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Down to Earth

PP04 - National Meteorological Administration of Romania

DOWN TO EARTH - Kick Off Conference

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30 June 2023 | Santiago de Compostela, Galicia, Spain

**AGROMETEOROLOGY
DEPARTMENT**

National Meteorological Administration of Romania

Project Partner 04

National Meteorological Administration activates under **Ministry of Environment, Water and Forests**, functioning on the basis of Law 216/2004, with the tasks in providing *meteorological, climatological and atmospheric services*, being the **technical, national, official, authorized authority**, with *attributions and responsibilities* in the elaboration of *guides, studies and research*, related to climate change effects on the most vulnerable rural areas into domain of (water resources, agriculture and rural development, forestry, tourism, urban systems, biodiversity, etc.), the effects on the population and implicitly the level of resilience of rural communities.

□ National Meteorological Administration is the **national authority** in the meteorological field in Romania, with a **continuous service since 1884**.

□ Romania is a founding member of the **International Meteorological Organization** (IMO), and beginning with 1948 it has become a full member of the World Meteorological Organization (WMO).

□ The National Meteorological Observation Network within the NMA is made up of 7 **Regional Meteorological Centers** / RMC.

<http://www.meteoromania.ro/>



WHAT WE DO?

- Analysis of the evolution in dynamics of the soil moisture reserve
 - **Drought monitoring** in Romania
 - **In-situ phenological** observations
 - **Weekly AGROMETEOROLOGICAL FORECASTS**
 - **Specialized AGROMETEOROLOGICAL BULLETINS**
 - **Useful recommendations for farmers in order to choose the best technological solutions**
-
- **Specialized studies at regional and national level with an impact on agriculture**
 - **AGROMETEOROLOGICAL YEARBOOK (September - August)**

•The **operational activity** of agrometeorology used software applications for real stream transmission of agrometeorological data from the specialized network at national, regional and local level.

•**Agrometeorological research** is generally applicable and covers a wide range of issues, selected in accordance with the terms of reference of the *WMO Committee on Agricultural Meteorology (CAgM)*, which aim to improve agro-meteorological applications and substantiate the operational activity of agrometeorology, in order to develop sustainable development of agricultural strategies and ensuring food security, as well as linking research in the field to European standards

The **Agrometeorology Department** was founded in 1950 within the Institute of Meteorology and Hydrology (I.N.M.H.), and in 1955, Virgil Jianu organized the Agrometeorology Department, organized in three laboratories and aiming to serve with specialized information of the agricultural field



THE NATIONAL AGROMETEOROLOGY NETWORK in ROMANIA

7 REGIONAL METEOROLOGICAL CENTERS

In Romania, the network of meteorological stations with agrometeorological program operates according to the recommendations of W.M.O. and is administered by the National Meteorological Administration.

OLTENIA

DOBROGEA

MOLDOVA

TRANSILVANIA
NORD

BANAT-
CRIȘANA

TRANSILVANIA
SUD

MUNTENIA



- 7 Regional Meteorological Centers;
- 68 agrometeorological stations
- phenological observations and soil moisture measurements (winter wheat, maize, sunflower, rapeseed, fruit trees and vines).

TYPE OF SERVICES

Daily agrometeorological prognosis / diagnosis, weekly, monthly and seasonal

Parameters maps of thermal vulnerability and risks at national level, regional / local (temperature, cold/frost units, intensity and duration of the scorching heat, etc.)

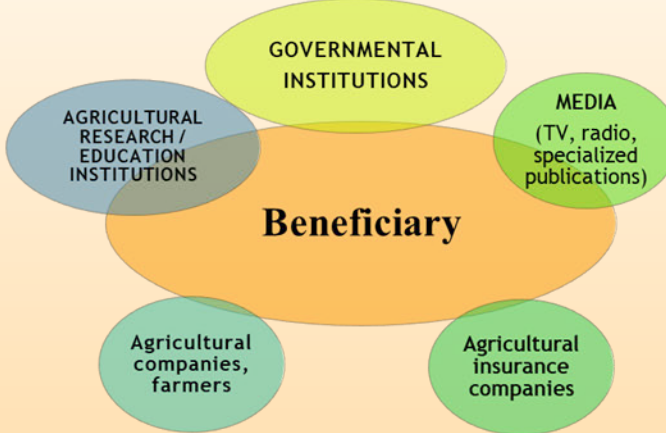
Indicators of water stress at national, regional and local level (ETP, relative air humidity, rainfall, etc.)

Aridity indices (standardized at the level of the entire agro network)

Weekly Agrometeorological bulletin includes specific information (air temperature, precipitation, ETP, soil moisture, crop water requirement) useful for assessing the occurrence of drought

Specialized agrometeorological studies

Soil moisture maps updated daily according to the operational activity are made available to the public on the **NMA website** (www.meteoromania.ro)




European and World engagement



European partnership

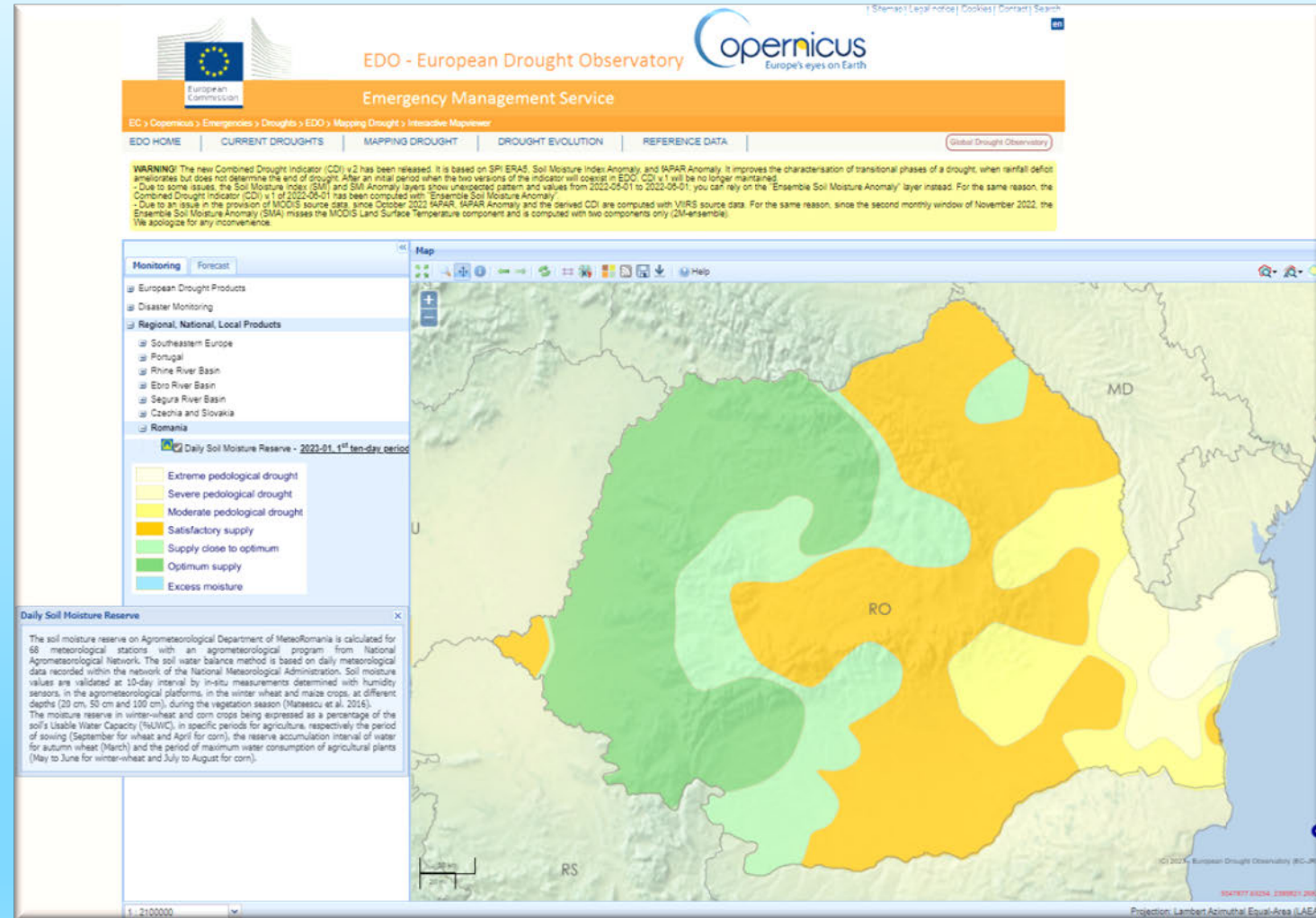


Soil moisture reserve in the 0-20 cm, 0-50 cm, 0-100 cm depths, for winter wheat and maize crop

Starting: January 2023
Delivered: 10 day basis

Average soil temperature at 5 cm and 10 cm depths, for winter wheat and maize crop

Starting: April 2023
Delivered: 10 day basis



[Geographic MapViewer - European Drought Observatory - JRC European Commission \(europa.eu\)](https://www.euro-drought.eu/)
Monitoring -> Regional, National, Local Products -> Romania -> **Daily Soil Moisture Reserve**

Regional Agrometeorology Center for the WMO Europe Region RA-VI



Launching the initiative

Date: 8 June 2019

Place: Geneva, World Meteorological Organization

Event: 18th World Meteorological Congress

Launch: *Regional Agrometeorology Center for the WMO Europe Region RA-VI*

INFRAMETEO PROJECT APPROVAL

Infrastructure upgrading for monitoring and warning of severe hydro-meteorological phenomena in order to ensure the protection of life and material goods. SMIS 2014+ 128047



SUPPORT



UNDER IMPLEMENTATION

Starting Date: July 1st 2020

Duration: 31 months

Ending Date: December 31st 2023

Place: **National Meteorological Administration headquarters**

OPERATIONAL ACTIVITIES

In-situ soil moisture monitoring
 Main crops phenology observations
 Agrometeorological diagnosis/forecasts
 Monthly bulletins
 Agrometeorological indicators

LOGISTICAL SUPPORT

IT Data Center
 Web-Portal communication
 Agrometeorological platform
 Network and Security
 Virtual IT infrastructure
 Conference rooms

RESEARCH

EU pilot projects in common thematic areas / climate change impacts and water resources management, etc
 The **impact of extreme weather events** on existing and future agricultural systems, food security
 Enhanced capability in development of weather/**climate-agricultural decision support systems**
Good practice guides for long-term sustainability in agriculture for RA VI Europe

EDUCATION

Knowledge transfer
 Trainings: workshops, webinars, field days
 E-learning
 Virtual courses



Regional Agrometeorology Center for the WMO Europe Region RA-VI

Romania's Sustainable Development Strategy 2018

The Department of Sustainable Development, as part of the Working Apparatus of the Romanian Government, in keeping with Government Decision 313/2017, has the role of coordinating the implementation of the set of 17 Goals of the 2030 Agenda for Sustainable Development.

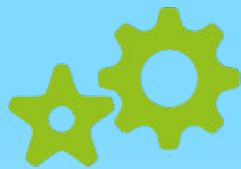


THE DEPARTMENT
OF SUSTAINABLE DEVELOPMENT

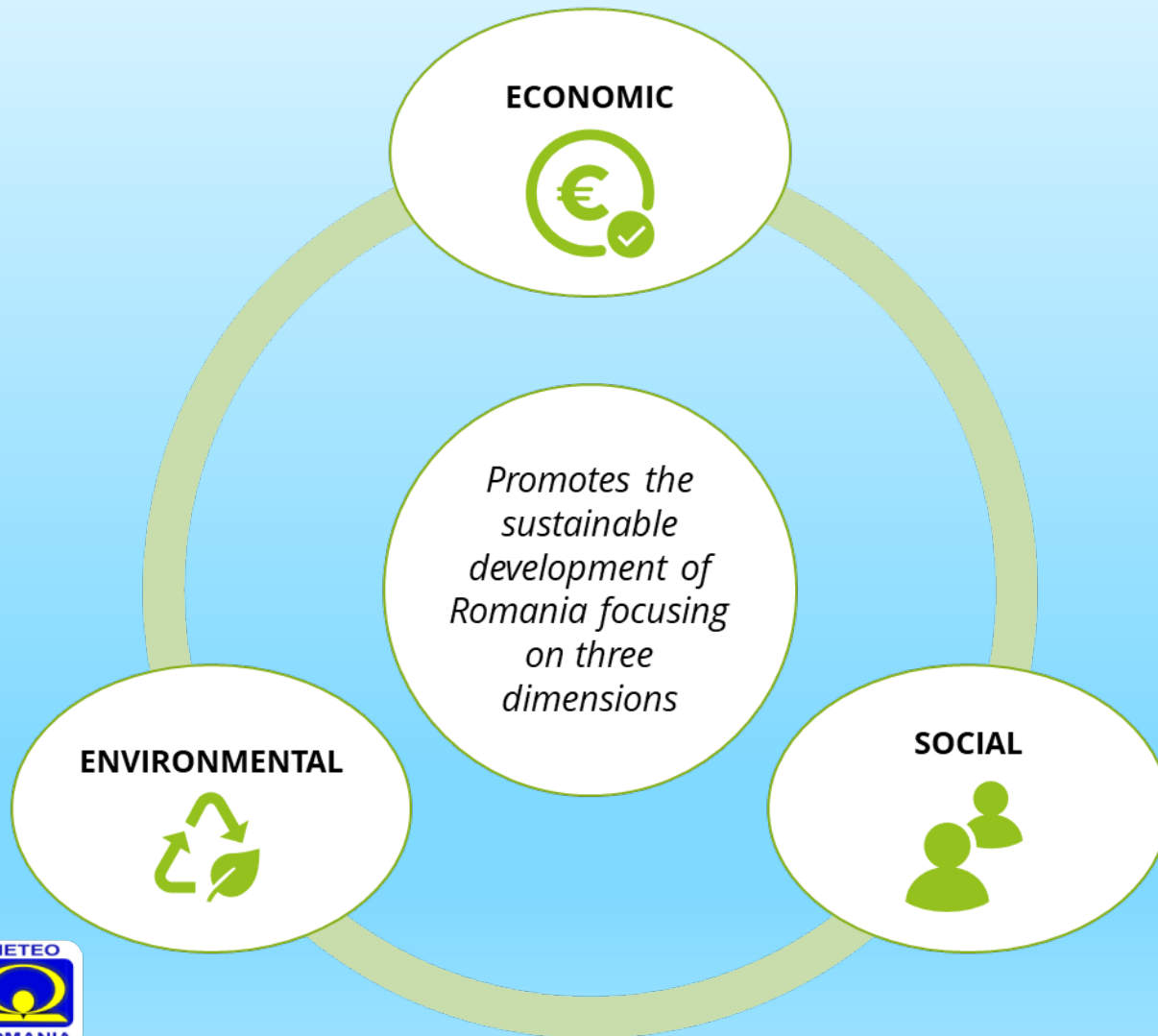


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Strategy Objectives



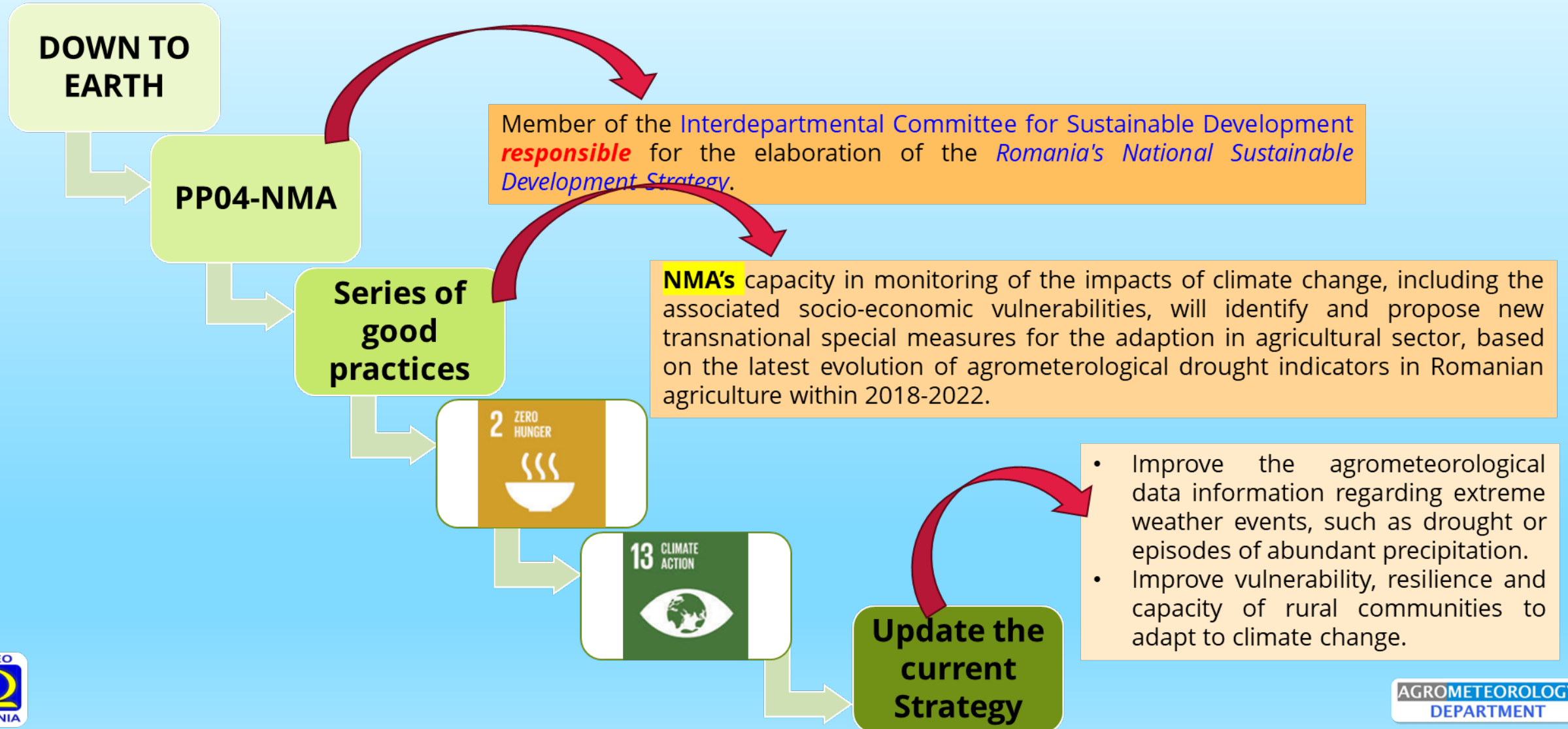
The strategy aims to **develop a sustainable and competitive agri-food sector** for *improving the quality of life and ensuring close living conditions in rural areas*, the promotion of local and ecological production and capitalization value-added traditional products.

The priority of the strategy is to **improve the level of agricultural productivity**, considering environmental factors (air, water, soil quality, biodiversity), by eliminating the main limiting factors of production yield: fragmentation of agricultural land and lack of cooperation between farmers, level of training of farmers, low capitalization, clearly indefinite professional status of the farmer, the level of technological endowment of farms.

Strategy Chapters



PP04-NMA update on Strategy



Chapter 2: Zero Hunger Agricultural Production

2 ZERO HUNGER



The Strategy aims to develop a sustainable and competitive agri-food sector so as to *improve quality of life in the rural environment* and ensure living conditions like those in urban areas, to encourage local and ecological production, and to promote traditional and mountain products with added value.

Agriculture accounts for a significant proportion of the Romanian economy and holds considerable potential for development within a European context owing to favorable soil and climatic conditions and the potential of the ecological production sector. In the period 1995-2016, the contribution of agriculture to the GDP fell sharply, from 14.7% in 1995 to 4.7% in 2016, with the share of the workforce employed in agriculture remaining almost the same over the period.



Chapter 2: Zero Hunger Agricultural Production

2 ZERO HUNGER



Romania is behind when it comes to irrigation systems, given that **50% of agricultural land** is frequently subject to **drought**, but only 12% has viable irrigation infrastructure.

The challenge for the future is therefore to improve the level of productivity in agriculture, without endangering environmental factors (e.g. air, water and soil quality, and biodiversity), by eliminating the main limiting factors to productivity: the fragmentation of farms and lack of cooperation between farmers (almost **75% of farms in Romania are smaller than 2 ha** and 70% have an income of less than 2,000 euros); the low level of training among farmers; the low level of capitalisation; and the lack of a clear definition for the professional status of farmer and the level of technical equipment of farms.



Chapter 13: Climate Action



The Strategy aims to consolidate Romania's capacity for adaptation and resilience in order to combat the dangers associated with climate change and natural disasters by **integrating measures** to diminish and adapt to climate change and natural disasters, both in the form of **strategies and national policies**, and by planning for and increasing the level of education and awareness with respect to climate change.

Increasing Romania's capacity to adapt to current and potential effects of climate change by monitoring the impacts of climate change, including the associated socio-economic vulnerabilities; the integration of *measures for adaption to climate change* into strategies and sectoral development policies and their intersectoral harmonisation through the creation of synergies; and the identification of *special measures* for the adaption to climate change of *critical sectors* in terms of vulnerability.



Chapter 13: Climate Action

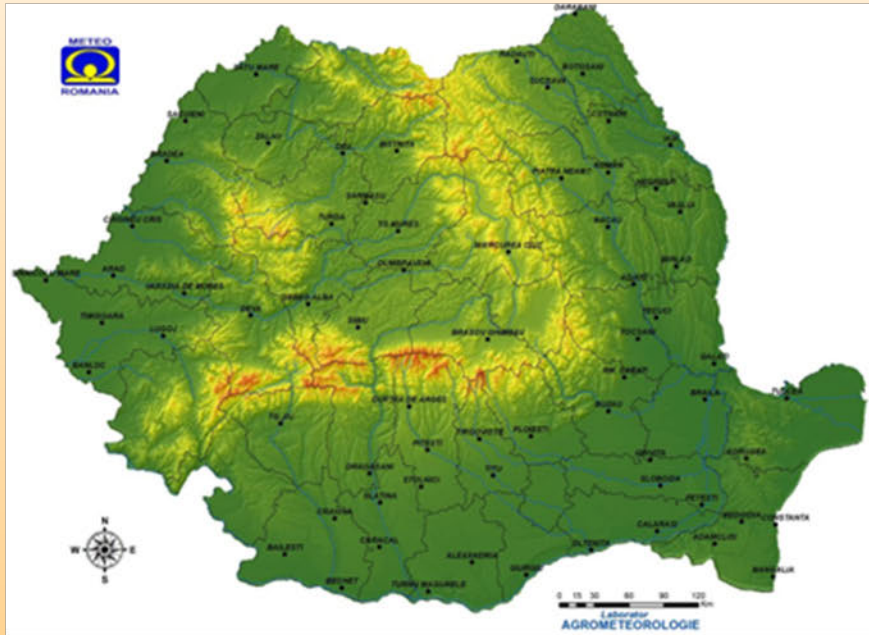


Climate change is increasingly impacting sectors such as energy, transport, the urban environment, **water supply, agriculture** and forestry, and **rural development**

Agriculture and **rural development** are highly *vulnerable to the impacts of climate change* and the associated risks are not equally distributed. There exist *regional differences* both in the rate of occurrence of extreme weather events, such as *drought* or *heavy rain* periods, and in the vulnerability, resilience and capacity of rural communities to adapt to climate change. These differences are further acerbated by the sharp divisions in terms of farm size specific to Romania. The worst affected category is and will continue to be that of farmers who practice *subsistence* and *semi-subsistence farming*.



Romania in numbers



Total area: 238 397 km²

	Number of cities	Number of communes	Number of villages
Total	319	2 862	12 958

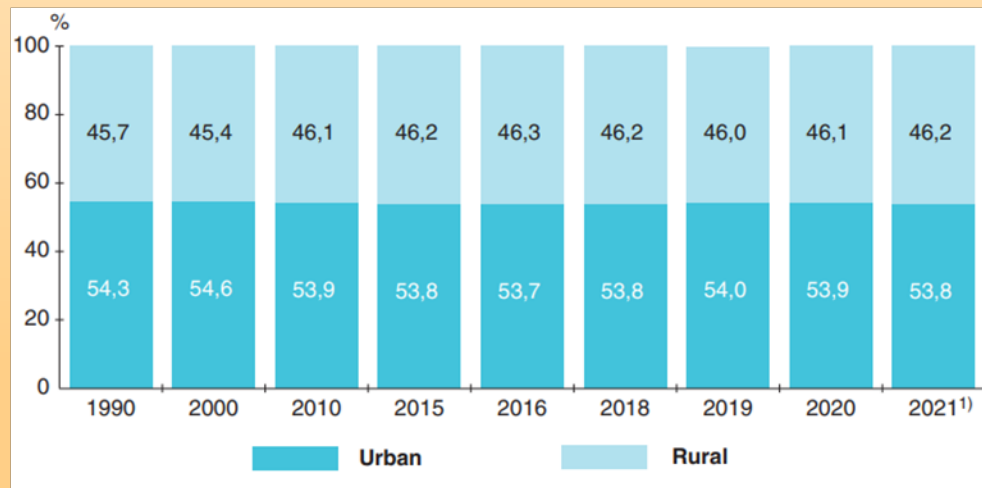
	2016	2020
Agricultural holdings	3 422 026	2 887 067
Utilised agricultural area (hectares)	12 502 535	12 762 829
Unutilised agricultural area (hectares)	100 832	76 172

Romania in numbers

AGROMETEOROLOGY
DEPARTMENT

Population by area

	Total	Urban	Rural
2018	19 483 840	10 487 094	8 996 746
2019	19 394 228	10 471 265	8 922 963
2020	19 269 469	10 378 580	8 890 889
2021	19 124 061	10 290 896	8 833 165

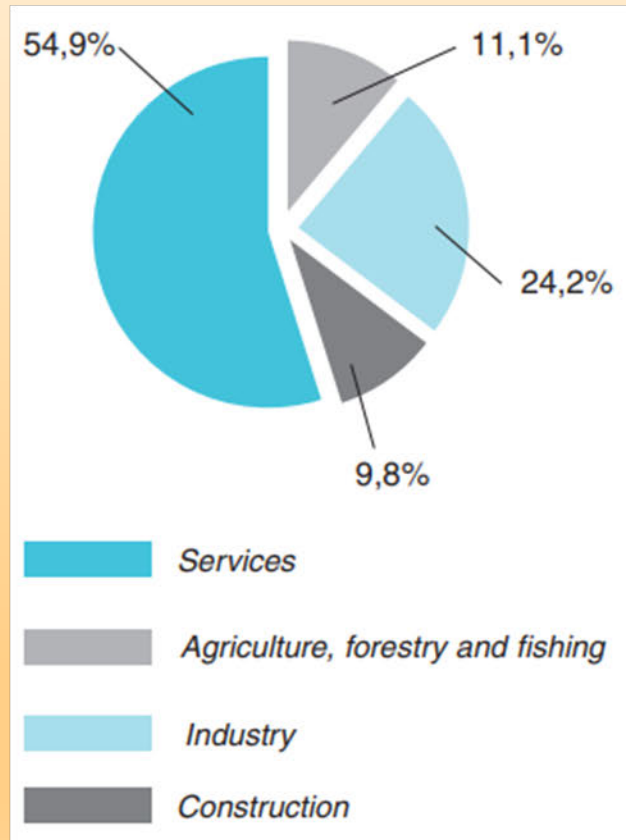


Usually resident population in rural areas

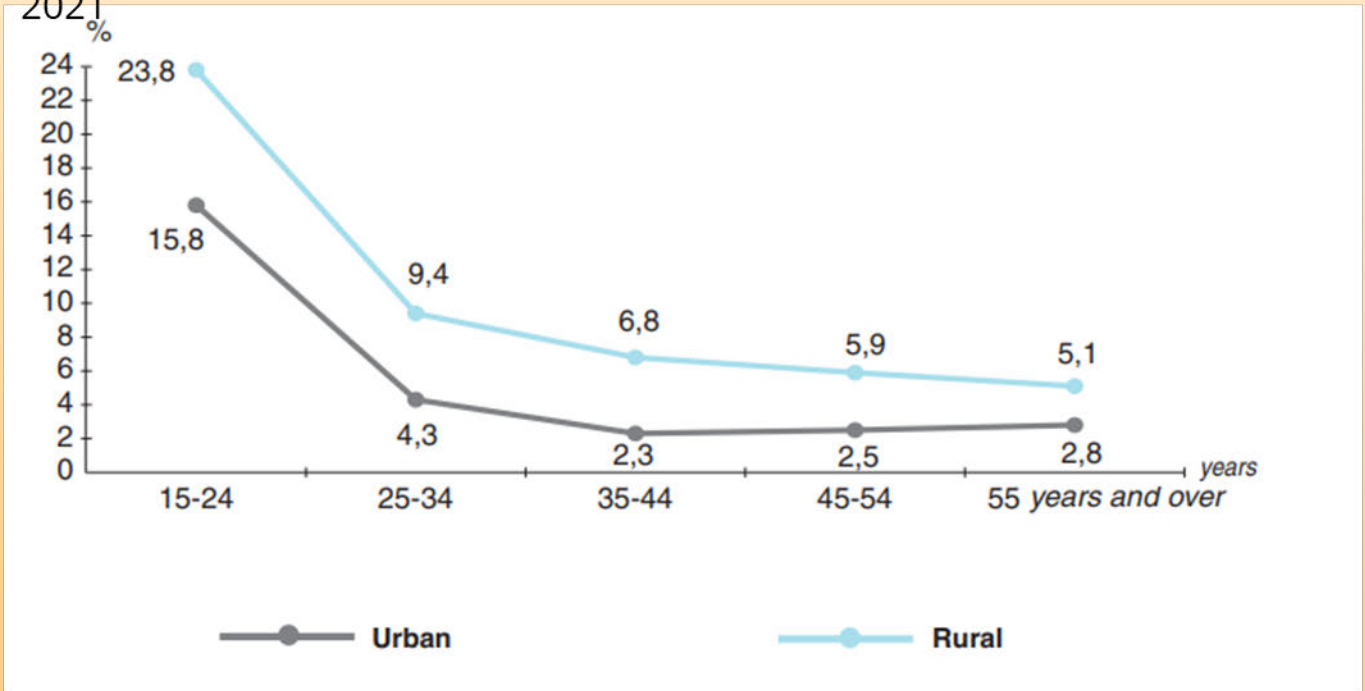
	2020	2021	2022
0-9 year	893 048	891 322	951 777
10-19 years	1 080 043	1 060 292	1 091 401
20-29 year	1 001 993	1 010 452	1 180 099
30-39 year	1 070 500	1 041 235	1 360 607
40-49 year	1 361 248	1 341 016	1 538 267
50-59 years	1 121 664	1 160 882	1 328 955
60-69 years	1 049 023	1 020 029	971 574
70-79 years	790 353	791 382	725 766
80 years and over	523 017	516 555	456 849
Total	8 890 889	8 833 165	9 605 295

Romania in numbers

Civil employment structure, by main activities of the national economy, in 2021



Unemployment rate by area, in 2021



Drought risk assessment in Romania



Sunflower crop
August 21st, 2017
Călărași region

Vulnerability assessments has a major role in the design of appropriate adaptation policies to CC impacts on agriculture field and not only. Risk is a function of the characteristics of a physical event or hazard (e.g. severity, duration, frequency, and trend) and the societal and environmental vulnerability.

risk identification (identify what may happen);

risk analysis (determine the level of probability and consequences of the hazard);

risk evaluation (decide what is acceptable).

Drought affects sustainable development through interrelations with social problems and enhances them:

heavy rains / floods, landslides, hail, lightning, ice, avalanches, storms, blizzards, droughts, heat waves, cold waves;

reduction in water reserves, potential for food production and thus food security for the population;

poverty, the most serious dysfunction in areas affected by these phenomena;

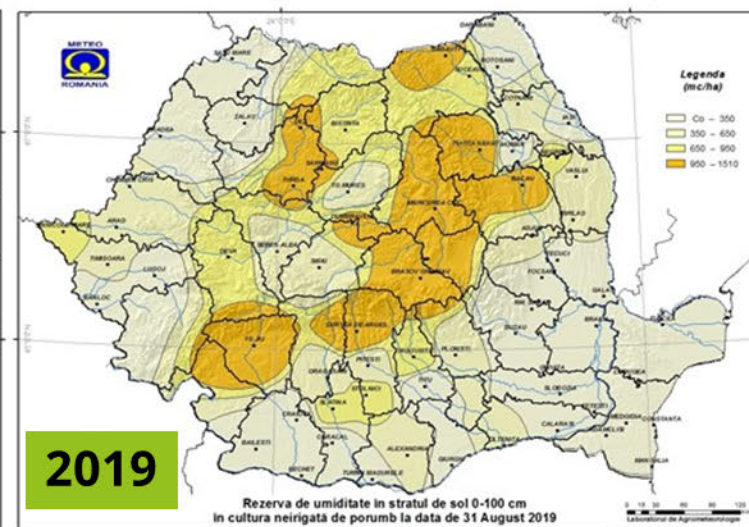
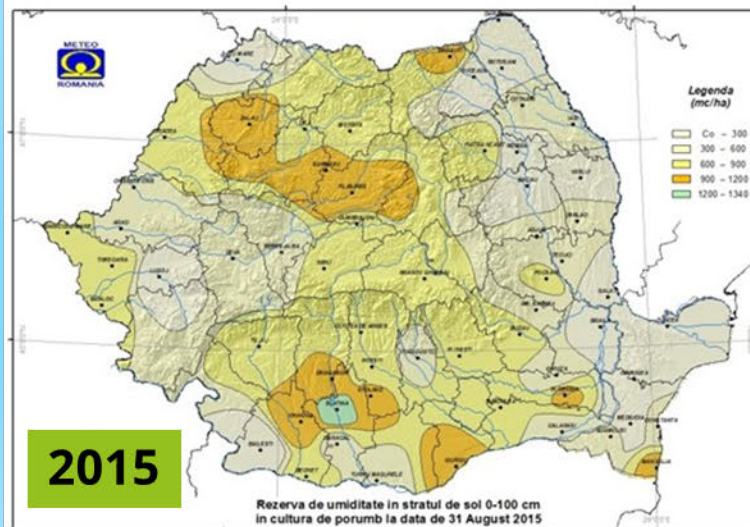
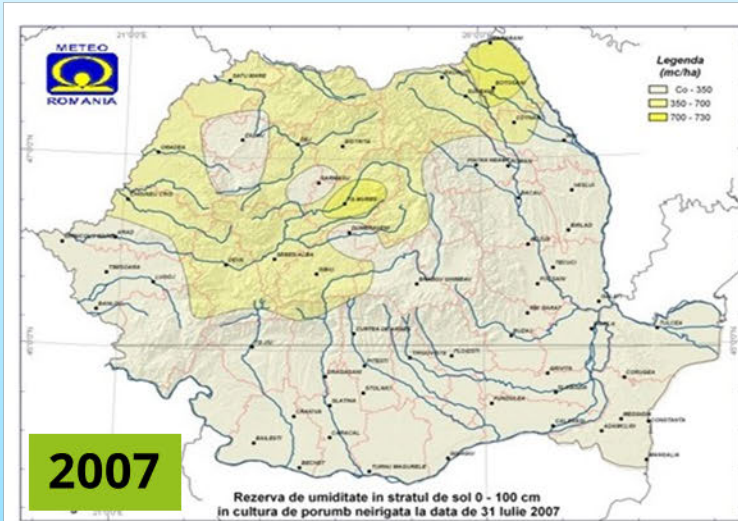
deterioration of human health due to inadequate food consumption, generating anemia, malnutrition and malnutrition.



Maize crop
August 21st, 2017
Călărași region

Maize soil moisture July-August

Most droughty years 2007 / 2012 / 2015 / 2019



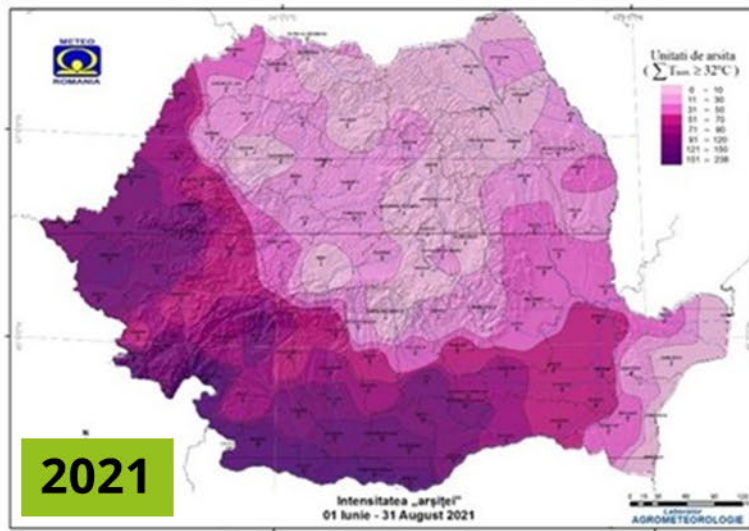
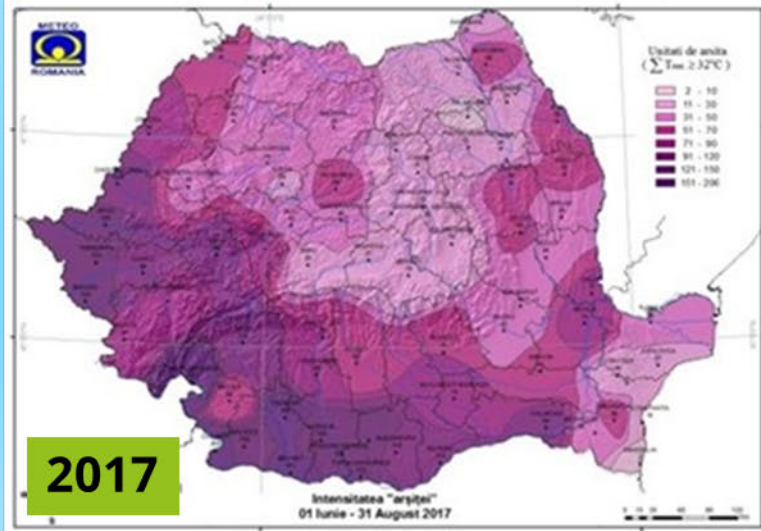
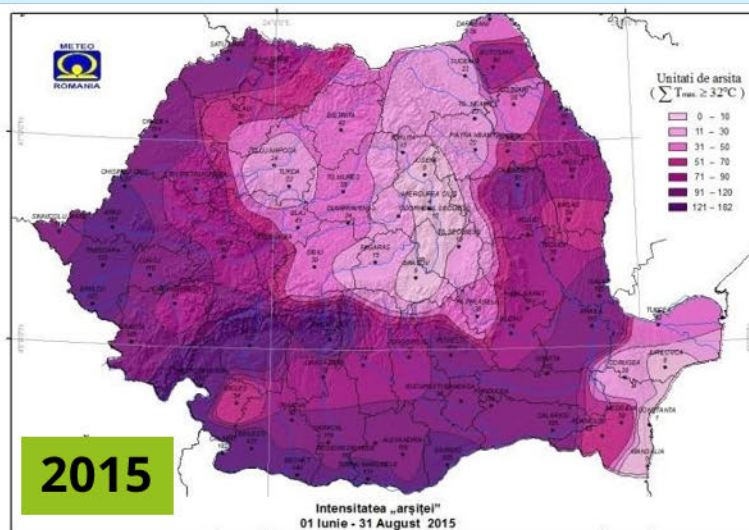
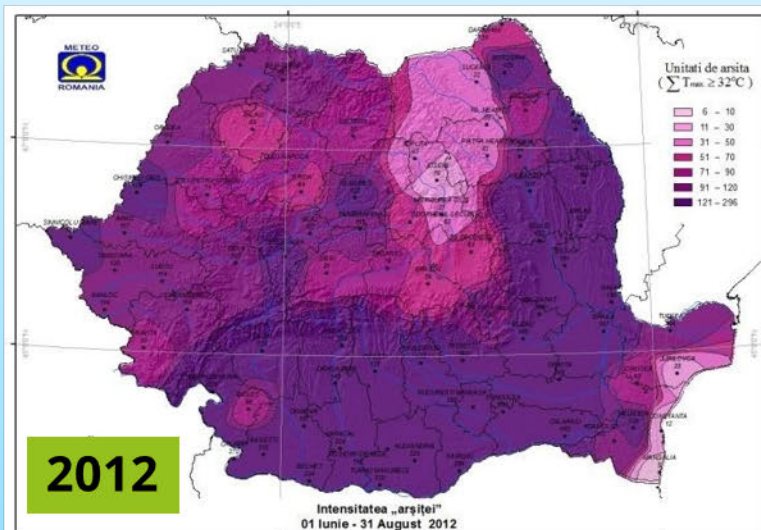
• Extreme pedological drought

• Severe pedological drought

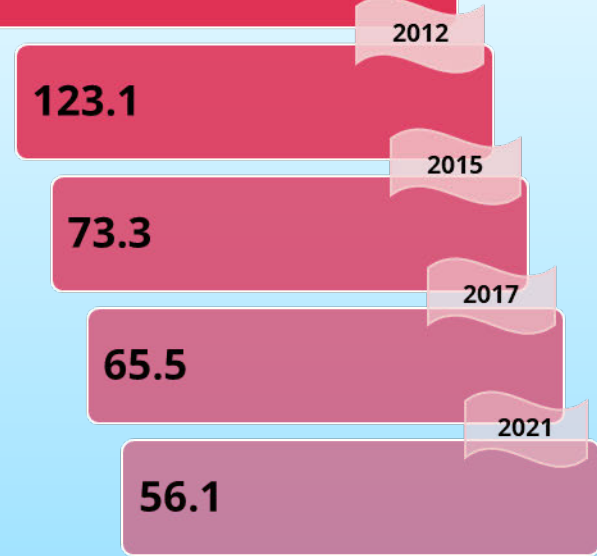
• Moderate pedological drought

• Satisfactory supply

Scorching Heat ($\Sigma T_{max} \geq 32^{\circ}\text{C}$) July-August

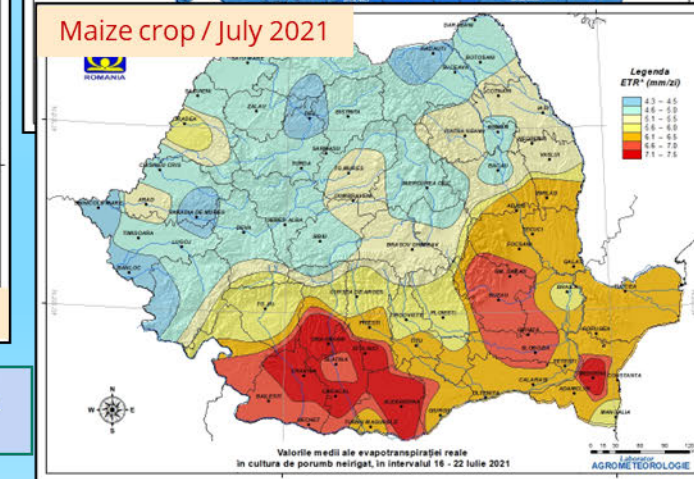
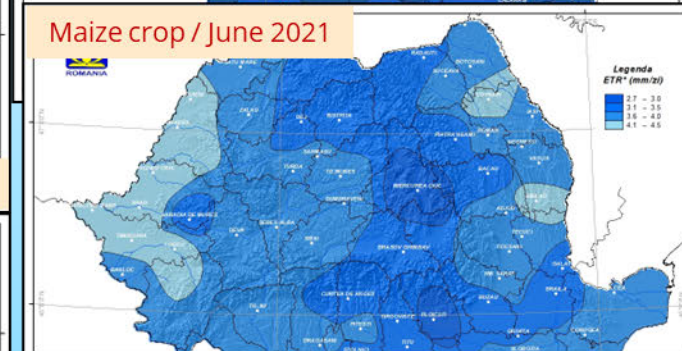
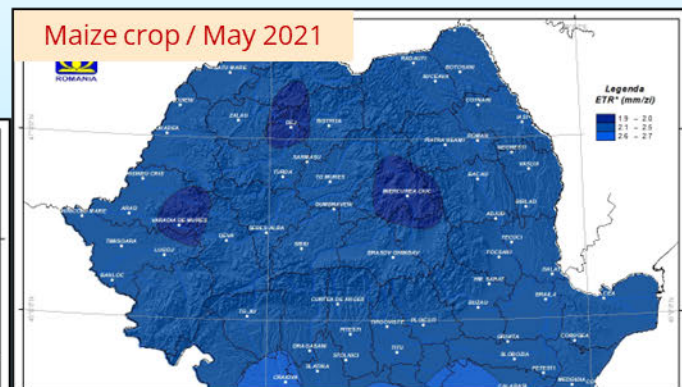
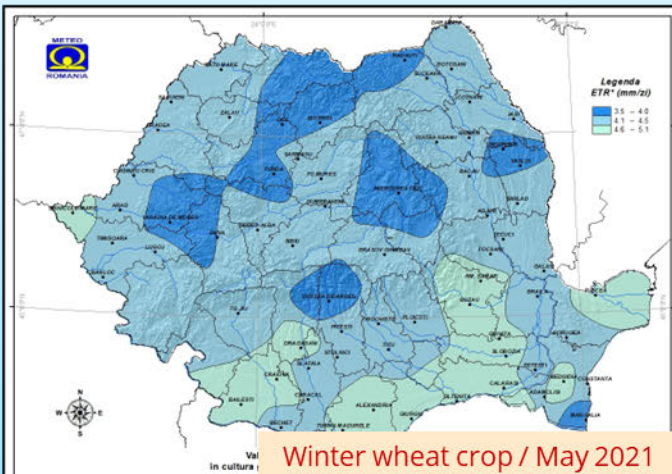


Heat Intensity

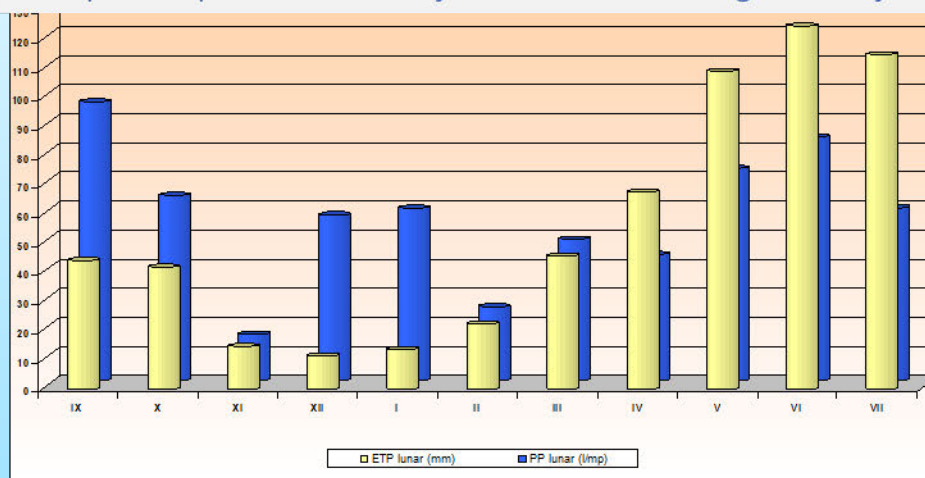


- low (0-10 scorching heat units)
- moderate (11-30 scorching heat units)
- high (31-50 scorching heat units)
- pronounced (51-296 scorching heat units)

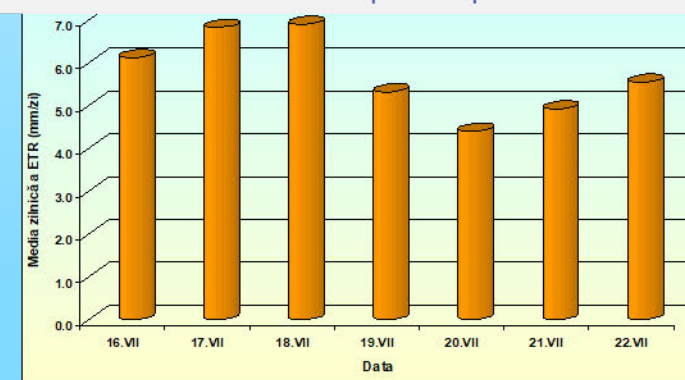
Reference evapotranspiration in agricultural crops



Monthly mean values of the reference evapotranspiration for the maize crop in comparison to monthly rainfall / 2020-2021 Agricultural year



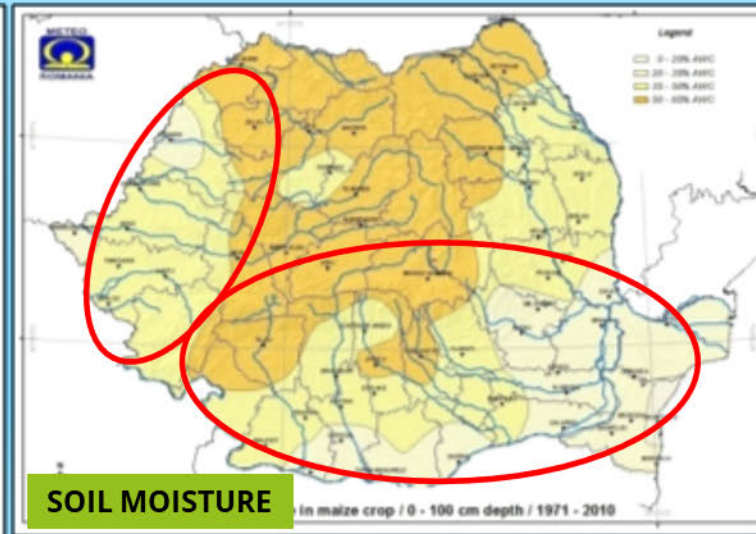
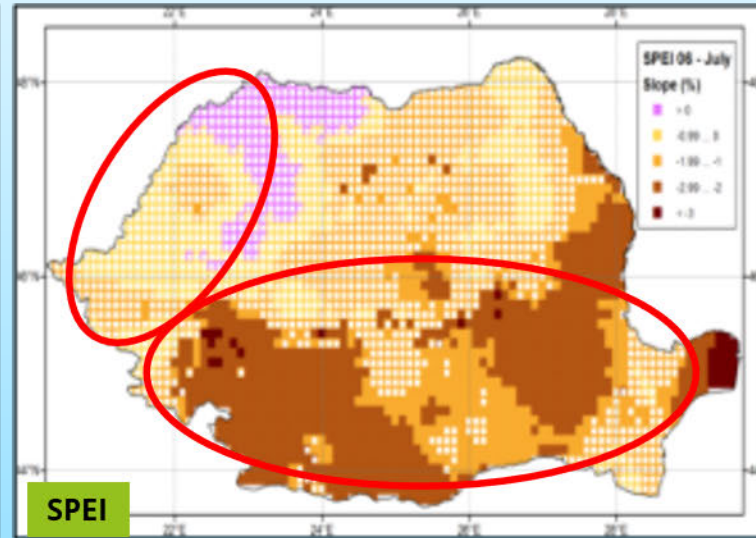
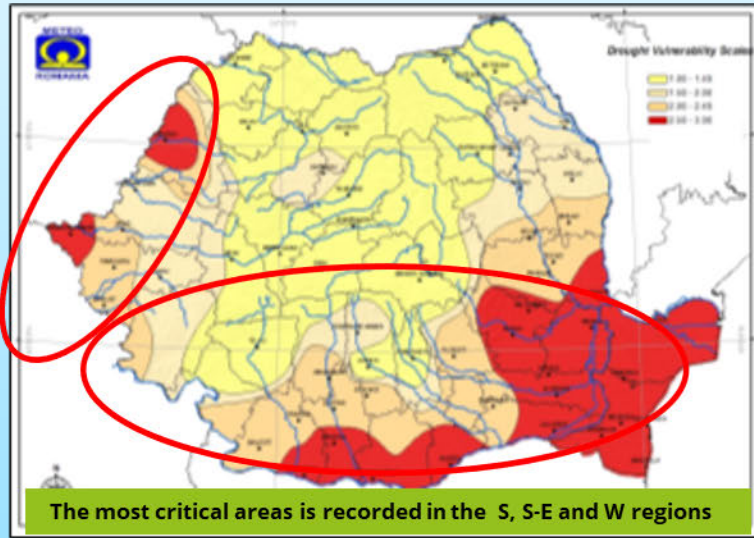
Daily mean values of the reference evapotranspiration / 16 - 22 July 2021



Reference evapotranspiration (ETR) is calculated by Penman-Monteith method (FAO), in correlation with vegetation phases, for winter wheat and non-irrigated maize crops during an agricultural year.

<http://www.meteoromania.ro/Upload-Produse/agro/evapotranspiratie.pdf>

Drought Vulnerability Index for maize crop during the critical period for water plant needs (August) based on climatic variables

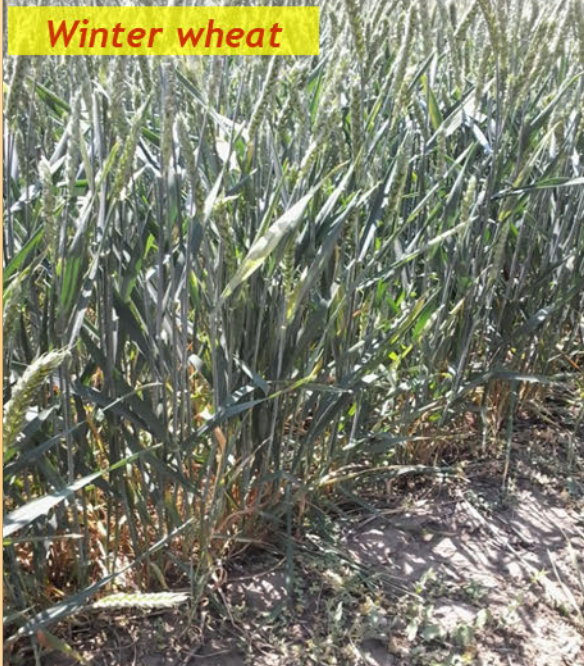


DVI	Vulnerability Scales	Color scale
0.00 - 0.49	No or less vulnerability	Green
0.50 - 0.99	Low vulnerability	Light Green
1.00 - 1.49	Medium vulnerability	Yellow
1.50 - 1.99	High vulnerability	Light Orange
2.00 - 2.49	Very high vulnerability	Orange
2.50 - 3.00	Extreme vulnerability	Red

Vulnerability has been expressed as a function of exposure and intensity at different level in time and space.

The approach is useful in evaluating the vulnerability of crop systems to drought and may help the decision makers to formulate more specific and targeted climate adaptation policies to reduce production losses in agriculture.

Impact of extreme weather in Romanian agriculture - case study 2018



Phenology of summer crops / corn and sunflower



Vaslui/Moldova

Călărași/Muntenia

Iași/Moldova

Turda/Transilvania



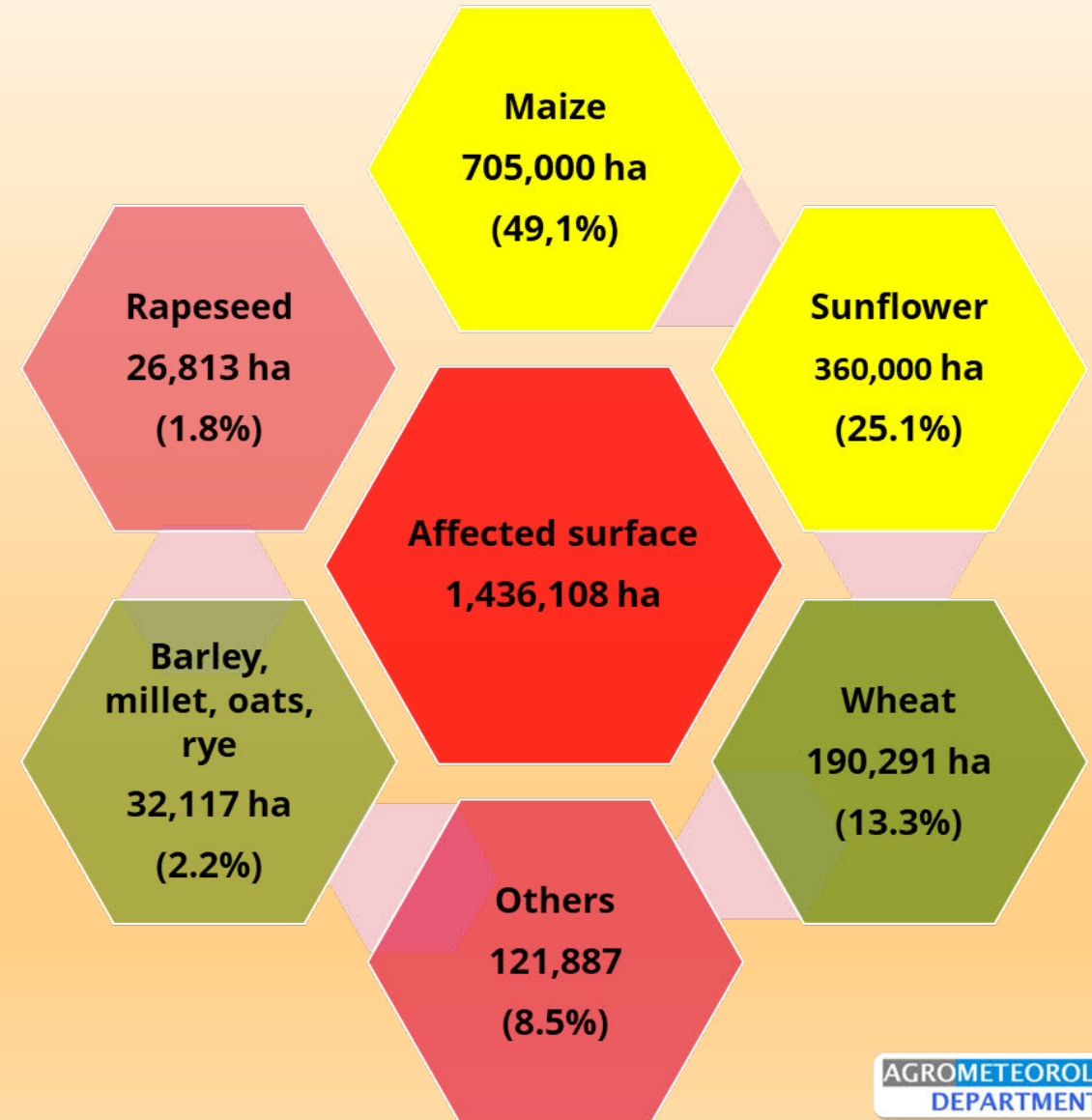
Adamclisi/Dobrogea

Călărași/ Muntenia

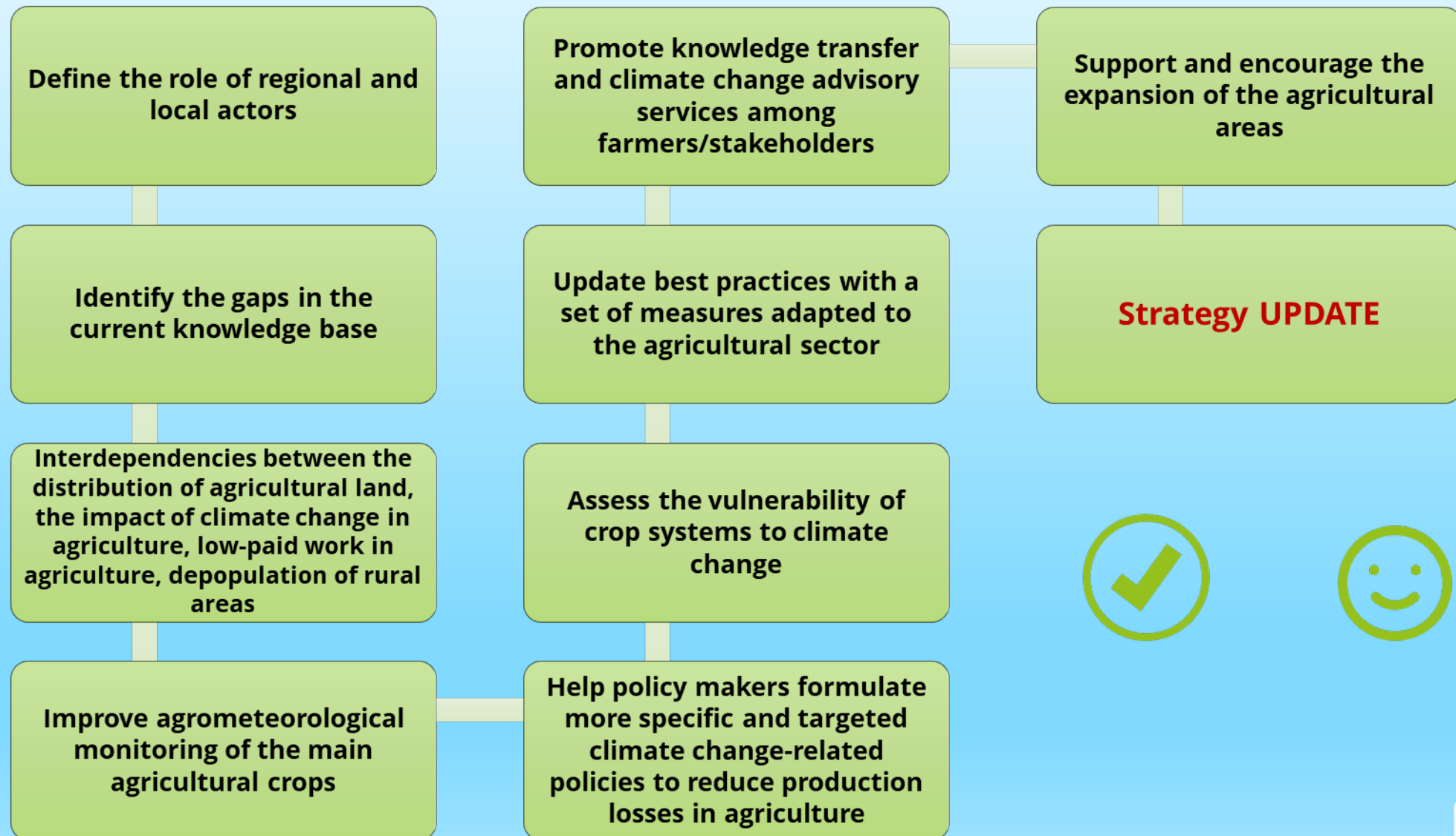
Iași/Moldova

Sebeș Alba/Transilvania

Drought areas in the agricultural year 2021 -2022



PP04-NMA update on Strategy





THANK YOU FOR ATTENTION!

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