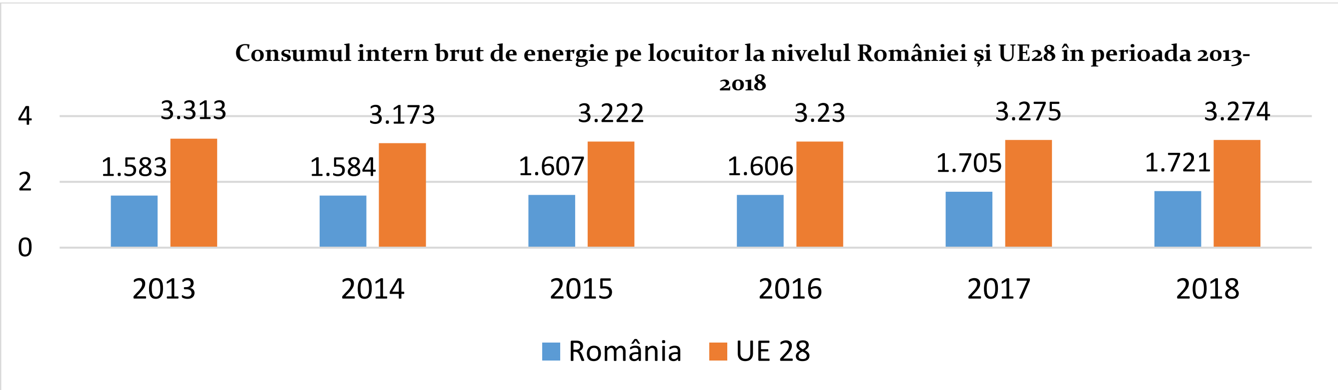
In 2011, the gross domestic energy consumption (CIBE) in the EU-28 was 1707.8 million toe, but the decline in economic activity led to a decrease in this indicator between 2011 and 2014, to a minimum of 1613.4 million toe in 2014. Starting with 2015, the gross domestic energy consumption (CIBE) in the EU-28 started to increase reaching the value of 1677.57 million 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, CIBE decreased in the EU 28 to 1664.4 thousand toe.

In Romania, CIBE, the gross domestic energy consumption in 2012 was 35,648 thousand toe and represented the peak in gross domestic energy consumption, because in the period 2012-2014 it decreased to a minimum of 31,538 thousand toe. In recent years, gross domestic energy consumption has recovered due to the recovery of economic activity, to the value of 31844 thousand toe in 2015 and 33596 thousand toe in 2018 by about 5.75% lower than in 2012.

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 derived from the sum of 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. Between 2011 and 2014, the gross domestic energy consumption per capita in Romania decreased by approximately 10.46%, increasing slightly in 2015-2018 to the value of 1.721 toe / inhabitant. At the level of 2018, Romania stood at approx. half of the EU-28 average consumption. Figure XII.13 shows the evolution of gross domestic energy consumption per capita in Romania compared to the EU-28 in the period 2013-2018.

Figure XII.13 - Gross domestic energy consumption per capita in Romania and the EU in the period 2013-2018, toe / inhabitant

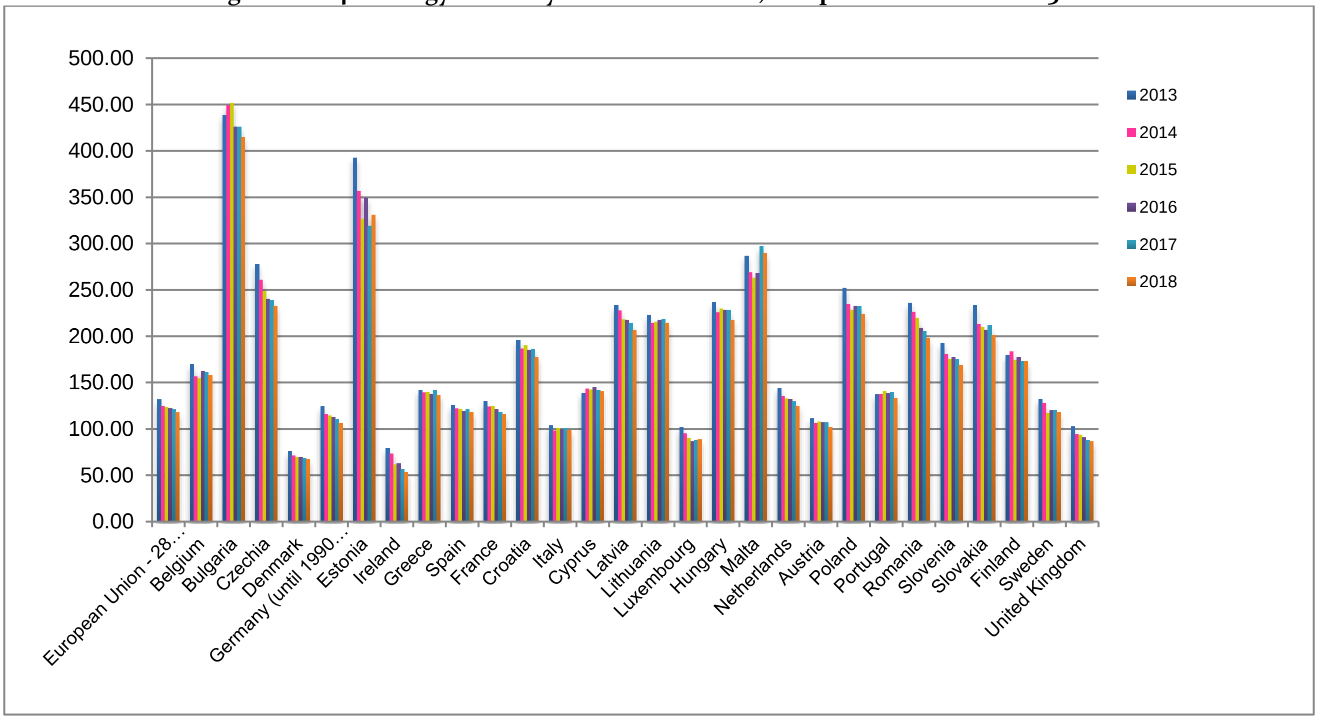


Sources: INS, Tempo online database; Eurostat, statistical database

Gross domestic energy consumption (CIBE) relative to gross domestic product (GDP)

CIBE in each country depends, to a large extent, on the structure of its energy system, on the natural resources available for primary energy production, as well as on the structure and level of development of its economy. ***Energy intensity*** is measured as the ratio of gross domestic energy consumption to unit of production - 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 the calculations are based on GDP in constant prices at 2010 prices. If an economy becomes more efficient in energy use and GDP remains relatively constant, then these indicator should decrease. *In 2018, the energy intensity in Romania was 197.48 kgep / 1000 euro, compared to the level registered in the EU-28 was 117.75 kgep / 1000 euro, which places Romania among the EU-28 member states with levels relatively high levels of energy intensity (19th place out of 28*). However, in the period 2012-2018 in Romania the energy intensity of the economy marked a continuous decrease, in total by 26.32% (*figure XII.14 și figure XII.15*).

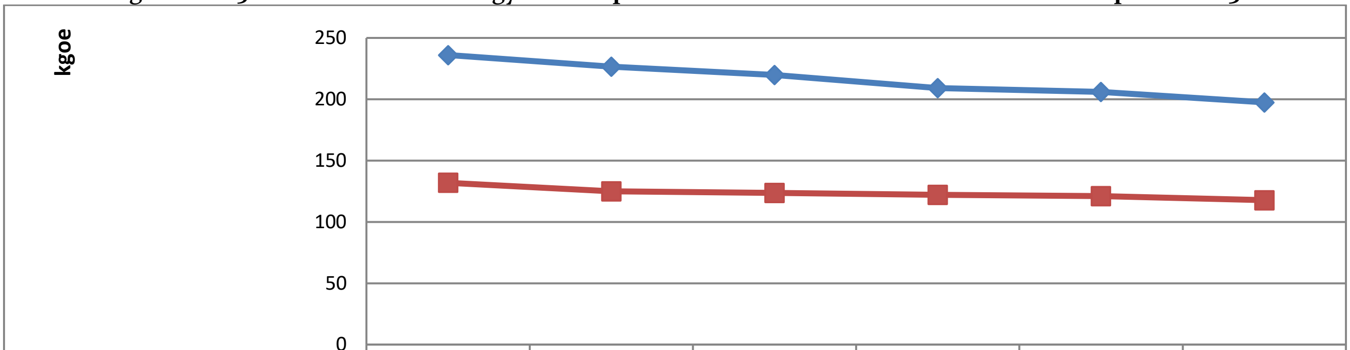
Figure XII.14 – Energy intensity level in the EU 28, comparison between 2013-2018



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.15 Gross domestic energy consumption on GDP in Romania and the EU in the period 2013-2018



	2013	2014	2015	2016	2017	2018
România	236.06	226.53	219.83	209.16	205.92	197.48
UE	131.88	124.86	123.67	122.02	120.94	117.75

Sources: INS, Tempo online database; Eurostat, the statistical database

ELECTRICAL ENERGY FROM RENEWABLE ENERGY SOURCES

RO 31

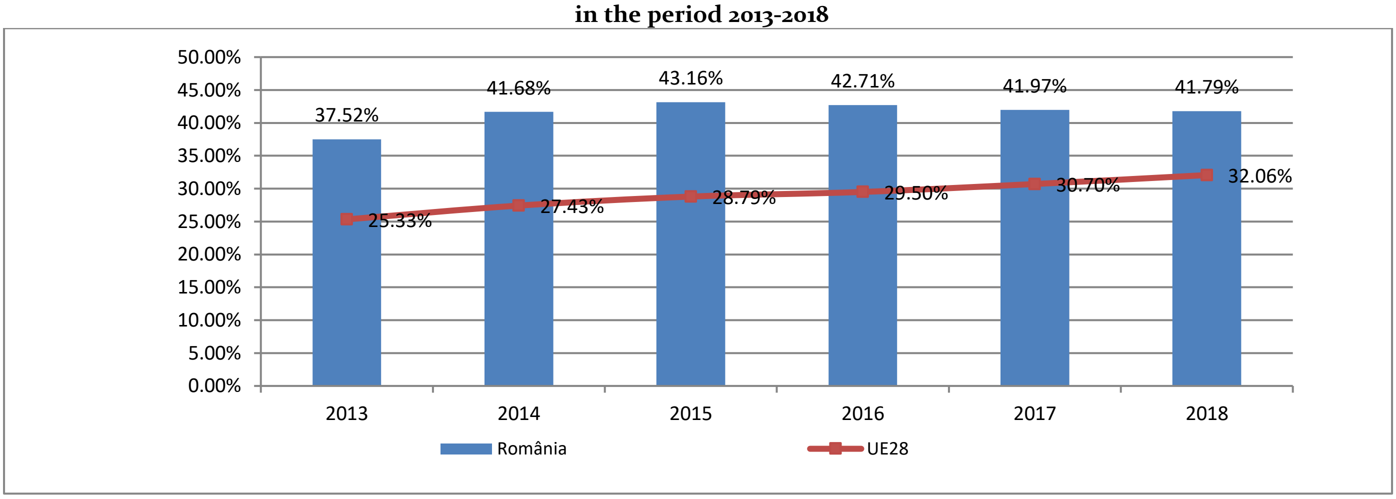
Indicator code Romania: RO 31
EEA indicator: CSI 31

TITLE: ELECTRICITY CONSUMPTION FROM RENEWABLE ENERGY SOURCES

DEFINITION: The indicator is the ratio of the electricity produced from renewable energy sources to the gross domestic consumption of electricity, expressed as a percentage.

The EU-28 target for 2020 is for electricity from renewable sources to account for at least 21% of total electricity production. The latest available information for 2018 (see Figure XII.16) shows that electricity produced from renewable energy sources contributed 32.06% to total electricity consumption in the EU-28. The increase in electricity produced from renewable energy sources over the past decade largely reflects an expansion on two renewable energy sources, namely wind energy and energy produced from biomass.

Figure XII.16 - The share of electricity from renewable energy sources in total electricity at the level of Romania and the EU in the period 2013-2018



Source: Eurostat, statistical database

Between 2013 and 2018, the share of electricity from renewable energy sources at EU 28 level is growing slightly. During this period there is an increase from 25.33% to 32.06% in the share of electricity from renewable sources at EU28 level. In recent years there has been an increase in the share of electricity produced in nuclear power plants and wind power plants. The share of electricity from renewable energy sources in Romania (see Figure XII.16), experienced an upward trajectory between 2010 and 2015, from 30.38% in 2010 to 43.16% in 2015, with a tendency to cap or even decrease in recent years, with the minimum value of the last 4 years in 2018 (41.79%).

EMISSIONS OF SUBSTANCES WITH ACIDIFYING EFFECTS

The acidity of the air is mainly determined by the presence of mineral acids which are in aerosol form and come from the various chemical industries, aluminum factories, etc. The increased acidity of the air has implications for all the environmental factors, the constructions and the health of the people. 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 to the source of impurities, where in contact with solar radiation and water vapor form acid compounds. Through precipitation they deposit on the ground or enter the composition of the water.

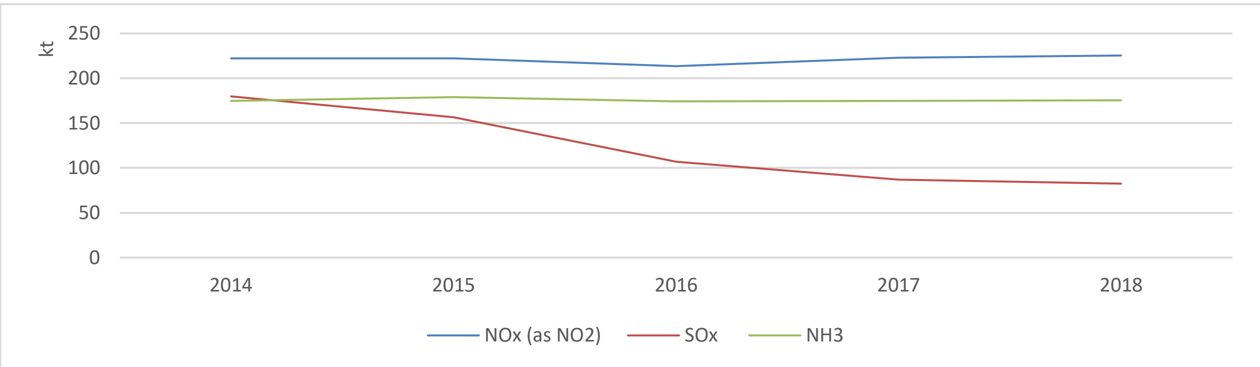
For SOx there was a major decrease, by 54.1%, in the period 2014-2018, influenced by economic developments, in particular for those air pollutants resulting mainly from energy production, industrial processes and road transport.

From the analysis of data on the trend of emissions of pollutants from the sectors of activity it is noted that the reduction of emissions of air pollutants, in order to comply with air quality standards for certain areas, can be foreseen/predicted as the effect of their impact depending on the form of the data "input" (data complexity, their organisation, etc.), but also that of the "output" (***tables, graphs, see subchapter 1.3 Trends and forecasts on ambient air pollution in Chapter I – Air quality and pullution***).

Between 2008 and 2017 Romania reduced SOx emissions. This is the consequence of environmental policy, to reduce pollutant emissions at national level in the energy, industrial, transport, agriculture and waste sectors. Emissions of NOx and NH3 pollutants increased insignificantly by 1.3% and 0.5% respectively in 2018 compared to 2014 (*Figure XII.17*).

RO 01
Indicator code Romania: RO 01
EEA indicator code: CSI 01
TITLE: EMISSIONS OF ACIDIFYING SUBSTANCES
DEFINITION: The indicator tracks trends in anthropogenic emissions of acidifying substances: nitrogen oxides (NOx), ammonia (NH3) and sulphur oxides (SOX, SO2) in each of them taking into account its acidifying potential

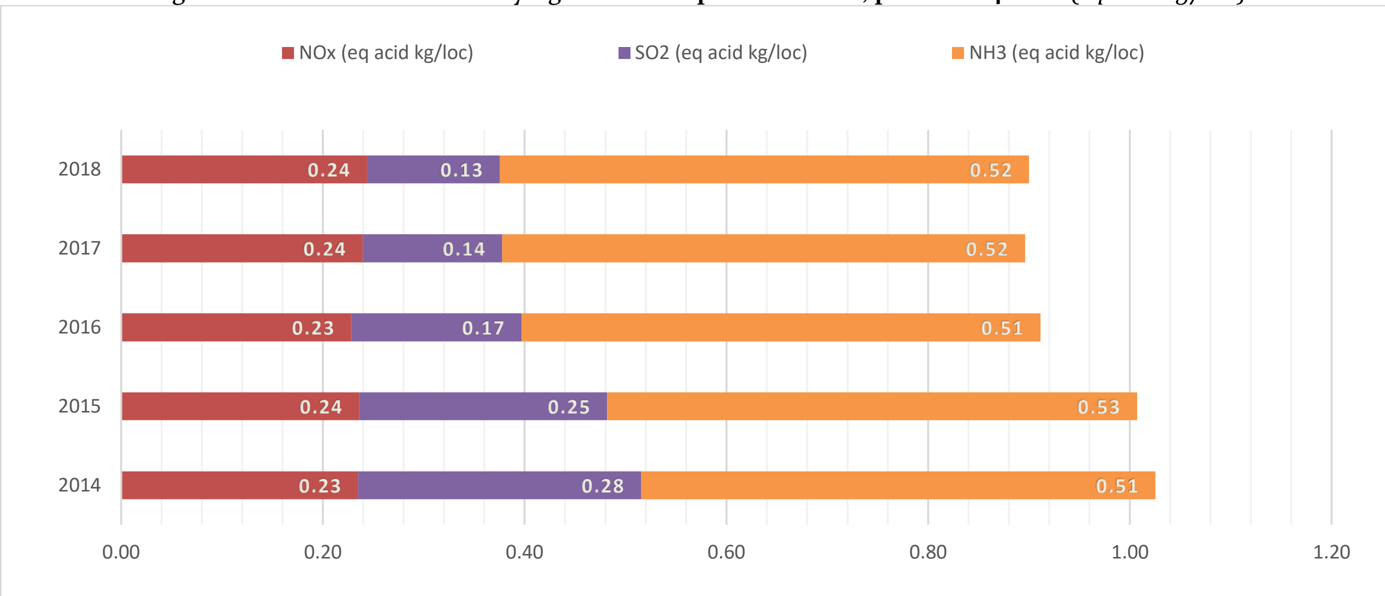
Figure XII.17 Evolution of emissions of acidifying substances (kt), period 2014 -2018 (kt)



Source N.E.P.A.- Inventory Atmospheric Pollutant Emissions

In 2018, the level of emissions of air pollutants with acidifying effect per capita in Romania was 0.9 kg acid equivalent/place. *Figure XII.18* shows the evolution of emissions of acidifying substances in *eq acid kg / inhabitant* in the period 2014-2018, which decreased from *1,025 total eq acid kg / place* in 2014, to *0.90 total eq acid kg / place* in 2018, meaning -12.2%.

Figure XII.18 Emissions of acidifying substances per inhabitant, period 2014 -2018 (*eq acid kg/loc*)



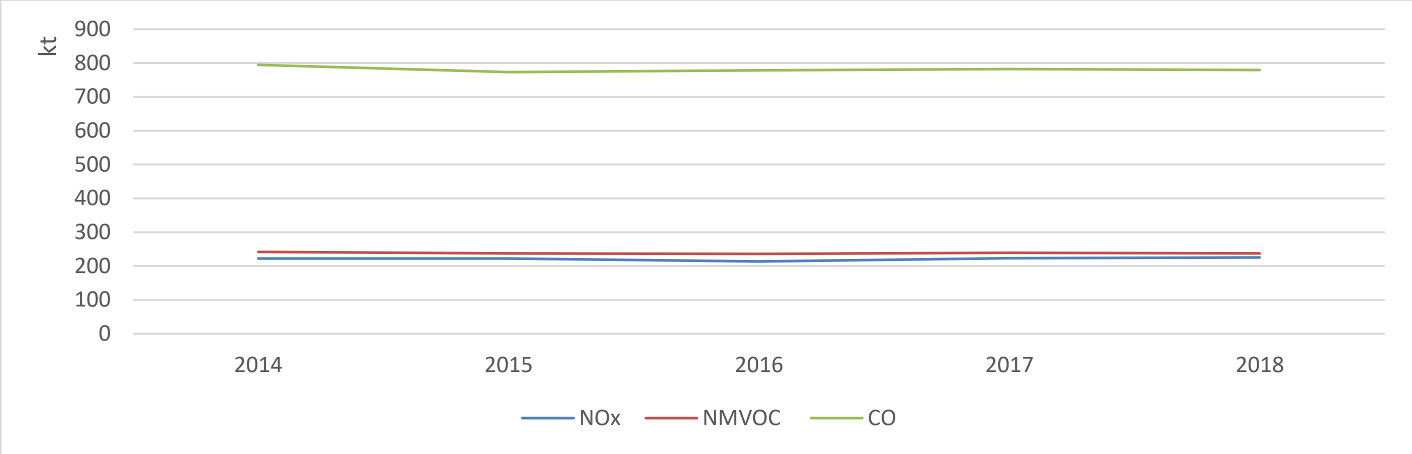
Source N.E.P.A.- Inventory Atmospheric Pollutant Emissions

OZONE PRECURSOR EMISSIONS

RO 02
Indicator code Romania: RO 02
EEA indicator code: CSI 02
TITLE: OZONE PRECURSOR EMISSIONS
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 (COVNMs)

In the period 2014-2018, emissions of air pollutants responsible for the formation of tropospheric ozone had minimal variations ± depending on the intensities of energy activities, industry, transport and agriculture, with the overall trend decreasing slightly in 2018 compared to previous years in CO-1.9% emissions, and NMVOC emissions -1.9% compared to 2014, with NOx emissions increasing slightly by 1.3% compared to 2014 , *Figure XII.19*.

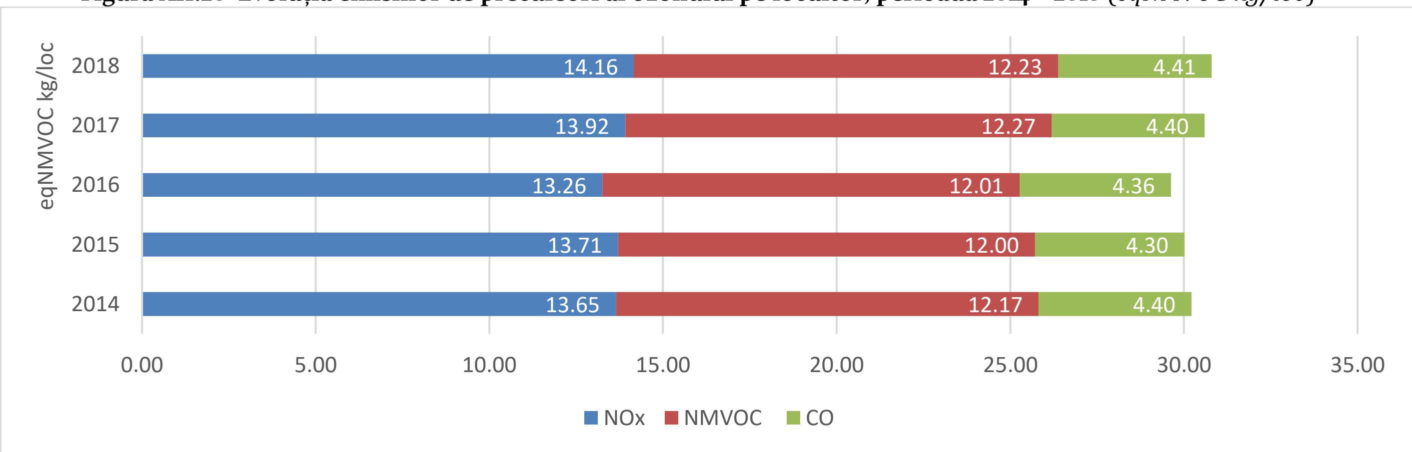
Figure XII.19 Evolution of ozone precursor emissions, period 2014 – 2018 (kt)



Source N.E.P.A.- Inventory Atmospheric Pollutant Emissions

Emissions of acidifying substances from ozone precursors per capita in Romania (kg eq NMVOC/place) increased by 1.9% in 2018 compared to 2014, from 30.21 eqNMCOVkg/place in 2014 to 30.8 eqNMCOVkg/place in 2018. Figure XII.20 shows the evolution of ozone precursor emissions per capita in the period 2014-2018 in Romania, where there are small fluctuations in decrease and increase during this period, with the increase in 2018 taking place on account of the increase of the fleet and the intensification of activities in industry and agriculture.

Figura XII.20 Evoluția emisiilor de precursori ai ozonului pe locuitor, perioada 2014 – 2018 (*eqNMVOC kg/loc*)



Source N.E.P.A.- Inventory Atmospheric Pollutant Emissions

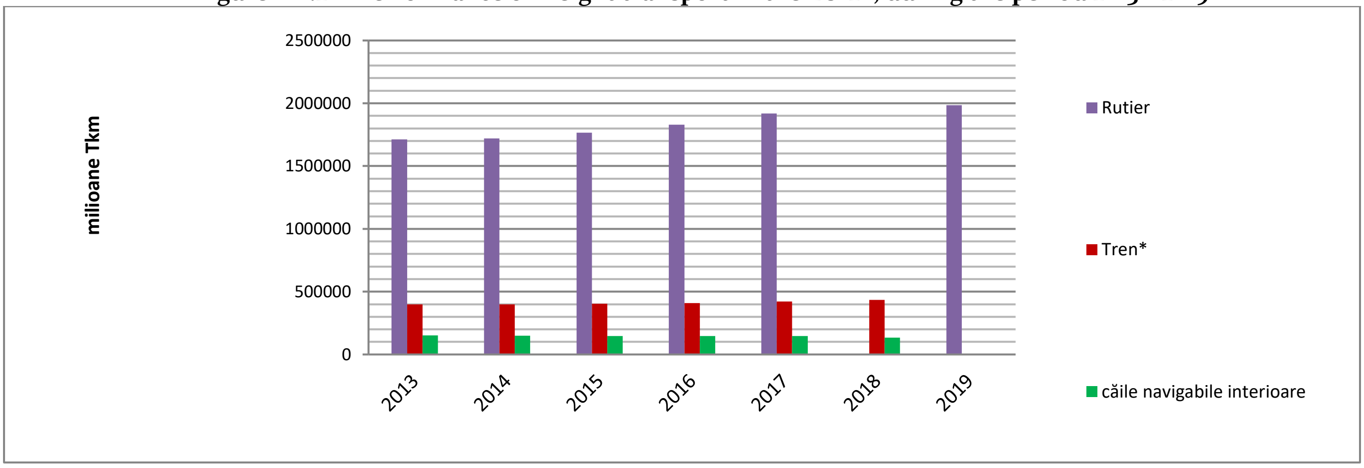
Emissions of pollutants released into the atmosphere have a downward trend following the implementation of the principles of sustainable development and the adoption of environmental policies, such as: the production of green electricity - wind energy, photovoltaic energy, hydro, etc; reducing sulfur content in fuels and fuels and introducing biodiesel and bioethanol into fuels; replacing the heating of households in the rural area (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 allow the replacement of installations with significant polluting effect on the environment with less polluting ones; provision of facilities for retention, capture, storage of polluting substances (eg carbon capture and storage at large combustion plants-IMA, electrostatic filters, low NOx burners, scrubbers, etc.).

DEMAND FOR TRANSPORT OF GOODS
Demand for freight transport per unit of GDP

RO 36
Indicator code Romania: RO 36
EEA indicator code: CSI 36
TITLE: DEMAND FOR TRANSPORT OF GOODS
DEFINITION: The indicator is defined by the quantity of goods transported on national territory (road, rail and inland waterways), expressed in tonne-kilometers traveled internally each year.

The level of inland freight transport (measured in tonne-kilometers) may be expressed in terms of GDP. This indicator provides information on the relationship between the demand for freight transport and the size of the economy, and it allows to monitor the intensity of demand for freight transport in relation to economic developments. In 2018, the share of domestic road freight transport in the EU accounted for over three quarters (76.5%) of total domestic freight transport (per tonne-kilometer performed). This share registered a slight decrease in the period 2010-2012, (by 2.3 percentage points) in freight transport, subsequently marking a return in the period 2014-2015 from 74.8% to the share of 76.5% of freight transport, close to the 2009 high (77%). After the steep fall in 2010 (from 52.4 in 2009 to 36.9% in 2010), in Romania road freight transport marked a turnaround between 2011 and 2018 from 36.9% to 44%, with a decline in 2015 to 38%. Rail freight transport, between 2011 and 2018, in the EU - 28, registered a gradual decrease, from 18.7% to 18%. Also in Romania rail freight transport registered a decrease in the same period from 35.4% to 28.9% (*figure XII.21*).

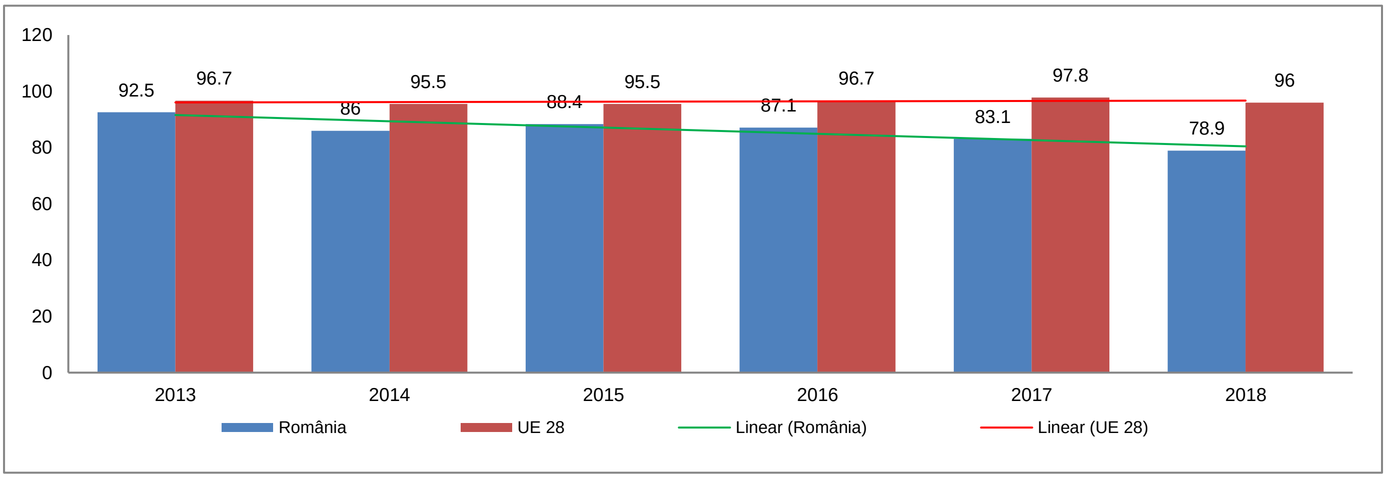
Figure XII.21 - Performance of freight transport in the EU-28, during the period 2013 – 2019



*Source: Eurostat, statistical database – for 2019 data are only available for road transport *Data for rail transport in the EU 28 do not include data for Belgium, Malta and Cyprus for the whole period analysed 2013-2019*

The evolution of the ratio between the volume of the goods transported internally and the GDP (expressed in euros constant prices, at the exchange rate of the reference year 2005) shows a slight tendency of decrease of this indicator at the level of Romania, in trend with the average of the EU-28 countries. Thus, between 2013 and 2018 the level of the volume of goods transported internally relative to the unit of GDP in Romania decreased by 14.7%. In the EU-28, after the increase recorded in 2011, it decreased in 2012, oscillating in subsequent years in the range of 95.5-97.8, the maximum being recorded in 2017. The evolution of the ratio between the volume of domestically transported goods and GDP (expressed in PCS and euro 2005) in Romania and the EU-28 is shown in *Figure XII.22*.

Figure XII.22 – The volume of freight transport reported to GDP at the level of Romania and EU-28 during 2013-2018

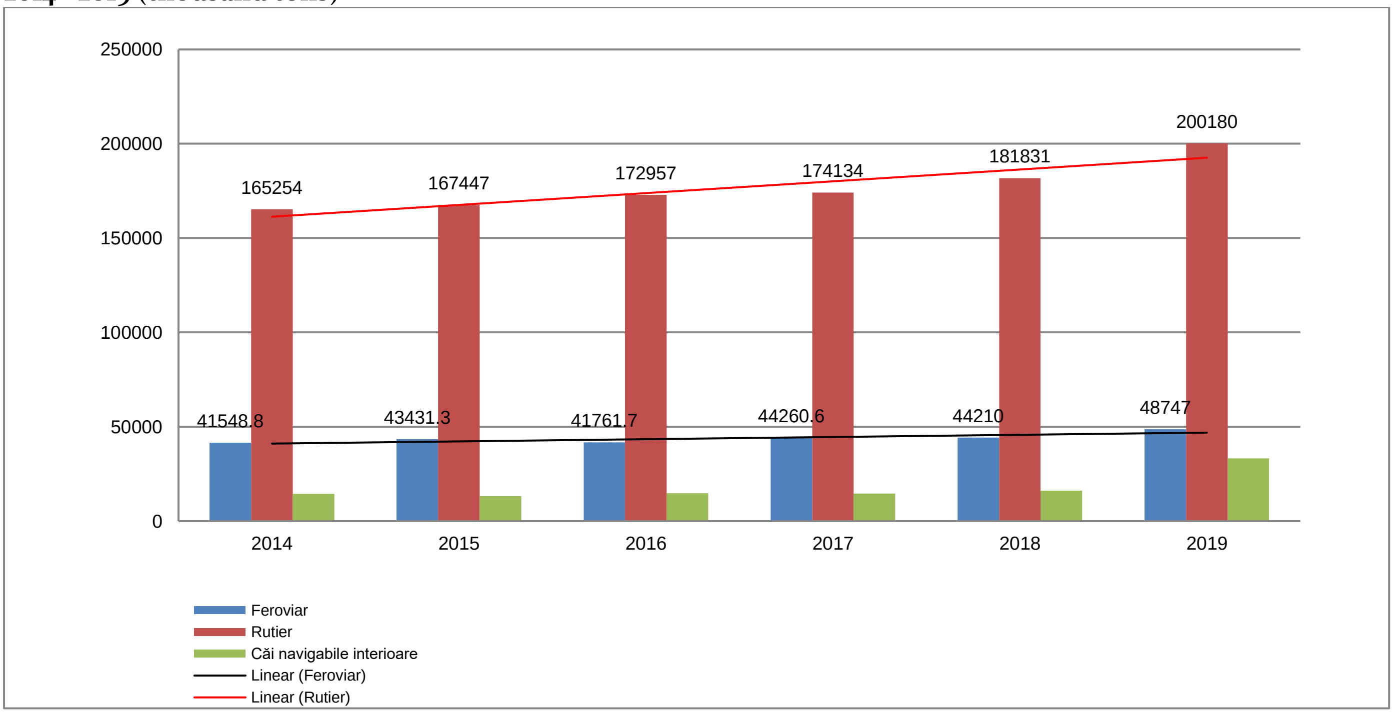


Source: Eurostat, statistical database

Demand for transport of goods

The volume of goods transported domestically in 2019 in Romania registered an increase of 40 007 thousand tonnes (16.52%) compared to 2018 and by 60 964.2 thousand tonnes (27.56%) compared to 2014 (Figure XII.23).

Figure XII.23 - The volume of goods transported in Romania, by rail, road and inland waterways, in the period 2014 - 2019 (thousand tons)



Source: Ministry of Transport

AREA FOR ORGANIC FARMING

RO 26

Indicator code Romania: RO 26

EEA indicator code: CSI 26

TITLE: AREA DESIGNATED FOR ORGANIC FARMING

DEFINITION: The indicator expresses the share of the area earmarked for organic farming (the sum of the current areas with organic farming and the areas undergoing conversion) of the total area used in agriculture.

Organic farming is a production system that puts 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 regulator promoters. Organic farming is a dynamic sector in Romania that has seen an upward trend in recent years. In 2011, the total area cultivated according to the organic production method in Romania was 229.95 thousand ha, and in 2019 it was 395.23 thousand ha, representing an increase in the areas cultivated in the ecological system by 21.14% compared to the previous year and by 41.89% compared to 2011 (*table XII.5* și *figure XII.24*).

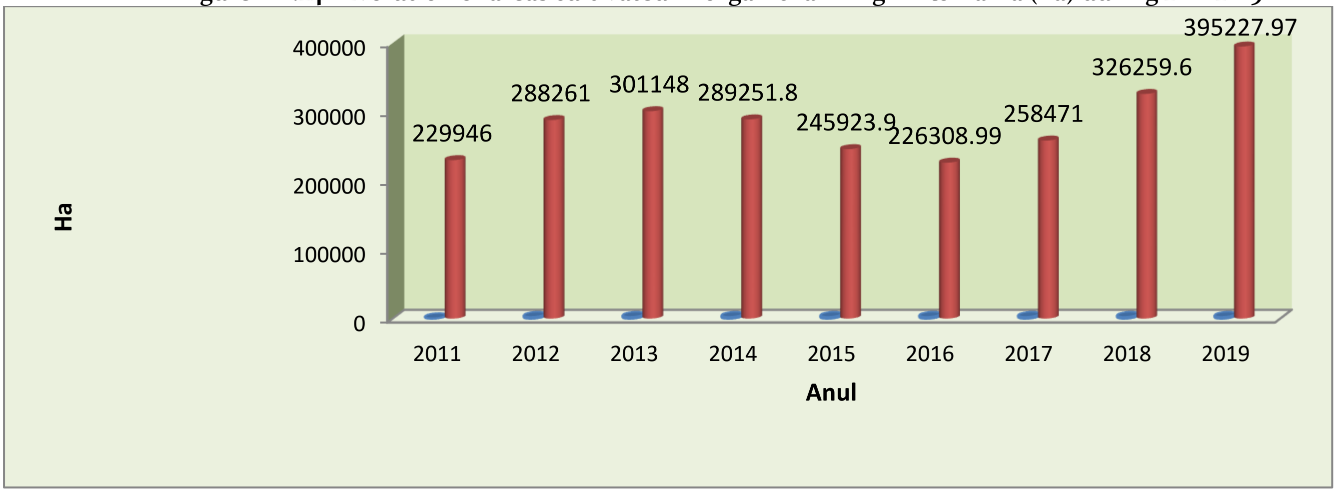
Tabelul XII.5 - Dynamics of operators and areas in organic farming during the period 2012-2019

Indicator	2012	2013	2014	2015	2016	2017	2018	2019
Number of certified operators in organic farming	15544	15194	14470	12231	10562	8434	9008	9821
Total area in organic farming (ha)	288261	301148	289251,79	245923,9	226309	258470,927	326259,55	395227,97
Cereals (ha)	105149	109105	102531,47	81439,5	75198,3	84925,51	114427,49	126842,95
Dried and proteinaceous pulses for the production of grain (including grains and mixtures of cereals and pulses) (ha)	2764,04	2397,34	2314,43	1834,352	2203,78	4994,66	8751,13	7411,05
Tuberculous and root plants total (ha)	1124,92	740,75	626,99	667,554	707,026	665,54	505,66	515,63
Industrial Cultures (ha)	44788,7	51770,8	54145,17	52583,11	53396,9	72388,33	80193,08	78350,29
Green harvested plants (ha)	11082,9	13184,1	13493,53	13636,48	14280,5	20350,75	28253,75	37660,85
Other crops on arable land (ha)	27,77	263,95	29,87	356,22	258,47	88,25	112,79	1774,15

Vegetables (ha)	896,32	1067,67	1928,36	1210,08	1175,33	1458,78	983,10	804,29
Permanent crops (ha) vineyards	7781,33	9400,31	9438,53	11117,26	12019,8	13165,41	18569,27	22143,43
Permanent crops (ha) pastures and meadows	105836	103702	95684,78	75853,57	57611,7	50685,74	66890,44	115420,14
Uncultivated land (ha)	8810,73	9516,33	9058,66	7225,852	9457,2	9747,94	7572,80	4305,20

Sursa: MADR

Figure XII.24 - Evolution of areas cultivated in organic farming in Romania (ha) during 2011-2019



Source:MADR

The evolution of areas cultivated in organic farming increased significantly in the period 2016-2019 compared to previous years. *Certified organic livestock* had oscillated with growth sectors of bees, birds, and actual decreases in other sectors (*table XII.6*).

Table XII.6 - Șeptel certificat ecologic - perioada 2013-2019

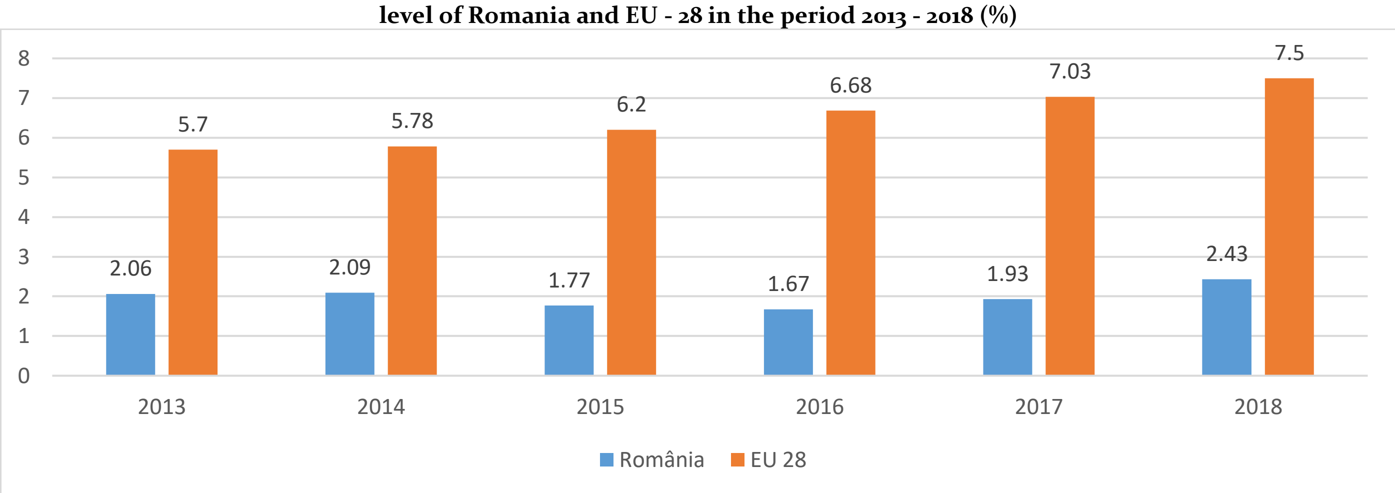
Ecological certified livestock								
		year 2013	year 2014	year 2015	year 2016	year 2017	year 2018	year 2019
Livestock	**unit of measurement**	**number**	**number**	**number**	**number**	**number**	**number**	**number**
Cattle (total)	**heads**	**20113**	**33782**	**29313**	**20093**	**19939**	**16890**	**19419**
Cattle for slaughter	heads	1101	244	491	478	481	701	482
Milk 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
Broilers	heads	-	-	-	-	285	-	-
Laying hens	heads	-	57797	-	60220	77096	-	127136
Breeding birds	-	-	-	-	-	-	-	-
Other birds	-	-	-	-	-	-	-	-
Turkeys			-	-	-	-	-	1460
Others	-			-	-	1300	-	-
Equines	heads	200	626	485	-	202	-	297
Bees (hives)	number of hives	81772	81583	-	86195	1086323	138557	175959
Other animals	heads	4878	2667	79654	86195	1791	-	1893

Source: MADR

At EU level 28, ***the share of the areas destined to organic farming from the total area used in agriculture*** registered an increase, from 5.5% in 2011, to 7.05% in 2018. In Romania, the share of the area for organic agriculture increased in 2012, to 2.2% from 1.7% in 2011, followed by a decrease in 2016 to 1.67% and a resumption of growth in 2017-18 to 2.43%. Figure XII.25 shows the evolution of the share of the area for organic agriculture in the total area used in agriculture in the period 2013-2018 in Romania and the European Union.

Figure nr.XII.25 - 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 - 2018 (%)



Sources: MADR; INS; 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

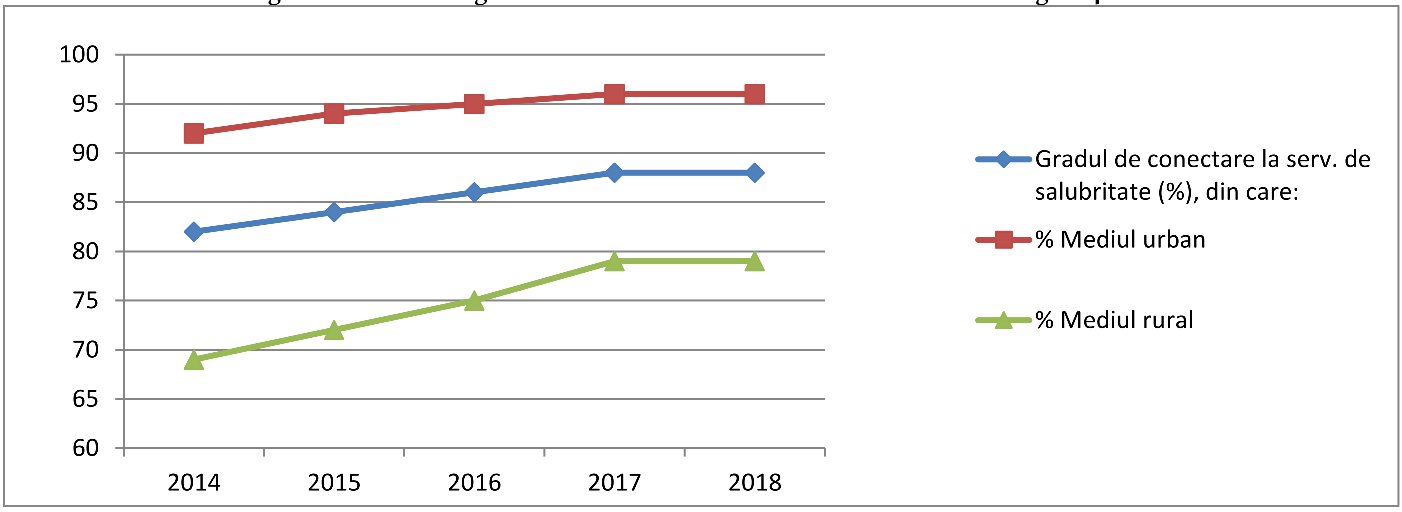
MUNICIPAL WASTE GENERATION

RO 16
Indicator code Romania: RO 16
EEA indicator: CSI 16
TITLE: MUNICIPAL WASTE GENERATION
DEFINITION: The indicator expresses the total amount of municipal waste generated per capita (kg per capita and year).

According to the provisions of the National Plan on Waste Management, approved by H.G. no. 942/2017, "*municipal wastes are household wastes and other wastes, which, by nature or composition, are similar to household wastes*". According to Decision 2011/753 / EU establishing norms 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. Municipal waste collection is the responsibility of the municipalities, who can carry out these tasks either directly (through the specialized services within the Local Councils) or indirectly (by delegating this responsibility on a contract basis, to specialized and authorized companies for performing the sanitation services).

At national level, municipal waste collection is not widespread. Figure XII.26 below shows the evolution of the level of connection to the sanitation service in the period 2014-2018.

Figure XII.26 The degree of connection to the sanitation service during 2014-2018



Source: National Environmental Protection Agency

The degree of connection of the population to the sanitation service remains around 88%. The quantities of waste generated by the population not served by sanitation services shall be calculated using the generation indices set out in the National Waste Management Plan: 0,65 kg/place/day for urban areas and 0,3 kg/place/day for rural areas. Municipal waste management involves the collection, transport, recovery and disposal of municipal waste, including the supervision of such operations and the subsequent maintenance of disposal sites. Responsibility for the management of municipal waste lies with local public administrations, which, by their own means or by the concession of the sanitation service to an authorised operator, must ensure the collection (including separate collection), transport and treatment of such waste.

For certain waste streams falling within the municipal waste category, collection from the public and authorised economic operators is permitted. Some of the municipal waste collected is sent directly to final recovery (material or energy), i.e. disposal, while another part is sent to intermediate treatment plants (sorting, composting stations). The disposal of municipal waste is carried out exclusively by storage. To date, no municipal waste incineration plants have been put into operation in Romania. At the end of 2018, 43 compliant municipal waste warehouses were also authorised in operation.

Sustainable development indicators on municipal waste

In accordance with the recommendations of EUROSTAT (Guide on the collection of municipal waste data), municipal waste is household and assimilable waste, generated from households, institutions, commercial units and economic operators. This includes bulky waste, waste from parks, gardens and street cleaning, including the contents of street trash cans, as well as waste electrical and electronic equipment from households. According to the collection method, 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.

Excluded:

- Sludges from urban wastewater treatment;
- Construction and demolition waste.

The indicators of sustainable development regarding municipal waste refer to:

- Municipal waste generated;
- Municipal waste treated by: energy recovery, storage, recycling (excluding composting and anaerobic digestion), composting.

Also, the EUROSTAT guide recommends that the recyclable waste streams (paper, plastic, metal, etc.) that result from the sorting plants and subsequently sent to the recycling facilities should be considered as recycled.

In view of the above, the following municipal waste indicators were calculated at national level:

- ***Municipal waste generated - 5296239 tons in 2018***
  The value was calculated by summing the quantities generated for the following types of waste:
- domestic and similar waste and from municipal services collected by sanitation operators, exclusive inert waste;
  - domestic 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, biodegradable, textiles, WEEE, waste batteries and accumulators)

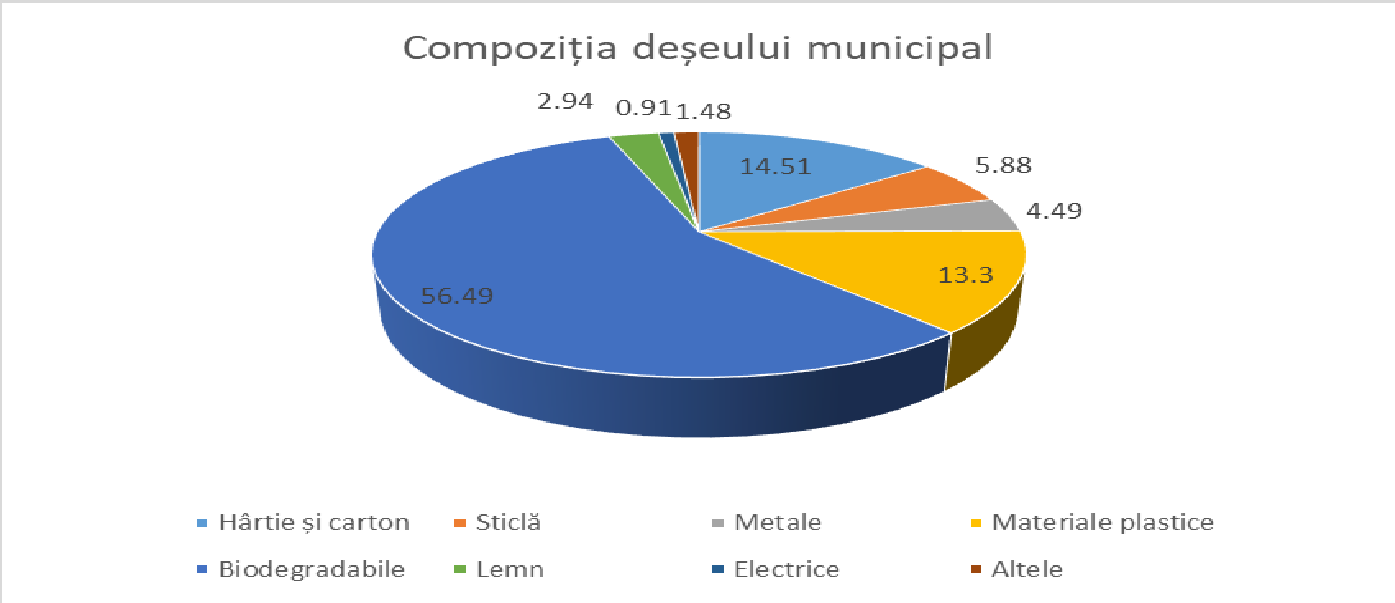
- ***Recycled municipal waste (including composting) – 586406 tons in 2018***

The value was calculated by summing the recycled quantities for the following types of waste:

- domestic and similar waste and from municipal services 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, biodegradable, textiles, WEEE, waste batteries and accumulators).

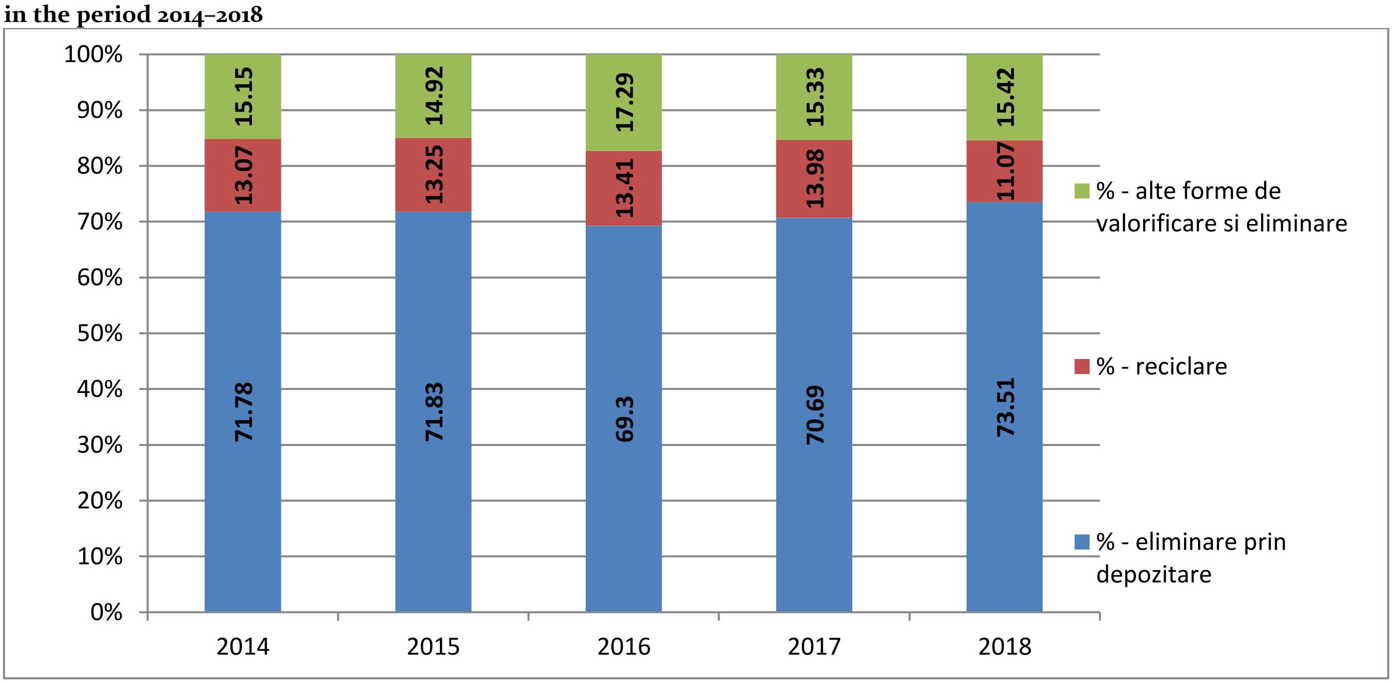
The recycling level achieved for municipal waste in 2018 was 11.08%.

Figure XII.27 The composition of municipal waste for 2018 (%)



Source: National Environmental Protection Agency

Figure XII.28 The share of the main municipal waste management activities, related to the amount of waste generated %, in the period 2014–2018



Source: National Environmental Protection Agency

Note: The decrease in the share of recycled waste in 2018 is driven by the change in the calculation methodology – for this year, the amount of individually composted biodegradable waste has not been considered recycled, taking into account the provisions of the PNGD and European legislation

From the above it is noted that from 2016 the amount of waste stored has an increasing trend, which is inconsistent with the principles and objectives adopted by the EU through the circular economy legislative package. The main causes leading to an increase in the amount of waste stored are:

- waste management facilities developed under integrated waste management systems are not functional or function at planned capacity and efficiency;

- lack of infrastructure for separate waste collection or malfunctioning,
- non-implementation of the "pay for what you throw away"",
- poor involvement of sanitation operators and local public administration in the separate collection of waste and its transport to treatment plants for recovery.

Municipal waste recycling rate, in accordance with Law 211/2011 on waste regime, republished, with subsequent amendments and additions, and Waste Directive 2008/98, with subsequent amendments and additions.

Directive 2008/98 on waste, as amended and supplemented, and the national legislation transposing it, lay down recycling targets for municipal waste and construction and demolition waste.

In order to verify the achievement of the objective of preparation for reuse and recycling of at least 50% of the total mass generated, at least for waste paper, metal, plastic and glass from household waste or, as the case may be, from other sources, to the extent waste streams are similar to household waste, for the reference year 2018 **method 2** of Commission Decision 2011/753 / EU laying down rules and calculation methods is used to verify compliance with the objectives set out in Article 11 (2) of Directive 2008/98 / EC of the European Parliament and of the Council. This method is used as a result of the provisions of HG no. 942/2017 on the approval of the National Waste Management Plan. Only the quantities of **waste from paper, metal, plastic, glass and wood** from household waste and similar waste, including public services, shall be taken into account for the calculation of the objective. As a result of the application of method 2 of calculation, a degree of decycling of municipal waste of 15,74 % was obtained**.**

USE OF WATER RESOURCES

RO 18
Indicator code Romania: RO 18
EEA indicator: CSI 18
TITLE: USE OF WATER RESOURCES
DEFINITION: The Water Exploitation Index (WEI) represents the total annual average catch of freshwater divided by the total annual national renewable water resources and is expressed as a percentage.

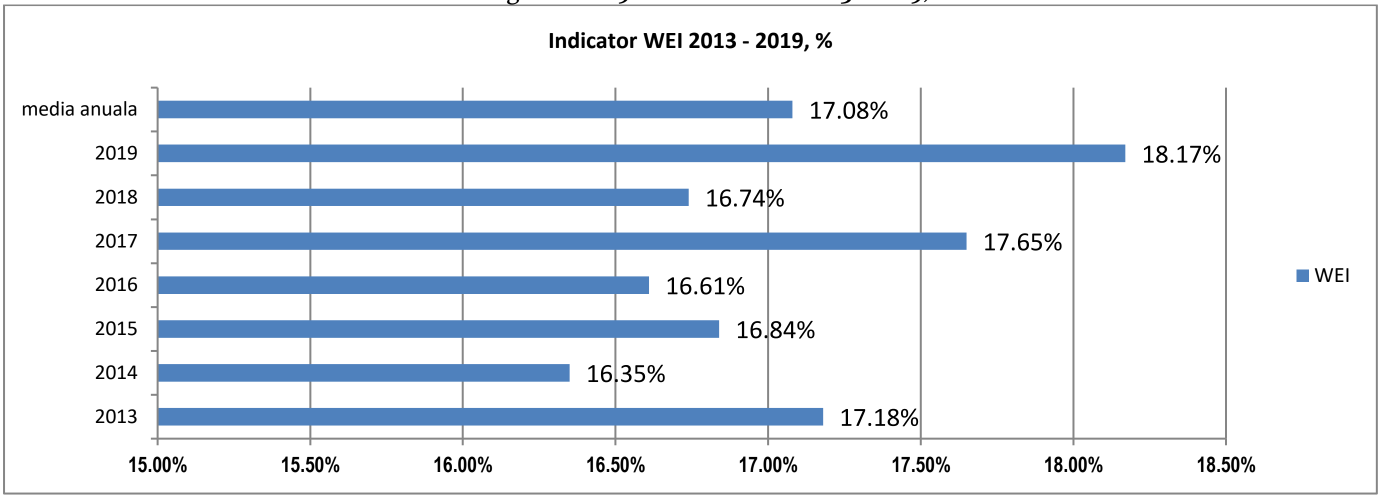
One notion used in water resource management is that of *water pressure*. It is, in general, directly related to an over-sampling of water that exceeds the resources available in certain areas. The ratio between total freshwater sampling and total resources generally indicates the existence of pressure on water resources and bears the name of *water exploitation index (WEI)*. According to the document drafted by the European 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 water resources are considered to be under reduced pressure, and values of the operating index greater than 20% indicate the existence of a pressure on water resources, and an index of over 40% it is a sign of severe stress on water resources. WEI values (%) 2012-2019 *(shown in Table XII.7 and Figure XII.29 - **WEI Indicator 2012-2019, %)*** is below 20% so that ***Romania's water resources can be considered to be under reduced operating pressure.***

Table XII.7 The evolution of water consumption in Romania 2013-2019 (mld m3)

Years	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*Average years*
Usable resource mld m3	**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**	**6,55**
Indicator WEI	**17,18%**	**16,35%**	**16,84%**	**16,61%**	**17,65%**	**16,74%**	**18,17%**	**17,08%**

Source: National Administration "Romanian Waters"

Figure XII.29 WEI Indicator 2013 – 2019, %



Source: National Administration "Romanian Waters""

At national level, Romania's water resources are relatively poor and unevenly distributed over time and space. These sum up theoretically approx. 134.6 billion cubic meters, consisting of surface waters, respectively rivers, lakes, the Danube river and groundwater, of which the usable resource, according to the degree of river basin arrangement, is 38.35 billion cubic meters. Compared to 2013, the romanian water requirement decreased by 0.11 billion mc in 2019, from 7.48 billion mc of water to 7.37 billion mc, broken down by the three categories of users: **population** 1.2 billion mc of water in 2019 compared to 1.161 billion mc in 2013, **agriculture** 1.65 billion mc of water in 2019 compared to 1.408 billion mc in 2013 and 4.52 billion mc of water for the **industrial** sector in 2019 compared to 4.911 mc in 2013. Compared to the previous year, the water requirement increased in 2019 by 0.31 billion mc. The volume of water taken (used) in 2019 was 7.37 billion mc, an increase of 0.94 billion mc of water compared to 2013, when the volume of water taken was 6.427 billion mc.

Divided by three categories of users (population, industry, agriculture):

- the volume of water taken in the agricultural sector increased from 1.135 billion mc in 2013 to 1.59 billion mc in 2019;
- the industrial sector consumed 4.2 billion mc in 2019, down from 4.312 billion mc in 2013;
- for the population the volume of water taken in 2019 was about 1.18 billion mc, up from 2013 (0.98 mc).

(*Statistics produced according to data provided by the National Administration "Romanian Waters").*

Romania's water resources are made up of surface waters – rivers, lakes, the Danube River – and groundwater. Potential and technically usable water resources for 2019 (Water balance – Requirement 2019) are shown in *Table XII.8.*

Table XII.8 Potential and technically usable water resources for 2019

Water source/Indicator of characterization	Total thousands. mc.
A. Inland rivers	
1. Theoretical resource	40 000 000
2. The existing resource according to the degree of basin arrangement *	13 679 121
3. Water demand for uses according to capture capacities in operation	3 466 945
B. Danube (directly)	
1. Theoretical resource (in the entry section of the country) **	85 000 000
Usable resource under the current arrangement	20 000 000
2. Requirement of water for use according to capacities in operation ***	3 126 866
Water source/Indicator of characterization	**Total thousands. mc.**
C. Underground	
1. Theoretical resource	9 600 000
from which:	
• groundwater	4 700 000
• deep water	4 900 000
2. Usable resource	4 667 639
3. Requirement of water for use according to capacities in operation	766 036
D. Black Sea	
Water demand for uses according to capture capacities in operation	10 413
Total resources	
1. Theoretical resource	**134 600 000**
2. Existing resource according to the degree of basin arrangement	**38 346 760**
3. Water demand for uses according to capture capacities in operation	**6 772 648**

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 of the multiannual average stock at the entry into the country;*
*** - *including volumes transferred to the Seaside basin*

Reported to the current population of Romania, it turns out:

- ***the specific resource usable in natural regime, of approx. 2660 m³ / loc. and year, taking into account the contribution of the Danube;***

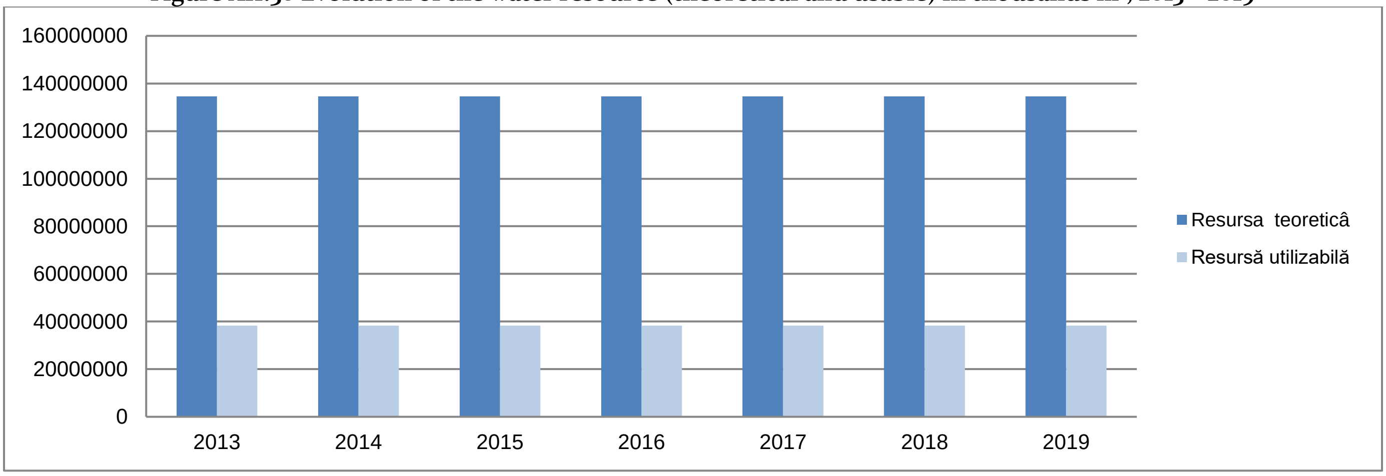
- ***specific, theoretical resource, of approx. 1770 m³ / place. and year, considering only the contribution of the inland rivers, from this point of view Romania in the category of countries with relatively low water resources in relation to the resources of other states.***

Tabelul XII.9 Volumul resursei de apă (teoretică și utilizabilă)

Years	Theoretical resource (thousands mc)	Usable resource (thousands mc)
2013	134600000	38346760
2014	134600000	38346760
2015	134600000	38346760
2016	134600000	38346760
2017	134600000	38346760
2018	134600000	38346760
2019	134600000	38346760

Source: National Administration "Romanian Waters"

Figure XII.30 Evolution of the water resource (theoretical and usable) in thousands m³, 2013 – 2019



ource: National Administration "Romanian Waters"

The main water resource of Romania is ***the inland rivers***. A basic feature of this resource category is the very large variability in space:

- the mountain area, which accounts for half the volume;
- the variability of the specific average flow (1 l / s and km2 in the low areas, up to 40 l / s and km2 in the high areas).

Another feature is the very pronounced variability over time, so that the spring produces significant floods, followed by prolonged droughts.

The Danube, the second largest river in Europe (with a length of 2850 km, of which 1075 km on the Romanian territory) has an average stock at the entrance to the country of 174 x 109 m³.

Groundwater resources are made up of existing water deposits in groundwater and deep water layers. The distribution of the underground drain varies on the large tectonic units in the territory of the country as follows:

- 0.5-1 l / s and km² in North Dobrogea;
- 00,5-2 l / s and km² in the Moldavian Plateau;
- 0.1-3 l / s and km² in the Transylvanian Depression and the Panonian 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 basin.

In 2019 the total gross water samples were **6,975 billion.m3** of which:

- population 1,176 mld.m³
- industry 4,207 mld.m³
- agriculture 1,591 mld.m³

Water samples fell from 7.96 billion. m3 in 2000, to 6,975 billion m3 in 2019, due to the:

- decrease in industrial activity;
- reducing water consumption in technological processes;
- loss reduction;
- application of the economic mechanism in water management.

For 2019 the requirement/sampling ratio for water resources is presented in *table XII.10.*

Tabelul XII.10Requirement / sampling ratio for water resources in the year 2019

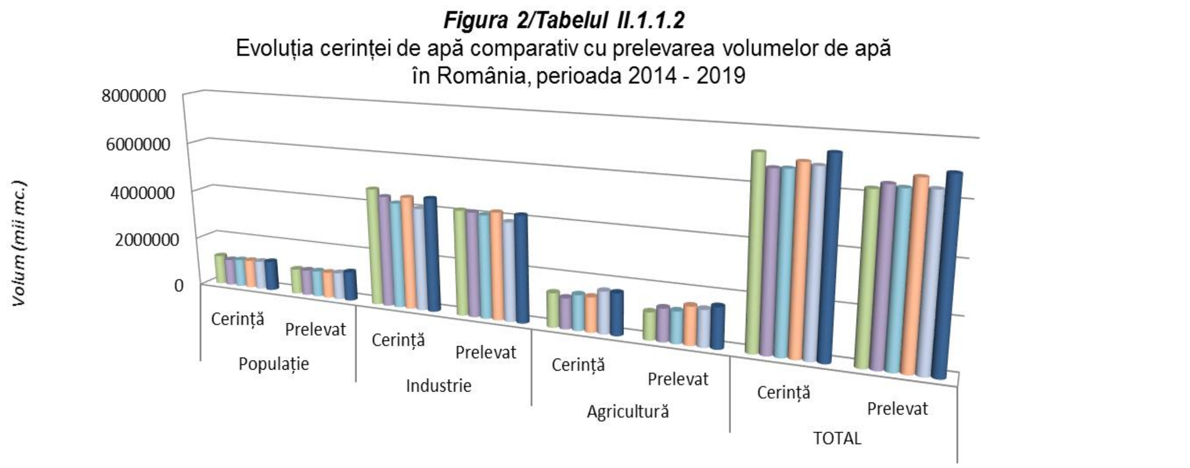
Water requirement		Water Samples		Degree of use
Activity	Value (mld.mc)	Activity	Value (mld.mc)	%
Population	1,204	Populație	1,177	97,7
Industry	4,517	Industrie	4,207	93,15
Agriculture	1,649	Agricultură	1,591	96,47
Total	**7,37**	**Total**	**6,975**	9,64

Source: National Administration "Romanian Waters"

The total water requirement for 2019 totaled approx. ***6 370 260 thousand mc.*** Actual water samples from direct sources in the services provided were *6,974,857 thousand mc*, an increase of 558,692 thousand mc compared to 2018, the year in which 6,416,165 thousand mc of water was taken.

At the current stage of river basin development, it was possible for both surface and underground sources to ensure the water requirement of users.

Figure XII. 31 The evolution of the water demand compared to the sampling of water volumes (thousand m3) in Romania, 2014 – 2019



	Populație		Industrie		Agricultură		TOTAL	
	Cerință	Prelevat	Cerință	Prelevat	Cerință	Prelevat	Cerință	Prelevat
TOTAL 2014	1189297	1016913	4673727	4169577	1355142	1079244	7218166	6265734
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

Source: National Administration "Romanian Waters"

Specialists from the National Institute of Hydrology and Water Management (INHGA) show that average annual river flows 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, as well as the development of new procedures for the operation of water management systems that take into account the degree of uncertainty in the evolution of the hydrological regime.

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III). LEGISLATION

Ordinul nr. 46/2016 privind instituirea regimului de arie naturală protejată şi declararea siturilor de importanţă comunitară ca parte integrantă a reţelei ecologice europene Natura 2000 în România.

Directiva 92/43/CEE a Consiliului din 21 mai 1992 privind conservarea habitatelor naturale și a speciilor de faună și floră sălbatică.

Raportul Comisiei către Parlamentul European și Consiliu privind progresele realizate în ceea ce privește crearea de zone marine protejate în conformitate cu articolul 21 din Directiva 2008/56/CE, Comisia Europeană Bruxelles, 2015.

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Regulamentul (CE) nr. 338/97 de reglementare a comerțului în vederea protejării speciilor de faună și floră sălbatică.

Directiva Parlamentului și a Consiliului European 60/2000/EC privind stabilirea unui cadru de acțiune comunitar în domeniul politicii apei.

Legea nr. 46/2008 - Codul silvic, republicată, cu modificările și completările ulterioare.

Hotărârea Guvernului nr. 349/2016 privind declararea zonei naturale "Acumulare Văcărești" ca parc natural și instituirea regimului de arie naturală protejată.

Legea nr. 5/06 martie 2000 privind aprobarea Planului de amenajare a teritoriului naţional - Secţiunea a III-a - zone protejate cu modificările și completările ulterioare.

Hotărârea Guvernului nr. 2151 din 30 noiembrie 2004 privind instituirea regimului de arie naturală protejată pentru noi zone*).

Hotărârea Guvernului nr. 1581 din 8 decembrie 2005 privind instituirea regimului de arie naturală protejată pentru noi zone.

Hotărârea Guvernului nr. 1143 din 18 septembrie 2007 privind instituirea de noi arii naturale protejate.

Hotărârea Guvernului nr. 1066 din 20 octombrie 2010 privind instituirea regimului de arie naturală protejată asupra unor zone din Rezervaţia Biosferei "Delta Dunării" și încadrarea acestora în categoria rezervaţiilor ştiinţifice.

Hotărârea Guvernului nr. 1217 din 2 decembrie 2010 privind instituirea regimului de arie naturală protejată pentru Parcul Natural Cefa.

Hotărârea Guvernului nr. 1284/2007 privind declararea ariilor de protecţie specială avifaunistică ca parte integrantă a reţelei ecologice europene Natura 2000 în România cu modificările și completările ulterioare.

Hotărârea Guvernului nr. 971 din 5 octombrie 2011 pentru modificarea şi completarea Hotărârii Guvernului nr. 1.284/2007 privind declararea ariilor de protecţie specială avifaunistică ca parte integrantă a reţelei ecologice europene Natura 2000 în România.

Ordinul nr. 1964 din 13 decembrie 2007 privind instituirea regimului de arie naturală protejată a siturilor de importanţă comunitară, ca parte integrantă a reţelei ecologice europene Natura 2000 în România cu modificările și completările ulterioare.

Ordinul nr. 2387 din 29 septembrie 2011 pentru modificarea Ordinului ministrului mediului şi dezvoltării durabile nr. 1.964/2007 privind instituirea regimului de arie naturală protejată a siturilor de importanţă comunitară, ca parte integrantă a reţelei ecologice europene Natura 2000 în România.

Hotărârea Guvernului nr. 663/2016 privind instituirea regimului de arie naturală protejată şi declararea ariilor de protecţie specială avifaunistică ca parte integrantă a reţelei ecologice europene Natura 2000 în România.

Ordonanța de Urgență a Guvernului nr.57 din 20 iunie 2007 privind regimul ariilor naturale protejate, conservarea habitatelor naturale, a florei şi faunei sălbatice cu modificările și completările ulterioare.

Legea nr. 49 din 7 aprilie 2011 pentru aprobarea Ordonanţei de urgenţă a Guvernului nr. 57/2007 privind regimul ariilor naturale protejate, conservarea habitatelor naturale, a florei şi faunei sălbatice.

Hotărârea Guvernului nr. 1000/2012 privind reorganizarea şi funcţionarea Agenţiei Naţionale pentru Protecţia Mediului şi a instituţiilor publice aflate în subordinea acesteia cu modificările și completările ulterioare.

Ordinul nr. 1052/2014 privind aprobarea Metodologiei de atribuire în administrare și custodie a ariilor naturale protejate cu modificările și completările ulterioare.

Legea nr. 95/2016 privind înfiinţarea Agenţiei Naţionale pentru Arii Naturale Protejate şi pentru modificarea Ordonanţei de urgenţă a Guvernului nr. 57/2007 privind regimul ariilor naturale protejate, conservarea habitatelor naturale, a florei şi faunei sălbatice cu modificările și completările ulterioare.

Ordonanța de Urgență a Guvernului nr. 90/2016 privind stabilirea unor măsuri pentru asigurarea managementului ariilor naturale protejate.

Legea nr. 104/2011 privind calitatea aerului înconjurător, cu modificările și completările ulterioare.

Directiva 2008/50/CE a Parlamentului European și a Consiliului privind calitatea aerului înconjurător și un aer mai curat pentru Europa.

Directiva 2004/107/CE a Parlamentului European și a Consiliului privind arsenul, cadmiul, mercurul, nichelul, hidrocarburile aromatice policiclice în aerul înconjurător.

Directiva 2010/75/UE privind emisiile industriale (IED).

Directiva 2000/76/CE privind incinerarea deșeurilor.

Legea nr. 278/2013 privind emisiile industriale.

Directiva 2001/80/CE (LCP) privind limitarea emisiilor în atmosferă a anumitor poluanţi provenind de la instalaţii de ardere de dimensiuni mari (LCP).

Directiva 78/176/CE privind deșeurile din industria dioxidului de titan.

Directiva 92/112/CE privind procedurile de armonizare a programelor de reducere, în vederea eliminării, a poluării cauzate de deșeurile din industria dioxidului de titan.

Directiva 82/883/CE privind modalitățile de supraveghere și control al zonelor în care există emisii provenind din industria dioxidului de titan.

Directiva 2008/1/CE privind prevenirea și controlul integrat al poluării (IPPC).

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Hotărârea nr. 529/2013 pentru aprobarea Strategiei naționale a României privind schimbările climatice, 2013-2020.