

3rd Virtual ADAPTtoCLIMATE Conference

*The Emilia-Romagna policies for the climate change
and the ecological transition*

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Emilia-Romagna Region



Total area: 22.453 km²
Plain: 47.8 % Hill: 27.1 % Mountain: 25.1 %
Inhabitants: 4.457.115
GDP (2018): 149.500 million €



Satellite Image of Northern Italy in the winter season (source: MODIS radiometer, NASA)

The region's actions to fight climate change

➤ Long-term objectives (2050)



➤ Short/Medium -term ambitions (2025 - 2030)

Under 2 Memorandum of Understanding

Under 2 Coalition

- The Under2 Coalition is driven by a group of ambitious state and regional governments committed to keeping global temperature rises to well below 2°C. sub national States and regional governments are playing a key role in accelerating climate change actions, compared to the policies implemented by national states
- The Region signed the MoU in 2015 and committed itself to reducing its emissions by 80 percent compared to 1990 levels by 2050 → Carbon Neutrality





Assembly Resolution n. 187/2018
*Mitigation and Adaptation strategy for
Emilia-Romagna region*

<http://ambiente.regione.emilia-romagna.it/it/cambiamenti-climatici>

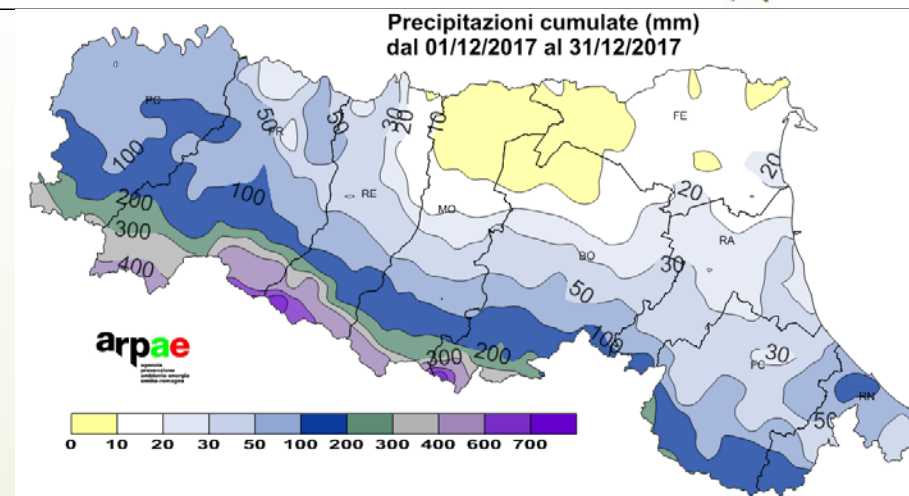
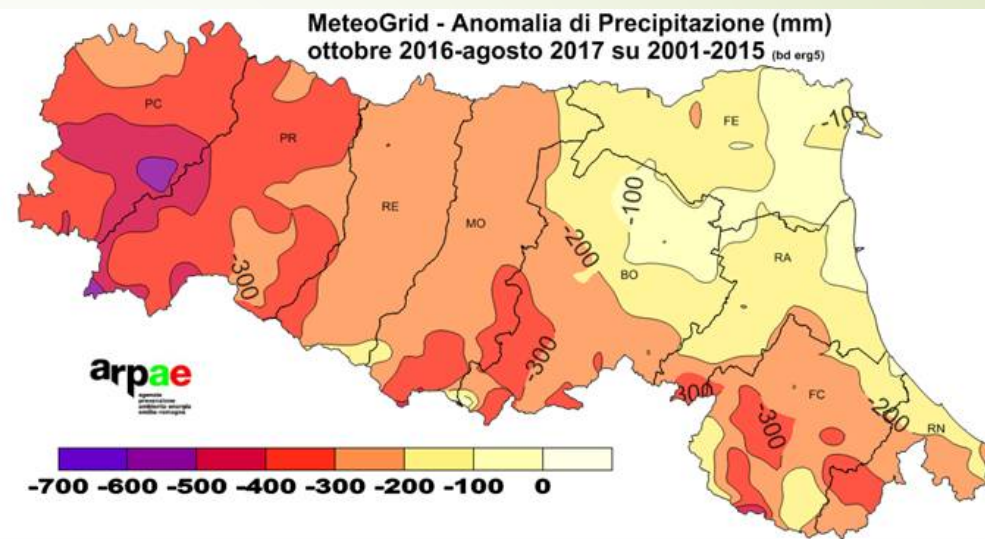
Climate Change effects in Emilia-Romagna: from little water to too much water

Summer 2017: record drought

More serious deficits between Piacenza and Parma with a reduction in rainfall from 200 to 600 millimeters compared to the average

December 2017: Record rainfall

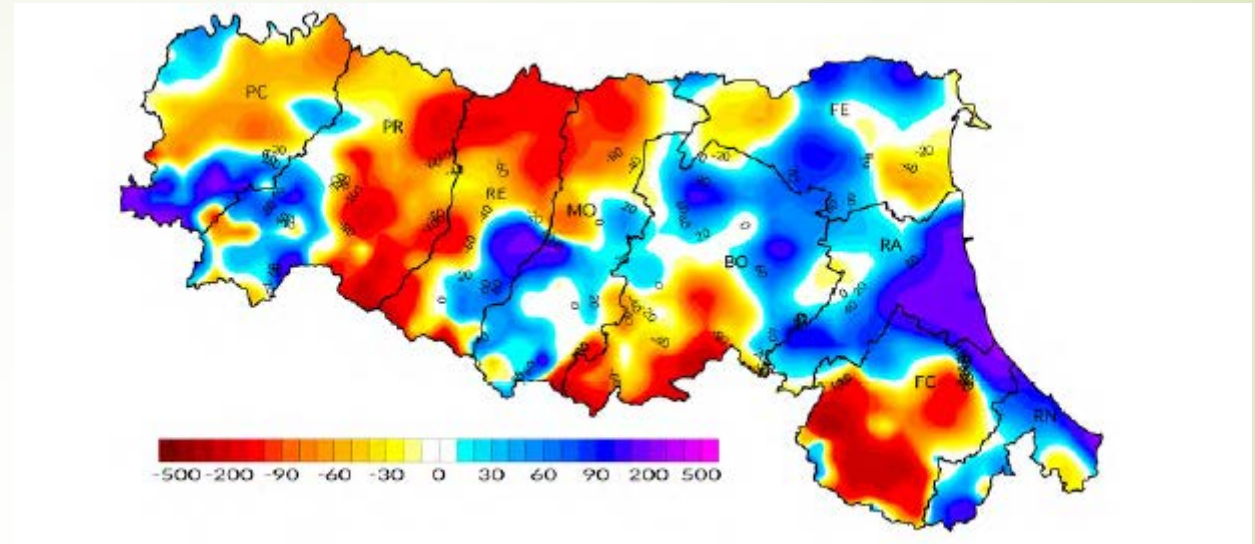
In 36 hours (11-13/12/2017) from 300 to 500 mm of rain. The ridge from Piacenza to Modena was very badly hit. Historical peaks for Parma, Enza and Secchia



2018: Precipitation

Map of precipitation anomalies with deficit - 120mm and surplus at + 150mm, compared to 1961-1990

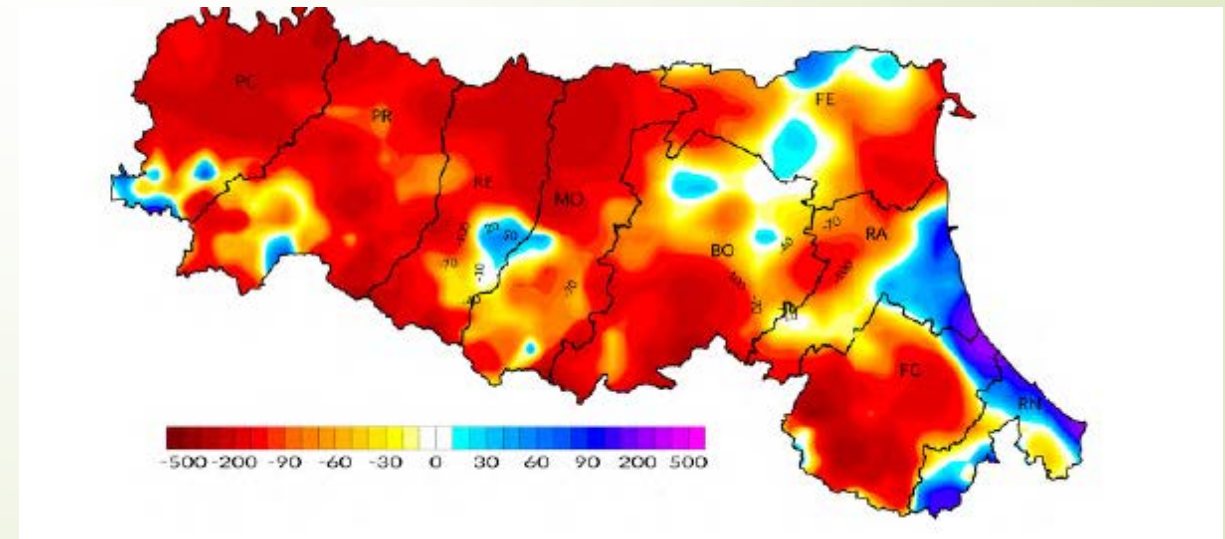
Source: ARPAE



2018: Hydroclimatic balance sheet

It's the difference between precipitation and evapotranspiration. Deficiencies in the foothills and plains of up to -550 mm and a water surplus of up to 900 mm in the entire Apennines.

Source: ARPAE



Climate variability observed in Emilia-Romagna

- Significant increases of minimum and maximum temperatures in annual and seasonal. More intense increase sign in highs and, especially during the summer
- Average cumulative annual and seasonal rainfall is slightly decreasing, except in autumn where a positive trend is maintained.

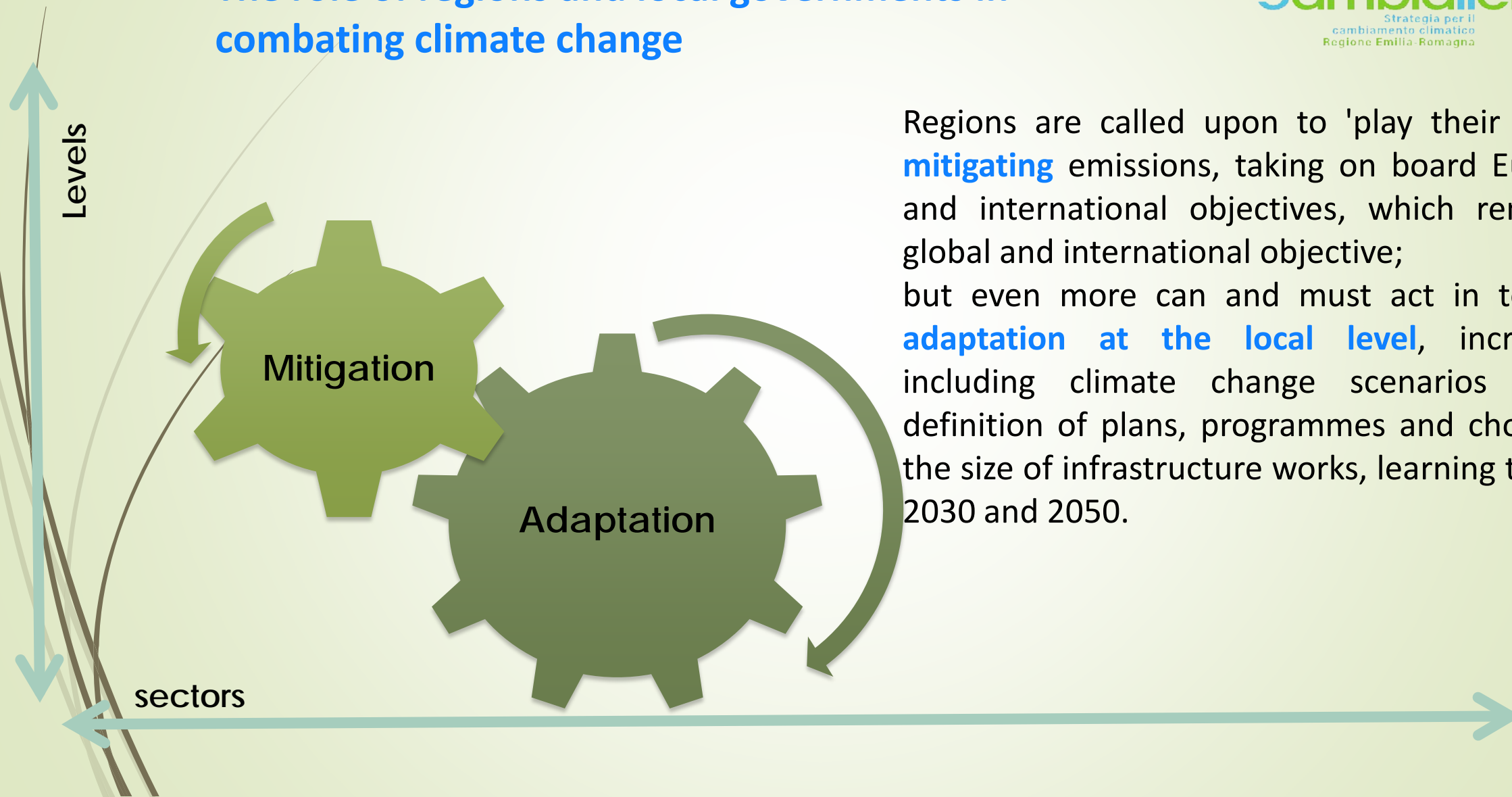
Future climate variability in Emilia-Romagna

- For the period 2021-2050, the minimum and maximum temperature can be increased by about 1.5° C in winter, spring and autumn approx. 2.5°C in summer
- **Possible increases in temperature extremes, in particular heat waves and tropical nights**
- Possible increase in total precipitation and extreme events in autumn (about 20%) and increase in the number of days without precipitation in summer (about 20%)

Mitigation and Adaptation

The role of regions and local governments in combating climate change

Regions are called upon to 'play their part' in **mitigating** emissions, taking on board European and international objectives, which remains a global and international objective; but even more can and must act in terms of **adaptation at the local level**, increasingly including climate change scenarios in the definition of plans, programmes and choices for the size of infrastructure works, learning to target 2030 and 2050.



Objectives of the Regional Strategy for Mitigation and Adaptation

The Regional Adaptation and Mitigation Strategy aims, first of all, to provide an **overall framework for the regional sectors**, administrations and organizations involved, also in order to assess the implications of climate change in the different sectors concerned.

The **mainstreaming process**, with which this document was built, **was itself one of the objectives of the Strategy**, to encourage the involvement of all regional stakeholders in the process of defining shared and informed policies.

Identify **new adaptation and mitigation measures that will complement the plans and programmes being reviewed and updated.**

Identify and activate a **process of involvement of local stakeholders** in order to integrate the issue of adaptation and mitigation in all regional sectoral policies.

The sectors included

- 1. Inland water and water resources**
- 2. Air quality**
- 3. Settlement systems and urban areas**
- 4. Territory (landslides, floods and soil degradation)**
- 5. Coastal areas**
- 6. Transport and Infrastructures**
- 7. Forests**
- 8. Biodiversity and Ecosystems**
- 9. Agricultures**
- 10. Production system**
- 11. Energy system**
- 12. Tourism**
- 13. Health**
- 14. Cultural Heritage**
- 15. Fisheries and aquaculture**

Main climate change risks analyzed in the Strategy

- increase in forest fires
- hydrogeological instability (landslides, floods) and subsidence
- soil degradation and the initiation of desertification processes
- loss of agricultural production
- lower water availability and quality
- retreat of the coastline
- saline intrusion
- adverse health effects
- increase in energy consumption
- loss of biodiversity and modification of ecosystems
- negative effects on economic activities (industry, trade, tourism)

The Strategy definition phases/i

Preparatory phase: Internal workshops for share climate scenario and define a common glossary

Mapping of all the mitigation and adaptation actions, already included, into the regional Plans and Programs)

Assessment of strength/weakness of the actions related the climate change scenarios (Matrix risks/actions)

The Strategy definition phases/ii

**Definition of new
measures/actions on the
bases of gaps**

**Setting up of Climate
Change Scenarios
Observatory (ARPAE)**

**Setting up of regional
internal Observatory for the
evaluation of effectiveness
of the actions**

The main vulnerabilities in Emilia-Romagna

- **the greatest impact of the climate change is related to the water cycle,** i.e. the greater frequency and intensity of extreme weather and climate events and the change in the average annual water availability;
- a **progressive erosion of the coast,** which is also subject to an increase in the number and intensity of storms, due to the combined action of sea rise and subsidence.

Short/Medium-term ambitions for the Climate Change (2030)

Implementation of the Regional Strategy for Mitigation and Adaptation through:

- **Updating of sector planning/programming by introducing and/or reinforcing mitigation and/or adaptation actions**
- **Greater integration between planning and multilevel governance also through support to the development of local adaptation plans**
- **Activation of the monitoring of the effectiveness of actions at global and transversal level and continuous mapping of territorial vulnerabilities**
- **Development of a culture of 'climate risk' in the design of public works (dimensioning and innovation) and in stakeholders**

Proposals for actions/addresses for future planning and programming

- The actions/addresses are divided into proposals for adaptation and mitigation
- The actions/addresses are both sectorial and cross-cutting
- They must be integrated into existing and future policies, plans and programs
- New actions/addresses for mitigation, only for those sectors considered a priority for mitigation (agriculture, energy system, production system, settlement system and urban areas, forests, transport)

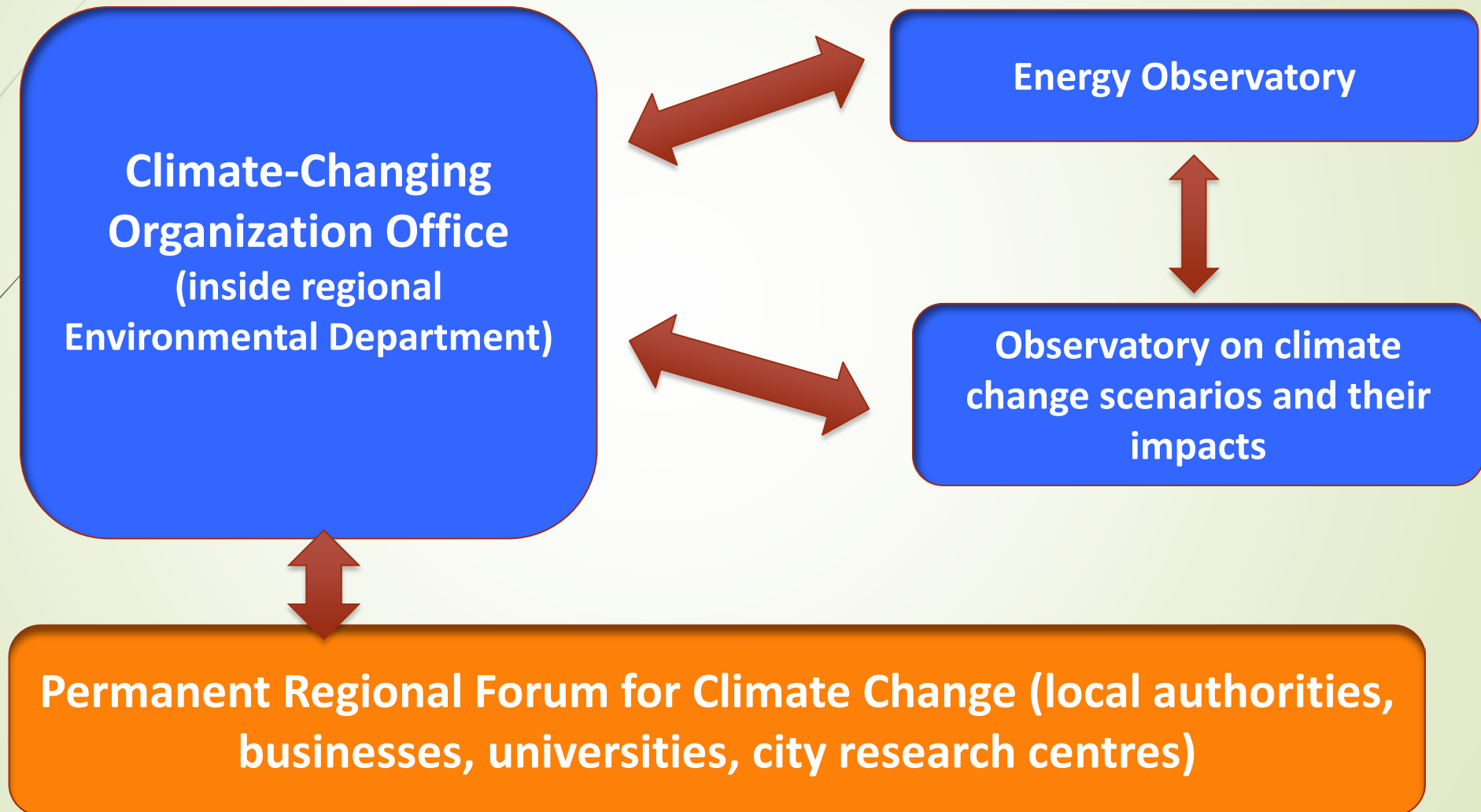
Some of the sectorial **Adaptation Actions** included in the document

- Preparation of a **Plan for the defense and adaptation of the coastal zone to climate change**
- Refinement of treatment systems on urban wastewater treatment plants for the reuse of wastewater
- **Prescription / encouragement of water efficiency/saving standards in civil construction and Regulation of agricultural practices: introduction of techniques that reduce the emission of GHG precursors**
- Define and systematize maintenance plans, safety plans and plans to reduce the vulnerability of structures, infrastructures, and structures (e.g. roads, distribution networks) of strategic importance also for the security of the territory and of people.
- **Allocate resources for structural interventions to counter heat waves**
- **Promote Adaptation Plans for companies**

Some concrete actions to implement the sustainable mobility strategy - **Zero Emission Vehicles (ZEV)**

- incentives for the purchase of electric vehicles and EV charging stations
- **Exclusive purchase of zero-emission buses from (2025-2030) and exclusive purchase of zero-emission vehicles for public fleets by 2030**
- Install EV chargers in all public buildings by 2020
- **Support the installation of EV chargers in the workplace**
- Installation of EV fast chargers on major motorways by 2025

The Governance for the mitigation and adaptation Strategy implementation and maintenance



Regional permanent Forum for Climate Change - goals

Institutional capacity, the socioeconomic context, as well as individual perception, knowledge and availability play a key role in the "adaptive capacity" of a social system.

- Awareness raising and information on the meaning of "adaptation and mitigation to climate change"
- Dissemination of knowledge and training on solutions and practices
- place of **permanent dialogue** with local administrations and productive sectors for the comparison and coordination on mitigation and adaptation policies at local level
- **inform citizens** about adaptation and mitigation issues, so that they can **contribute to the development of increasingly resilient territories**



Enterprises

Local
Authorities

Stakeholder
Citizens

Regional Forum for Climate Change - tools

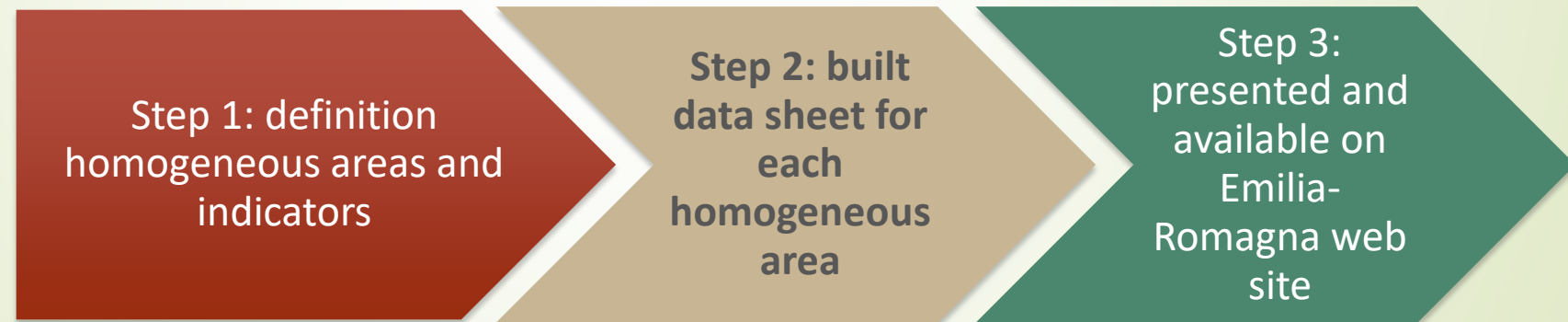
- ▶ With forms of participation in presence, **meetings and workshops** open to different stakeholders will be organized, with the use of methods of involvement, listening, communication and facilitation.
- ▶ Through a **web platform** that will ensure communication and transparency of the process by offering everyone the opportunity to participate online in the discussion
- ▶ Through **education and communication actions for students** carried out with the contribution of the Regional Centres of Education for Sustainability

Regional Forum for Climate Change - tools

Example of Forum activities to support local authorities for Sustainable Energy and Climate Action Plan

climate service: climate projection 2021 – 2050 for Sustainable Energy and Climate Action Plan

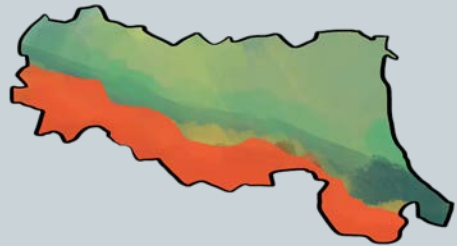
objective: to support municipalities and unions of municipalities to compose SECAP having a base of climate scenarios at the regional level defined with a single methodology



areas

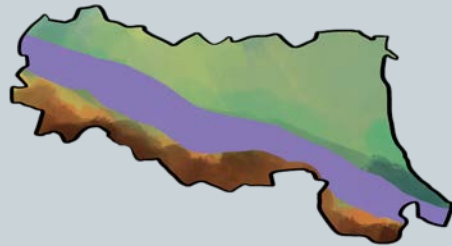
for each area in which the Emilia-Romagna Region has been divided, only schematically report the main and major effects that the risks identified above have on the physical-biological and socio-economic sectors.

ridge



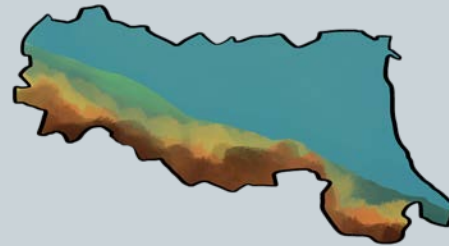
includes municipalities at altitudes exceeding 800 metres above sea level

hill



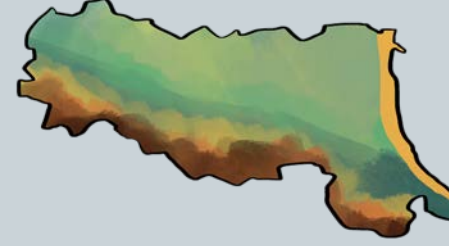
includes municipalities at altitudes between 200 and 800 metres above sea level

lowland



includes municipalities at altitudes lower than 200 metres above sea level

coastal



includes municipalities facing the sea or less than 5 km away

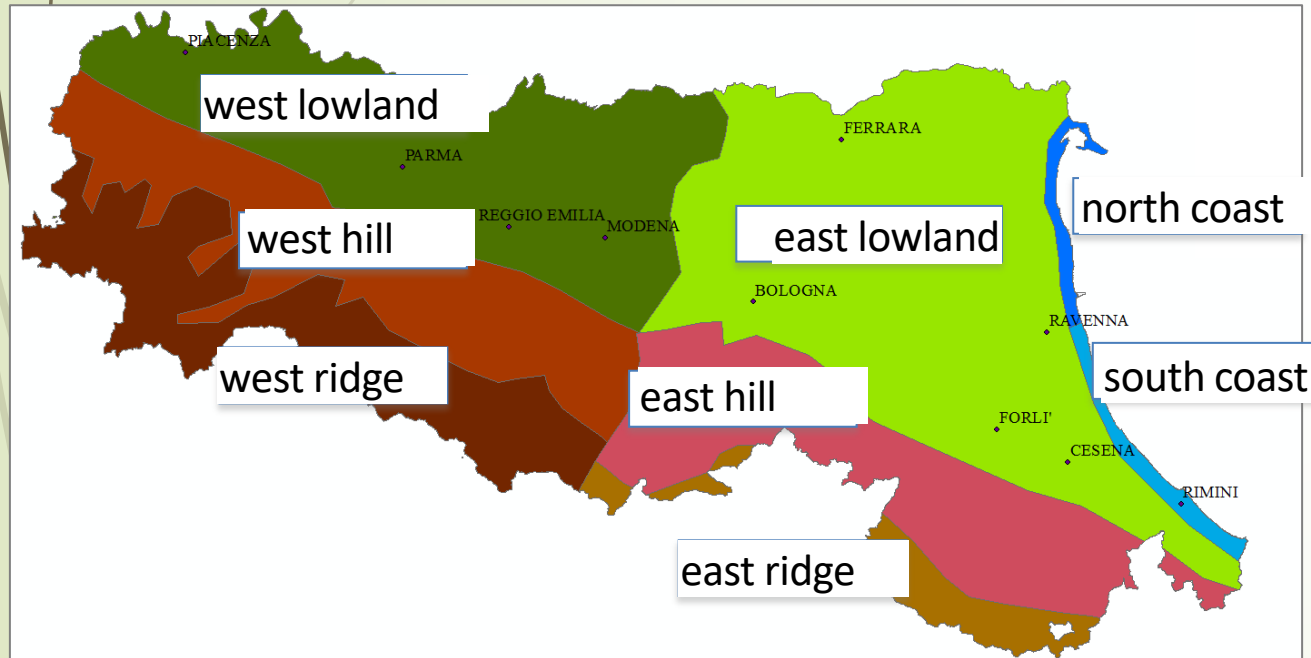
urban areas



include municipalities with > 30,000 inhabitants

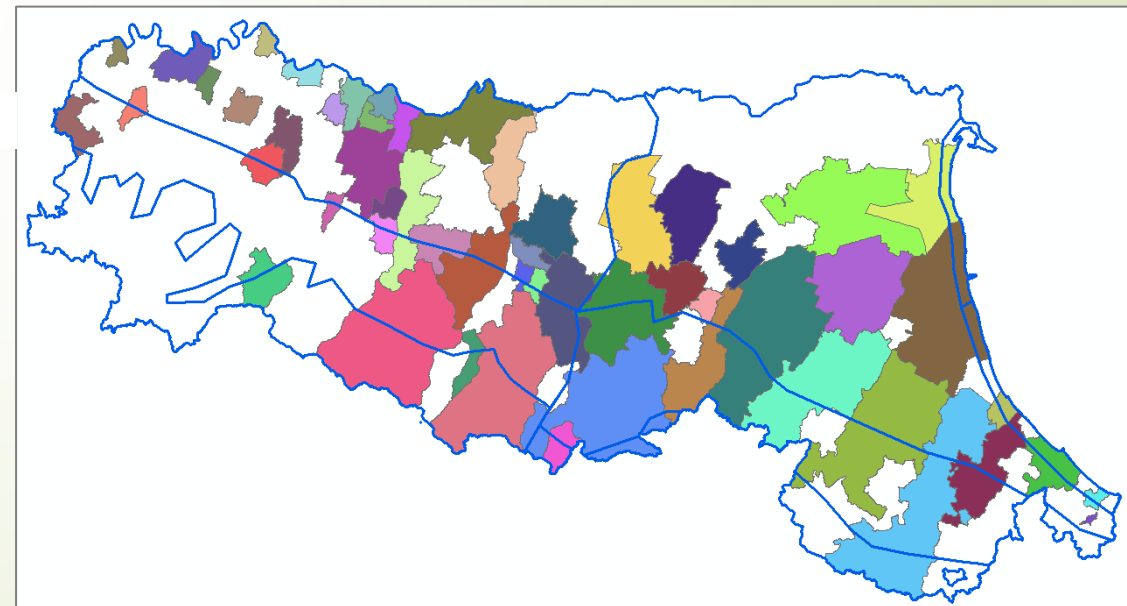
For a more in-depth, detailed analysis of the individual sectors, please refer to the annexes of the complete document – Climate change mitigation and adaptation strategy for the Emilia-Romagna Region – which is available on www.regione.emilia-romagna/ambiente/cambiamentoclimatico

homogeneous areas and SECAP municipalities



8 homogeneous areas and 10 urban areas

SECAP projects applications financed by the region



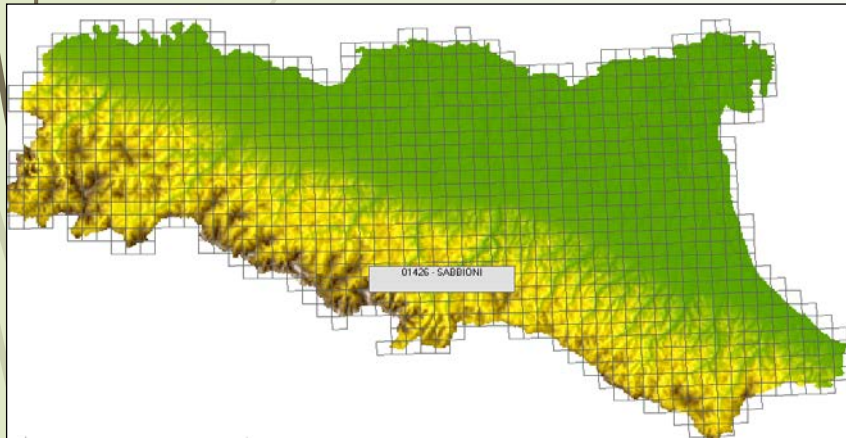
climate vulnerability seven indicators of the European SECAP guidelines

Indicator	Description
Average annual temperature	Annual average daily average temperatures
Maximum summer temperature	Average of the maximum daily temperatures recorded during the summer season
Minimum winter temperature	Average of the daily minimum temperatures recorded during the winter season
Tropical summer nights	Number of nights with the minimum temperature higher than 20°C, recorded in the summer season
Summer heat wave duration	Maximum number of consecutive days recorded during the summer, with the maximum daily temperature greater than the 90th percentile local daily (calculated over the 1961-1990 reference period)
Annual precipitation	Total annual precipitation quantity
Dry summer days	Maximum number of consecutive days without precipitation during the summer

statistical regionalization applied to Global Climate Models (Coupled Model Intercomparison Project 5 –CMIP5)

Il data set climatico Eraclito v. 4.2

Modelli Climatici Globali



- Spatial resolution 5x5 km;

Antolini et al, 2015, *Int. J. of Climatology*, DOI:10.1002/joc.4473

CMCC-CM	Centro Euro-Mediterraneo per i Cambiamenti Climatici	0.75°x0.75°
MPI-ESM-MR	Max Planck Institute for Meteorology	1.87°x1.87°
CNRM-CM5	Centre National de Recherches Meteorologiques	1.40°x1.40°
CanESM2	Canadian Center for Climate Modelling and Analysis	2.79°x2.81°
NorESM1	Norwegian Climate Center	1.9°x2.5°
INM-CM4	Russian Institute for Numerical Climate Modelling	2°x1.5°

Future Projection: Models Average (ensemble mean)

datasheet for each homogeneous area (i.e. eastern hill)

Minimum winter temperature

PAESC	
<i>Area di pertinenza</i>	COLLINA EST
<i>Periodo di riferimento</i>	1961-1990
<i>Periodo futuro</i>	2021-2050
<i>Scenario emissivo</i>	Rcp 4.5
<i>Fonte Dati</i>	data set Eraclito (vers. 4.2)
<i>Metodo di elaborazione</i>	regionalizzazione statistica applicata a modelli climatici globali.
<i>Indicatore</i>	temperatura minima invernale
<i>Descrizione</i>	media delle temperature minime giornaliere
<i>Unità di misura</i>	[°C]
<i>Valore climatico di riferimento</i>	0.0
<i>Valore climatico futuro</i>	1.4

climatic reference value

future climatic value

Average annual temperature

PAESC	
<i>Area di pertinenza</i>	COLLINA EST
<i>Periodo di riferimento</i>	1961-1990
<i>Periodo futuro</i>	2021-2050
<i>Scenario emissivo</i>	Rcp 4.5
<i>Fonte Dati</i>	data set Eraclito (vers. 4.2)
<i>Metodo di elaborazione</i>	regionalizzazione statistica applicata a modelli climatici globali.
<i>Indicatore</i>	temperatura media annua
<i>Descrizione</i>	media delle temperature medie giornaliere
<i>Unità di misura</i>	[°C]
<i>Valore climatico di riferimento</i>	11.7
<i>Valore climatico futuro</i>	13.4

datasheet for each homogeneous area (i.e. eastern hill)

Maximum summer temperature

PAESC	
<i>Area di pertinenza</i>	COLLINA EST
<i>Periodo di riferimento</i>	1961-1990
<i>Periodo futuro</i>	2021-2050
<i>Scenario emissivo</i>	Rcp 4.5
<i>Fonte Dati</i>	data set Eraclito (vers. 4.2)
<i>Metodo di elaborazione</i>	regionalizzazione statistica applicata a modelli climatici globali.
<i>Indicatore</i>	temperatura massima estiva
<i>Descrizione</i>	media delle temperature massime giornaliere
<i>Unità di misura</i>	[°C]
<i>Valore climatico di riferimento</i>	25.5
<i>Valore climatico futuro</i>	28.8

Tropical summer nights

PAESC	
<i>Area di pertinenza</i>	COLLINA EST
<i>Periodo di riferimento</i>	1961-1990
<i>Periodo futuro</i>	2021-2050
<i>Scenario emissivo</i>	Rcp 4.5
<i>Fonte Dati</i>	data set Eraclito (vers. 4.2)
<i>Metodo di elaborazione</i>	regionalizzazione statistica applicata a modelli climatici globali.
<i>Indicatore</i>	notti tropicali estive
<i>Descrizione</i>	notti con la temperatura minima superiore a 20°C
<i>Unità di misura</i>	
<i>Valore climatico di riferimento</i>	3
<i>Valore climatico futuro</i>	8

datasheet for each homogeneous area (i.e. eastern hill)

Summer heat wave duration

PAESC	
Area di pertinenza	COLLINA EST
Periodo di riferimento	1961-1990
Periodo futuro	2021-2050
Scenario emissivo	Rcp 4.5
Fonte Dati	data set Eraclito (vers. 4.2)
Metodo di elaborazione	regionalizzazione statistica applicata a modelli climatici globali.
Indicatore	onde di calore estive
Descrizione	numero massimo di giorni consecutivi con temperatura massima superiore al 90mo percentile
Unità di misura	
Valore climatico di riferimento	1
Valore climatico futuro	8

Annual precipitation

PAESC	
Area di pertinenza	COLLINA EST
Periodo di riferimento	1961-1990
Periodo futuro	2021-2050
Scenario emissivo	Rcp 4.5
Fonte Dati	data set Eraclito (vers. 4.2)
Metodo di elaborazione	regionalizzazione statistica applicata a modelli climatici globali.
Indicatore	precipitazione annuale
Descrizione	quantità totale cumulata
Unità di misura	[mm]
Valore climatico di riferimento	1000
Valore climatico futuro	910

Dry summer days

PAESC	
Area di pertinenza	COLLINA EST
Periodo di riferimento	1961-1990
Periodo futuro	2021-2050
Scenario emissivo	Rcp 4.5
Fonte Dati	data set Eraclito (vers. 4.2)
Metodo di elaborazione	regionalizzazione statistica applicata a vari modelli climatici globali.
Indicatore	giorni senza precipitazione in estate
Descrizione	numero massimo di giorni consecutivi con precipitazione inferiore a 1 mm
Unità di misura	
Valore climatico di riferimento	20
Valore climatico futuro	25

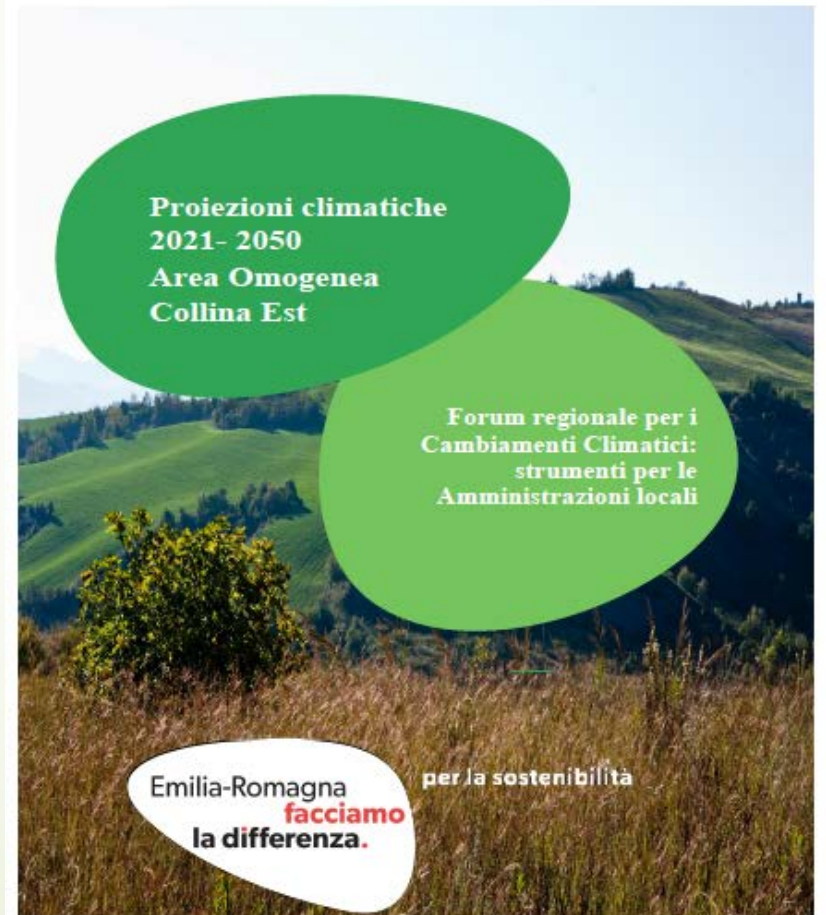
correspondence of municipalities with homogeneous area

REGGIO EMILIA PROVINCE			
MUNICIPALITY	HOMOGENEOUS AREA CLIMATE DATA SHEET	HOMOGENEOUS AREA CLIMATE DATA SHEET	HOMOGENEOUS AREA CLIMATE DATA SHEET
Albinea	LOWLAND WEST	HILL WEST	
Bagnolo in Piano	LOWLAND WEST		
Baiso	HILL WEST		
Bibbiano	LOWLAND WEST		
Boretto	LOWLAND WEST		
-----	LOWLAND WEST		

booklets datasheet for each homogeneous area

**available in Emilia-Romagna
website – climate change pages**

<https://ambiente.regione.emilia-romagna.it/it/cambiamenti-climatici/gli-strumenti/forum-regionale-cambiamenti-climatici/scenari-climatici-regionali-per-aree-omogenee-1/schede>



**We don't have more time!
We have to act!**



Thanks!

<http://ambiente.regione.emilia-romagna.it/it/cambiamenti-climatici>

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