

CLIMATE CHANGE ADAPTATION

NATIONAL POLICY AND LOCAL ACTIONS

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climatici*

*Cutting-edge research to investigate and to address
the Climate Change Challenge*

Who we are

The Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici (Fondazione CMCC) is a non-profit research institution. CMCC's mission is to investigate and model our climate system and its interactions with society to provide reliable, rigorous, and timely scientific results, which will in turn stimulate sustainable growth, protect the environment, and develop science driven adaptation and mitigation policies in a changing climate.



Climate Change is happening

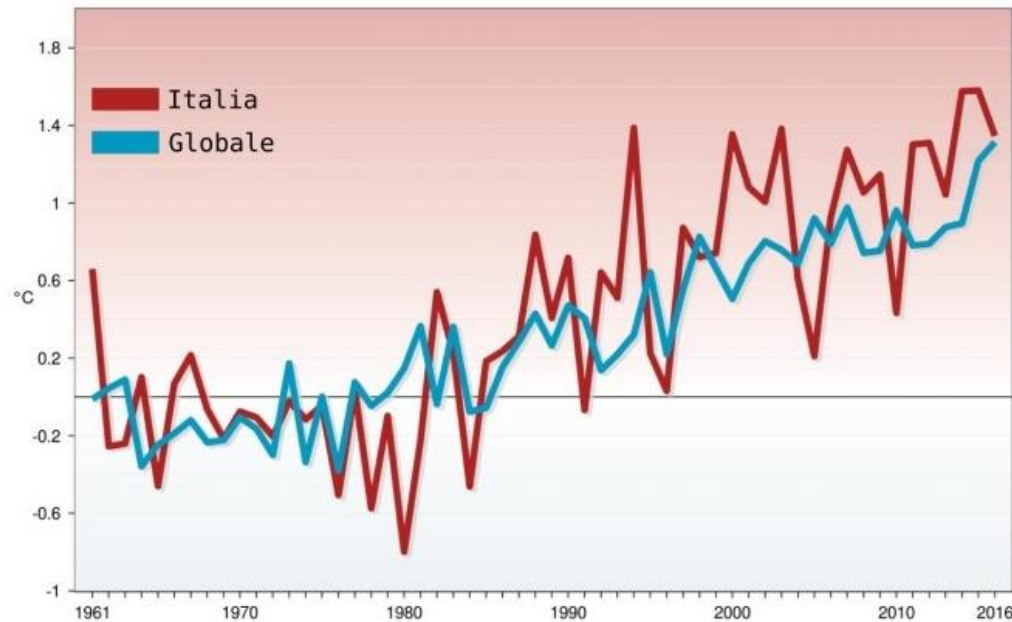


Figura 2.1: Serie delle anomalie di temperatura media globale sulla terraferma e in Italia, rispetto ai valori climatologici normali 1961-1990. Fonti: NCDC/NOAA e ISPRA. Elaborazione: ISPRA.

On average, the global land surface temperature anomaly was $+1,31^{\circ}\text{C}$ compared with the normal value 1961-1990, while in Italy the thermometer of global warming recorded $+1,35^{\circ}\text{C}$ (Data source: ISPRA 2016)

The same happens to the sea surface temperature of Italian seas. ISPRA observed: « an average anomaly of $+0.99^{\circ}\text{C}$ compared to the period 1961-1990».



The expected impact of climate change

- Reduction in water availability
- Increase of drought
- Serious biodiversity losses
- Increase of forest fires
- Reduction in summer tourism
- Increase of heat waves' effects on health
- Extension of habitats for diseases' vectors
- Reduction of hydroelectric power generation
- Reduction of agricultural areas
- ...



IMPACTS= Effects on natural and human systems. [...] The term impacts is used primarily to refer to the effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. (IPCC 2014)



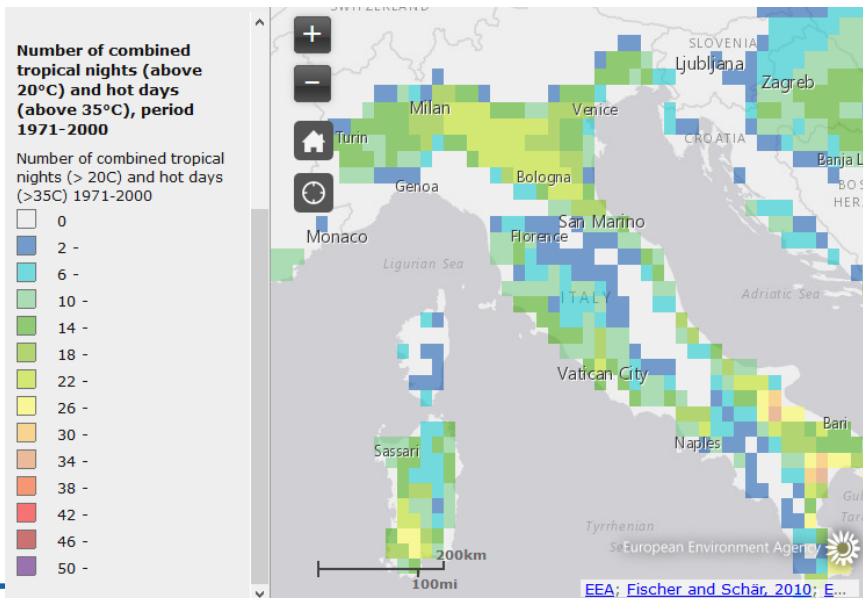
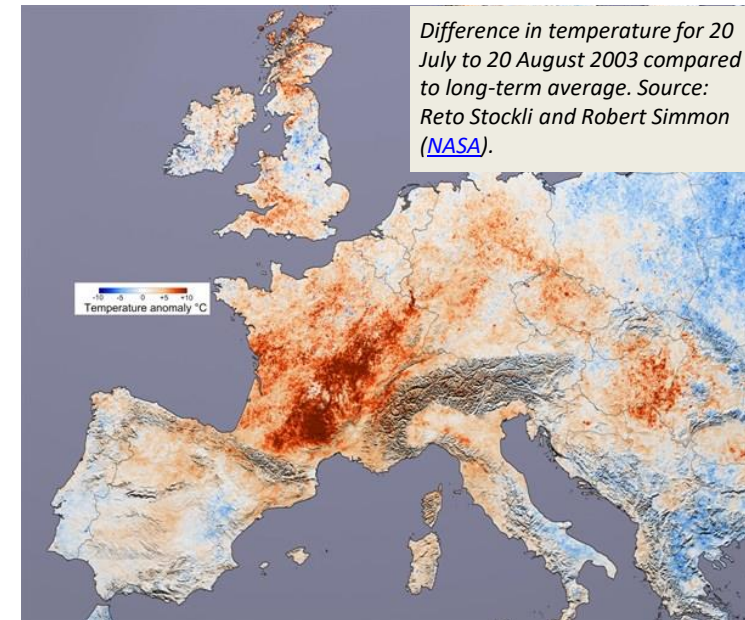
Impact of climate change on urban areas

Heat waves

EU: the increase of temperature is the principal cause for the increase of heat waves observed during summer.

In the urban context, the build environment contributed to worsen the intensity and the frequency of these events.

Europe, August 2003: 70.000 victims in 12 countries



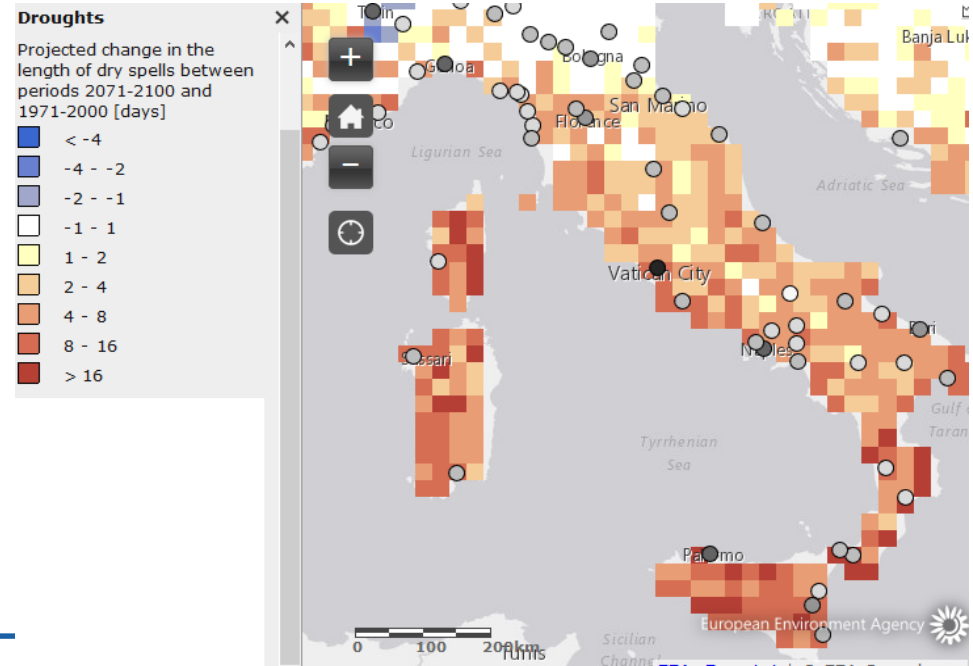
In the future, this type of event is expected to become more persistent and more frequent



Expected climate change in urban areas

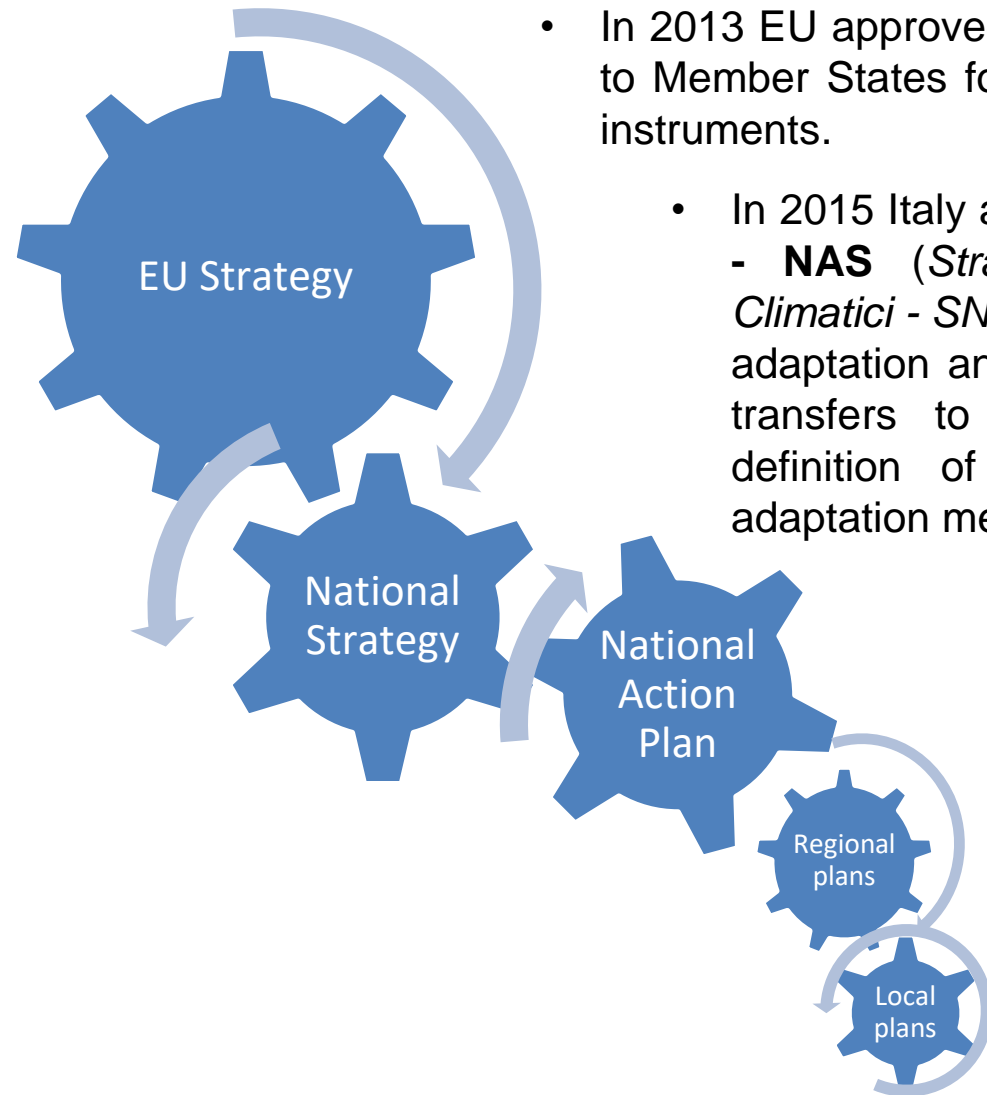
Increase of drought period and extreme events

- Urban flood
- Geo-hydrological events
- Damages to infrastructures and services
- Reduction of precipitations during summer
- Competition among services for water resources



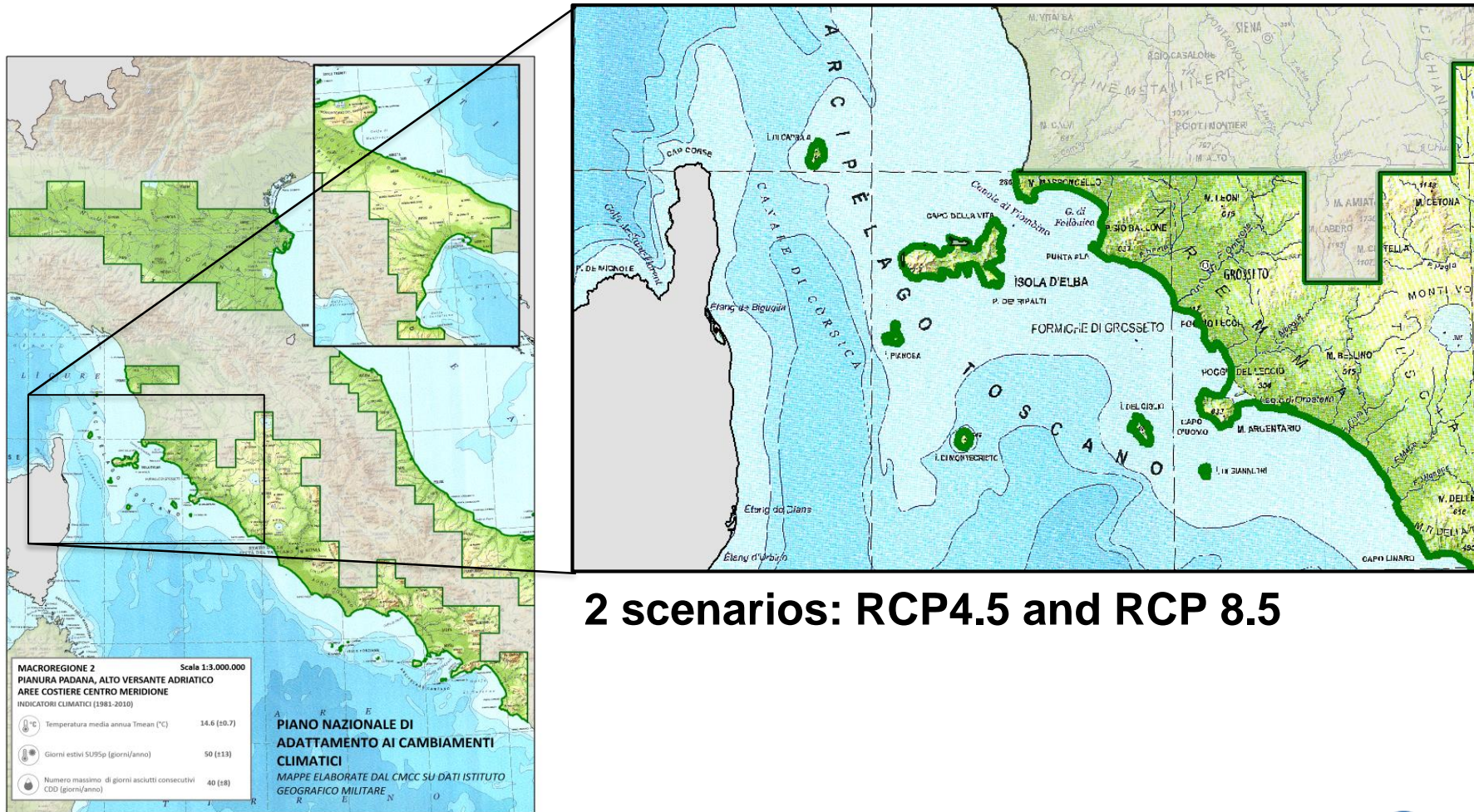
The adaptation framework in Italy

- In 2013 EU approved a **European Strategy**. It gives mandate to Member States for the development of national adaptation instruments.
 - In 2015 Italy adopted the **National Adaptation Strategy** - **NAS** (*Strategia di Adattamento ai Cambiamenti Climatici - SNAC*) that identifies the general principles for adaptation and the main risks in 18 different sectors. It transfers to the National Adaptation Plan for the definition of precise future climate scenarios and adaptation measures.
 - The **National Adaptation Plan – NAP** (*Piano Nazionale di Adattamento ai Cambiamenti Climatici - PNACC*) – currently under approval after a public consultation phase.
 - **From national to local level:** local authorities are responsible for the proper definition and implementation at local level.



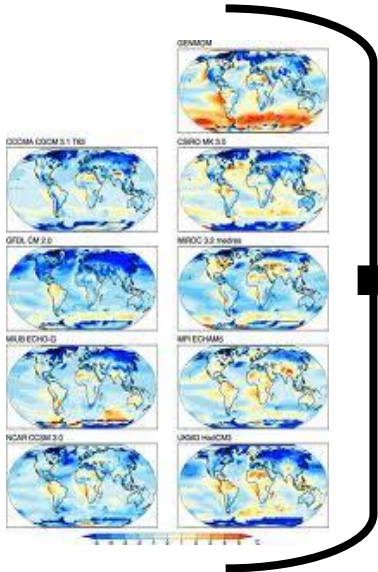
1° Step: knowing the present and future climate

The NAP offers a detailed analysis of current and future climate conditions. 6 land macro-regions have been identified.

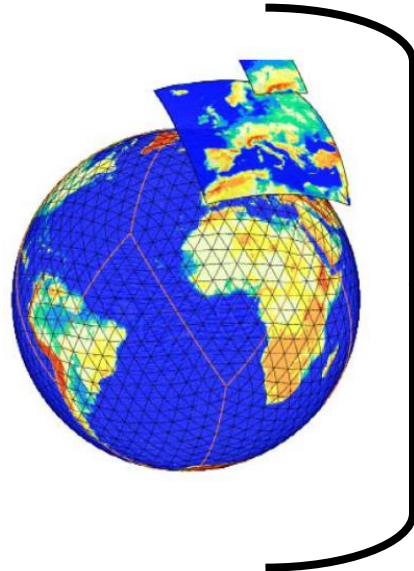


From Climate to Impacts

Climate data from GCMs/ESMs



Downscaling (statistical/dynamical)



Models for impact assessment

Agriculture

Forest and fires

Water cycle

Coastal Zones

Tourism

Health

.....

Economic analyses

Climate change mitigation

Climate risk reduction or prevention

Adaptation to Climate Change

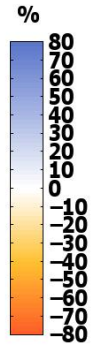
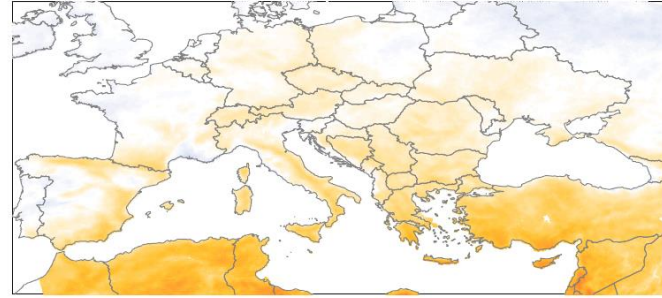
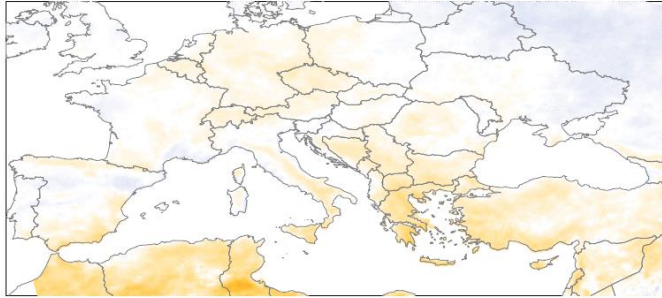


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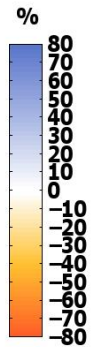
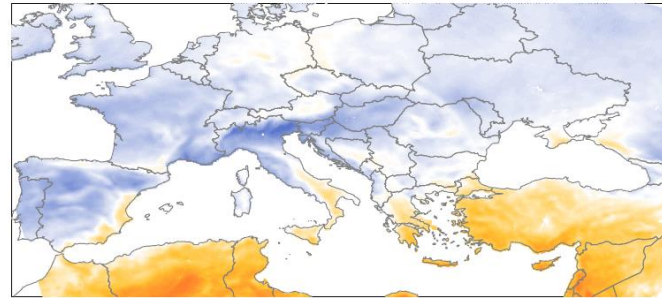
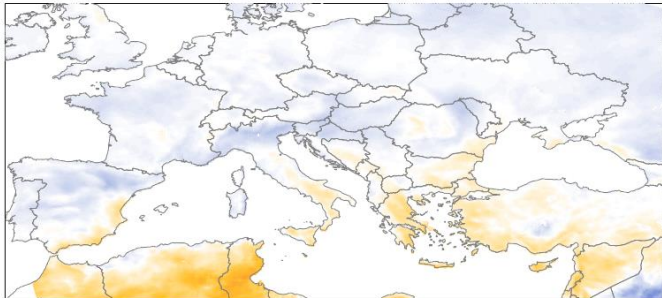
RCP4.5

RCP8.5

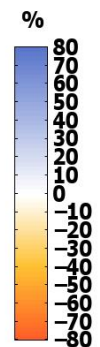
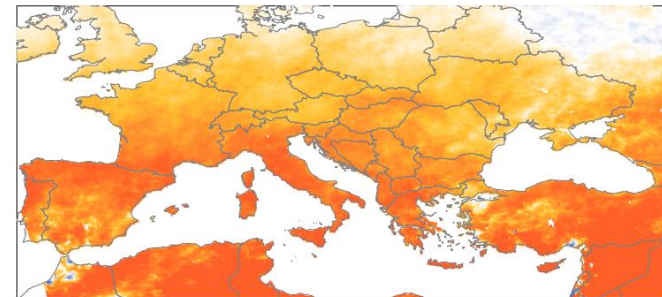
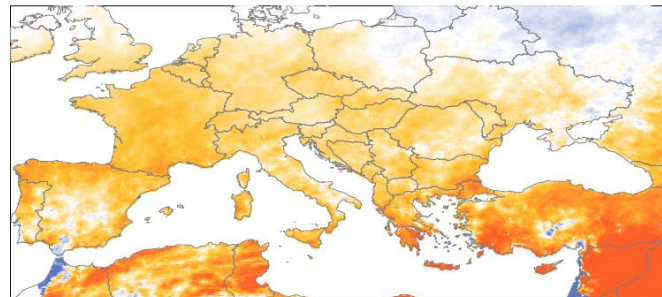
ANNUAL



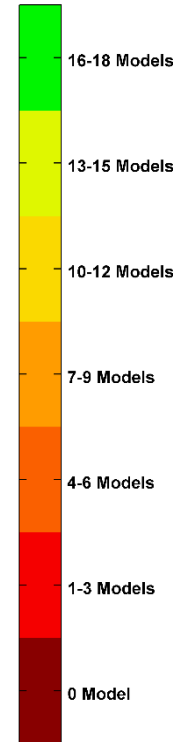
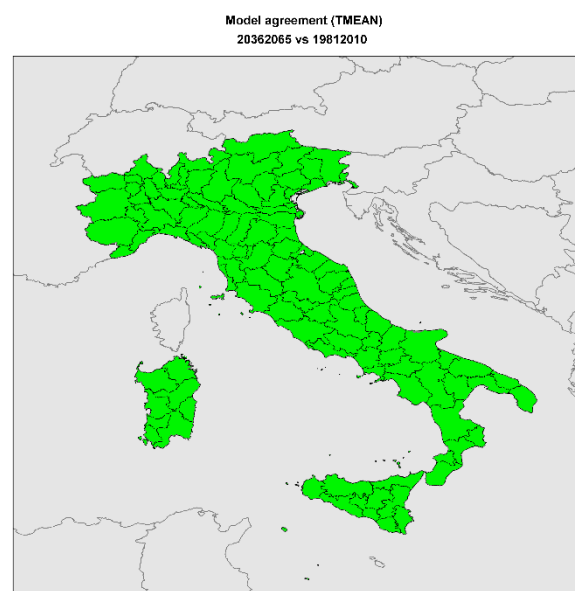
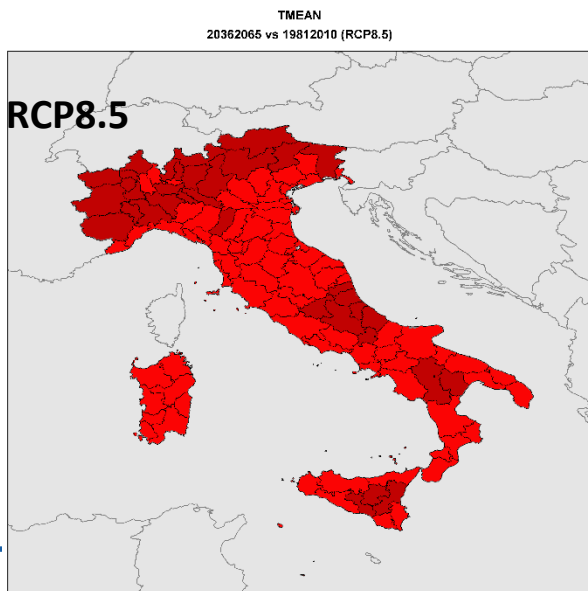
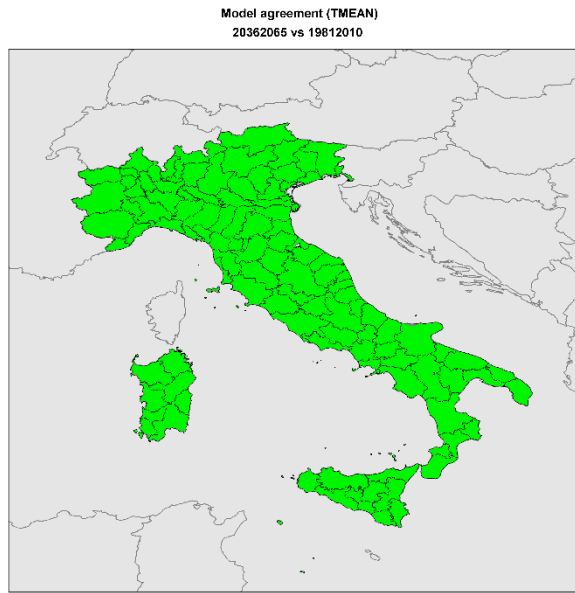
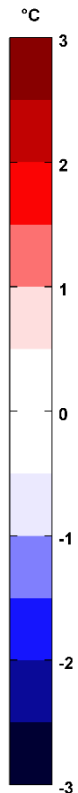
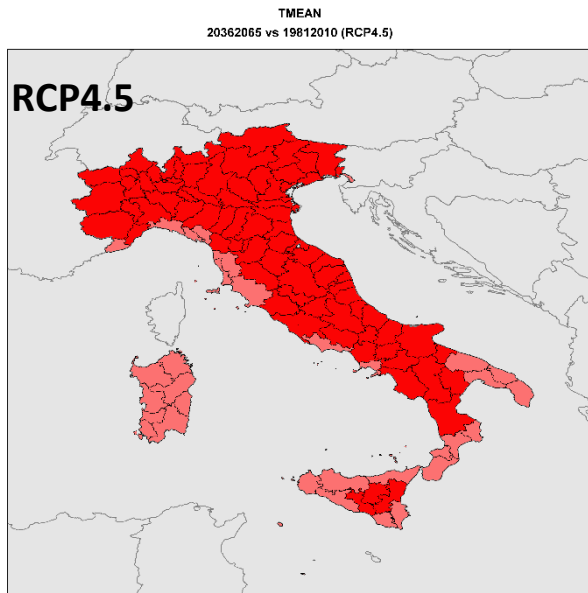
WINTER



SUMMER



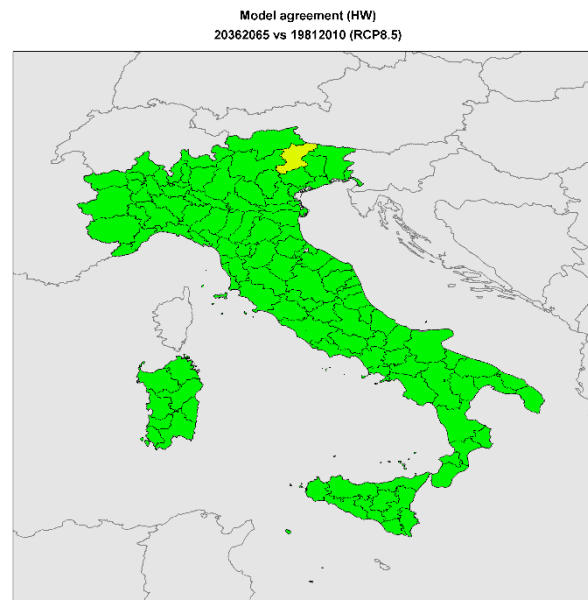
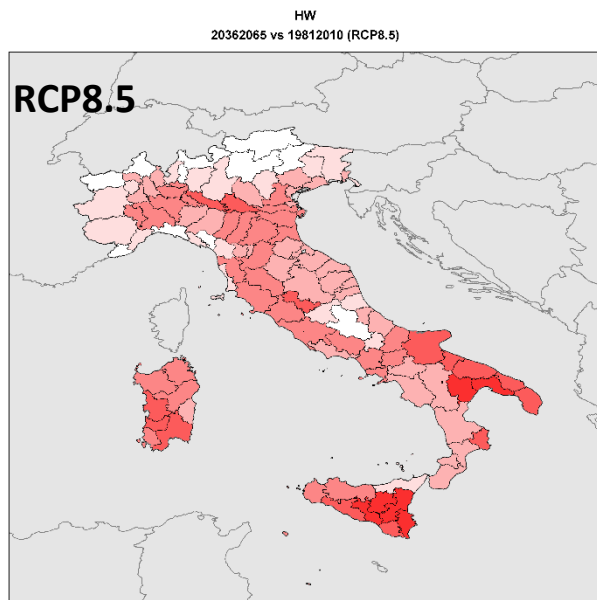
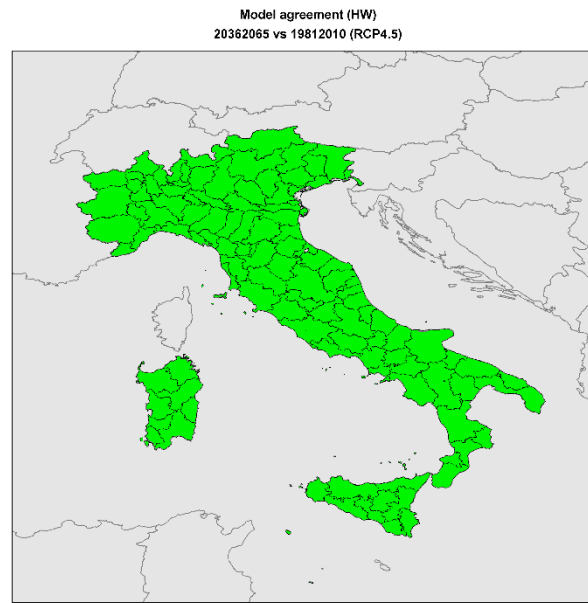
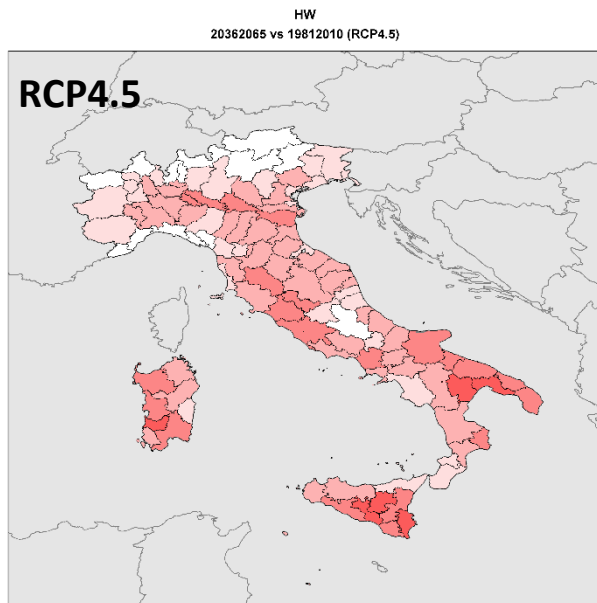
Data projection on Italy (NUTS3): mean temperature



**Variation of
daily mean
temperature:
2036-2065 vs
1981-2010**



Data projection on Italy (NUTS3): number of days with maximum temperature over 35°C



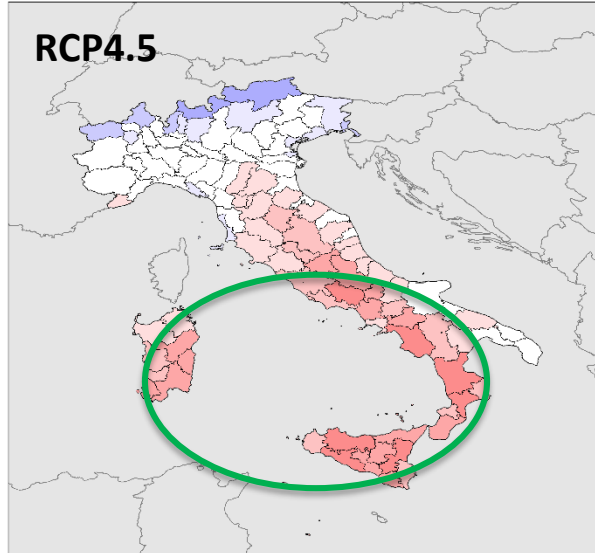
**Variation of
the number of
days with
maximum
temperature
over 35°C:
2036-2065 vs
1981-2010**



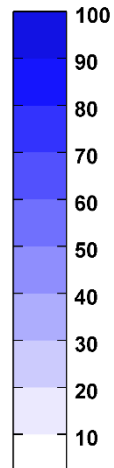
Data projection on Italy (NUTS3): annual precipitation

PRCPTOT
20362065 vs 19812010 (RCP4.5)

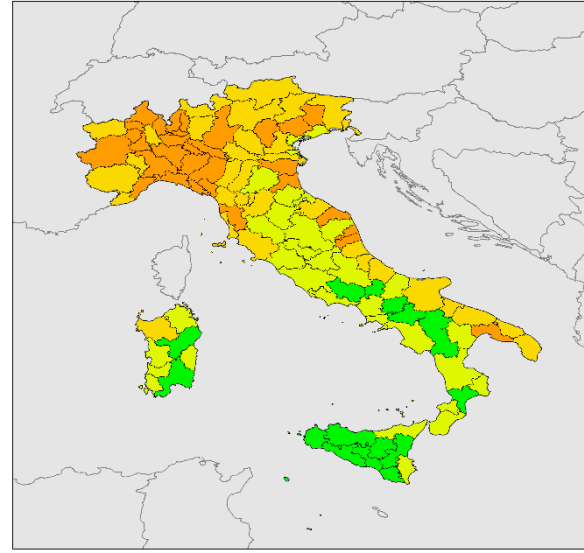
RCP4.5



mm/year



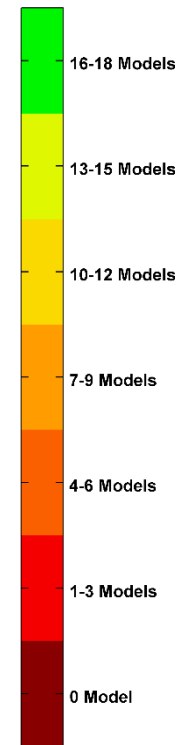
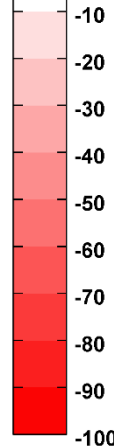
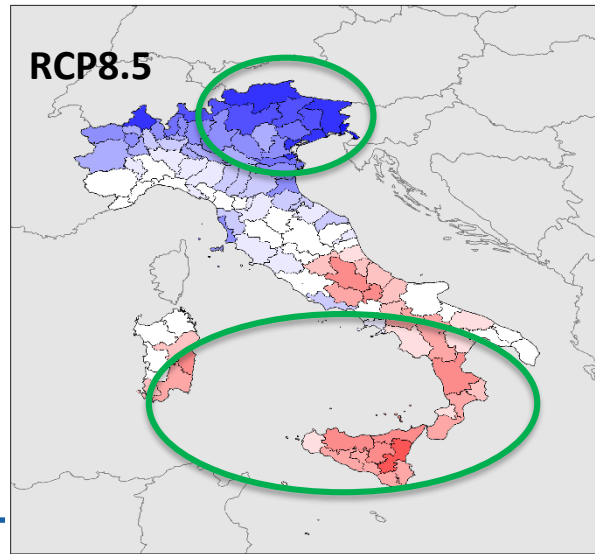
Model agreement (PRCPTOT)
20362065 vs 19812010 (RCP4.5)



Model agreement (PRCPTOT)
20362065 vs 19812010 (RCP8.5)

20362065 vs 19812010 (RCP8.5)

RCP8.5



Variation of
annual
precipitation:
2036-2065 vs
1981-2010



2° Step: Knowing the impacts

The NAP analyses the impacts on 18 different sectors (grouped in Land, Water and Man).

WATER

- Water resources
- Marine ecosystems
- Inland water ecosystems
- Coastal zones

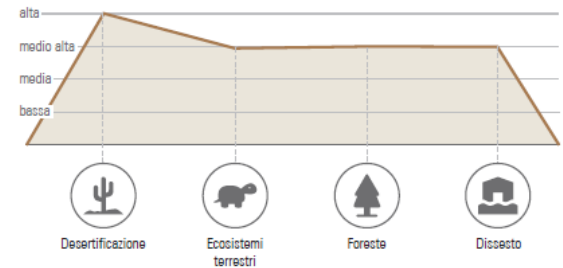
LAND

- Geological, hydrological and hydraulic disruption
- Desertification
- Land ecosystems
- Forests

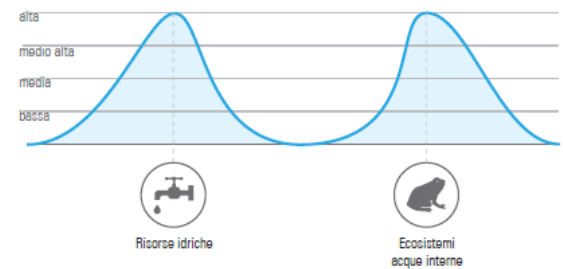
MAN

- Agriculture
- Marine fishery
- Aquaculture
- Tourism
- Urban settlement
- Transports
- Dangerous infrastructures and industrial plants
- Cultural heritage
- Energy
- Health

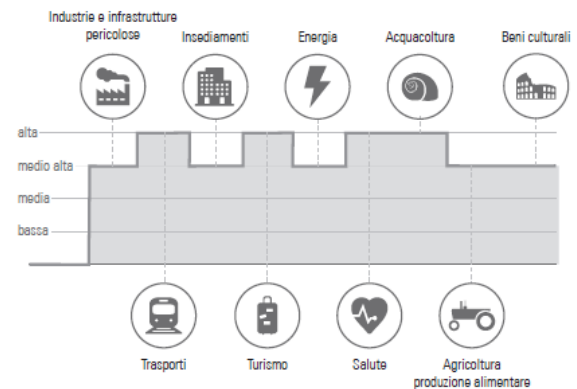
TERRA



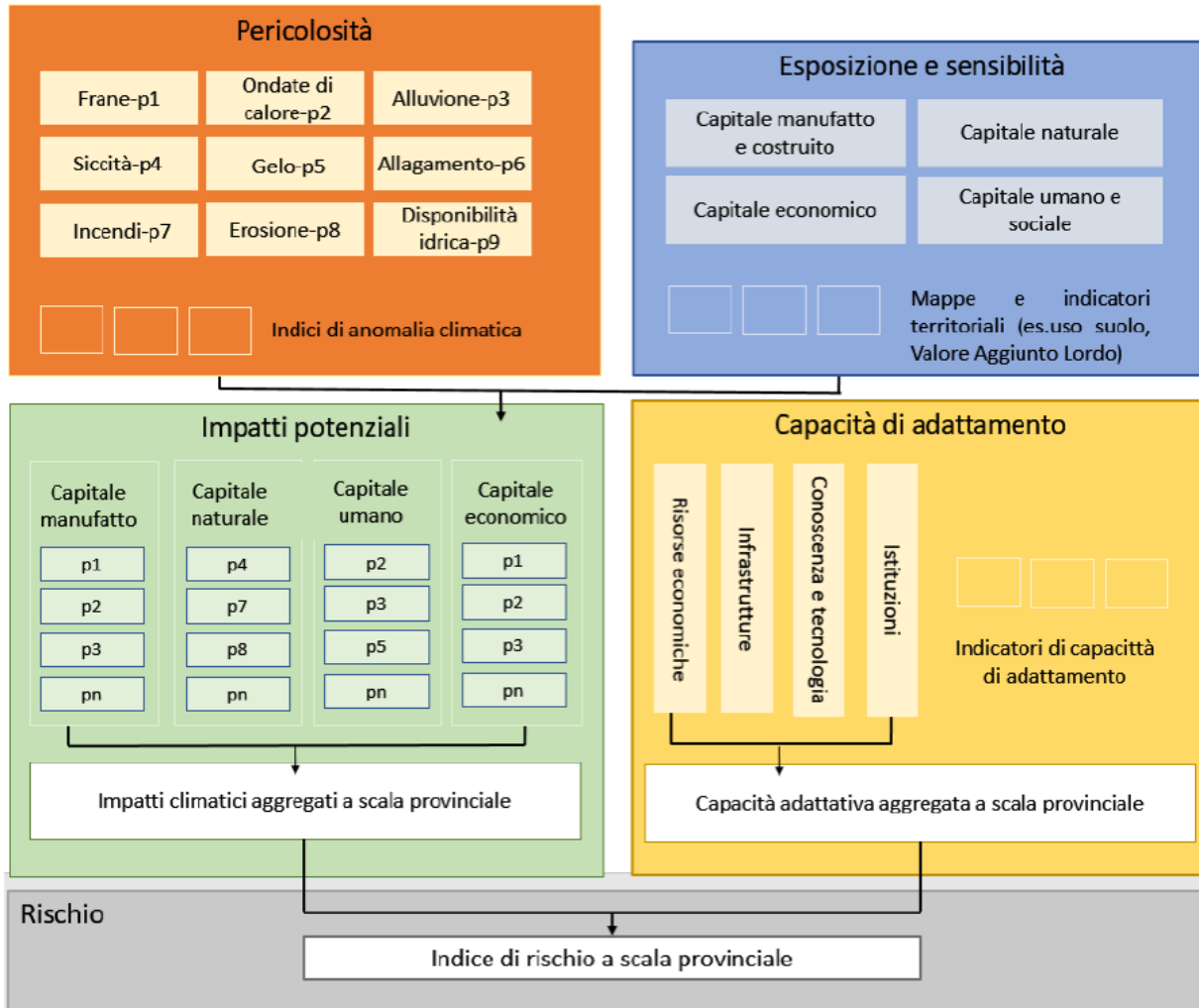
ACQUA



UOMO



2° Step: Knowing the impacts

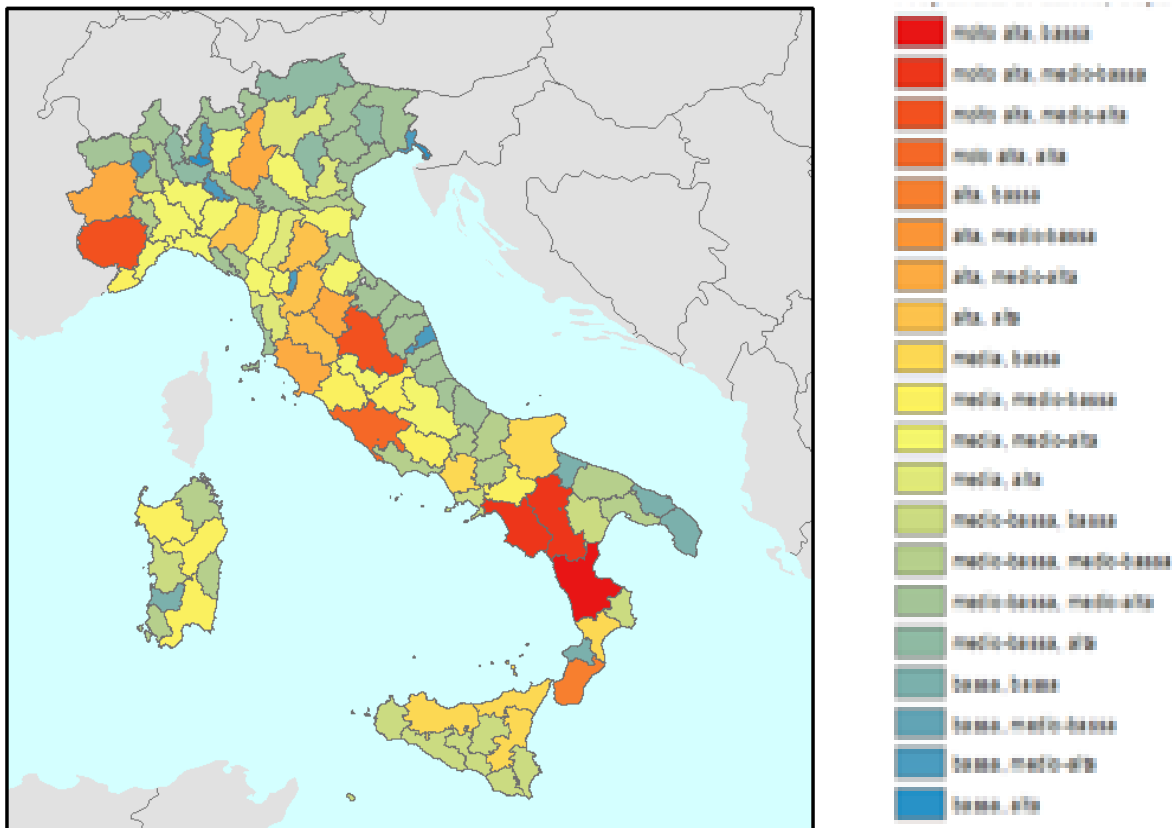


The NAP presents a **risk index at provincial scale**, which takes into account both the expected impacts and the adaptation capacity of each province.



2° Step: Knowing the impacts

The final outcome of this analysis is a risk map at provincial scale, where the impacts (ranked from low to very high) are related to the adaptation capacity (from high to low)



3° Step: the selection of the actions

Specific actions were identified to face the impacts and the threats in each sector.

The NAP offers a database of actions including information on action categories, regulations and implementing bodies, timeframe, monitoring indicators.

Two important things to remember when selecting the actions!

- You need a complete frame of the current policies and the local development priorities.
- You need a transversal approach, bundling the actions that affect the same resource or environmental component.



4° Step: Implementation and Governance

The NAP establishes two supporting bodies for the governance of the process, aiming to help local authorities during the implementation.

- **The Permanent Forum**

It is composed by representatives of IMELS and civil society and it aims to communicate and raise awareness on adaptation

- **National Observatory**

It is composed by representatives of Regions and Local Authorities and it aims to enhance the coordination between different levels and to monitor the implementation of the NAP

The implementation of each action requires to identify:

- Clear roles and responsibilities
- Precise timeframe
- Financial resources



Orientations for adaptation «to» and «towards» the local level

The NAP is intended as a flexible document, which offers flexible tools to local bodies at the regional/local level where the impacts of climate change will be mostly perceived.

It represents an abundant source of data and information and a robust analysis of the territory that has to be integrated with an adequate analysis of the local context.

- Coherence between **national** and **local objectives**.
- **Risk analysis** and impact analysis **fitting the local scale**
- **Sharing of priorities of action** with several stakeholders within the local context.
- Check of priorities with **neighboring territories** facing the same challenge and having similar opportunities.
- Priority to **non-infrastructural short-term actions** that can be integrated into the current local plans to increase resilience in the long period.
- Development of a **communication and information** programme.



Thank you!

