

WATER: a Resource to be preserved

Elisabetta Trovatore
Department for Environment and Civil Protection

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ERASMUS project “Water”



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From big strategies to day by day behaviors





01

A world of Water

The water cycle and its precarious equilibrium



A PLANET OF WATER

Planet Earth seen from space is blue, due to the water that covers 70% of the earth's surface

WHERE IS THE WATER?



OCEANS

Duration: 3,100 years



GLACIERS

Duration: 100 years



SNOW

Duration: up to 6 months

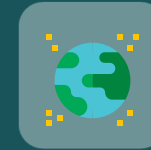


LAKES

100 years on average



RIVERS



ATMOSPHERE





97%

of the planet's water is contained by the oceans

0.6%

GROUNDWATER

2.1%

ICED WATER

0.1%

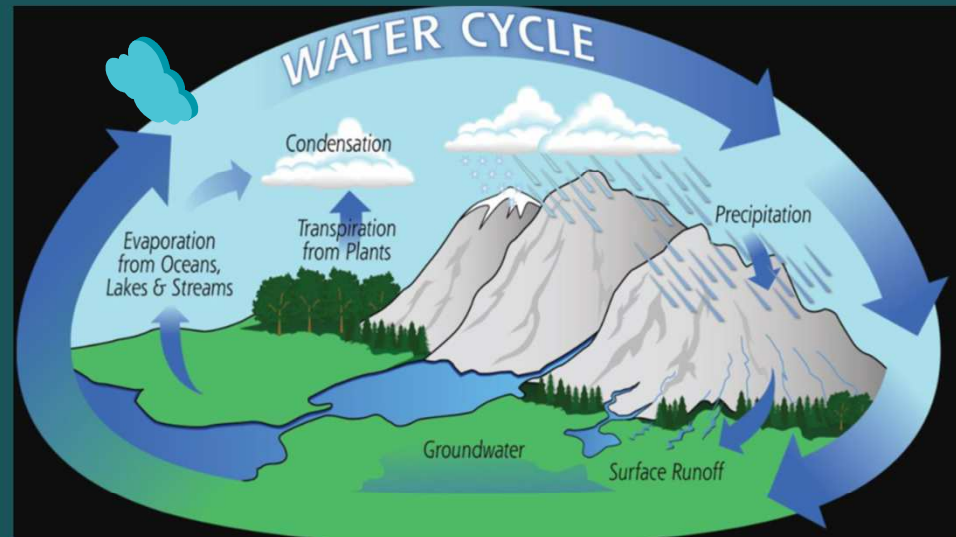
FRESH WATER

WATER CYCLE

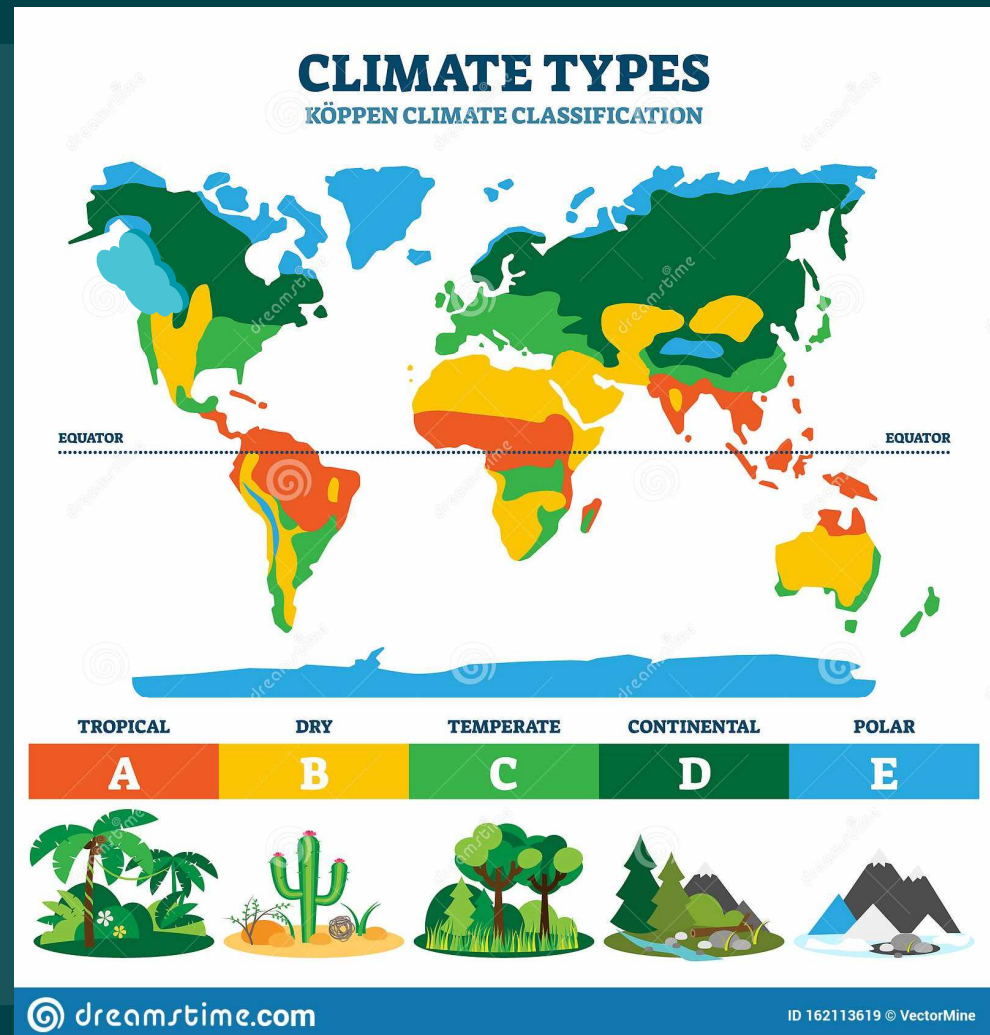
Water continuously changes:

State
(from liquid to gaseous to solid and back)

Place
(from atmosphere to earth and back)



DIFFERENT (natural) AVAILABILITY





02

What's wrong?

We have plenty of water. What's wrong?

WATER CYCLE and WATER USE

We use water:

Domestic withdrawal

Agriculture

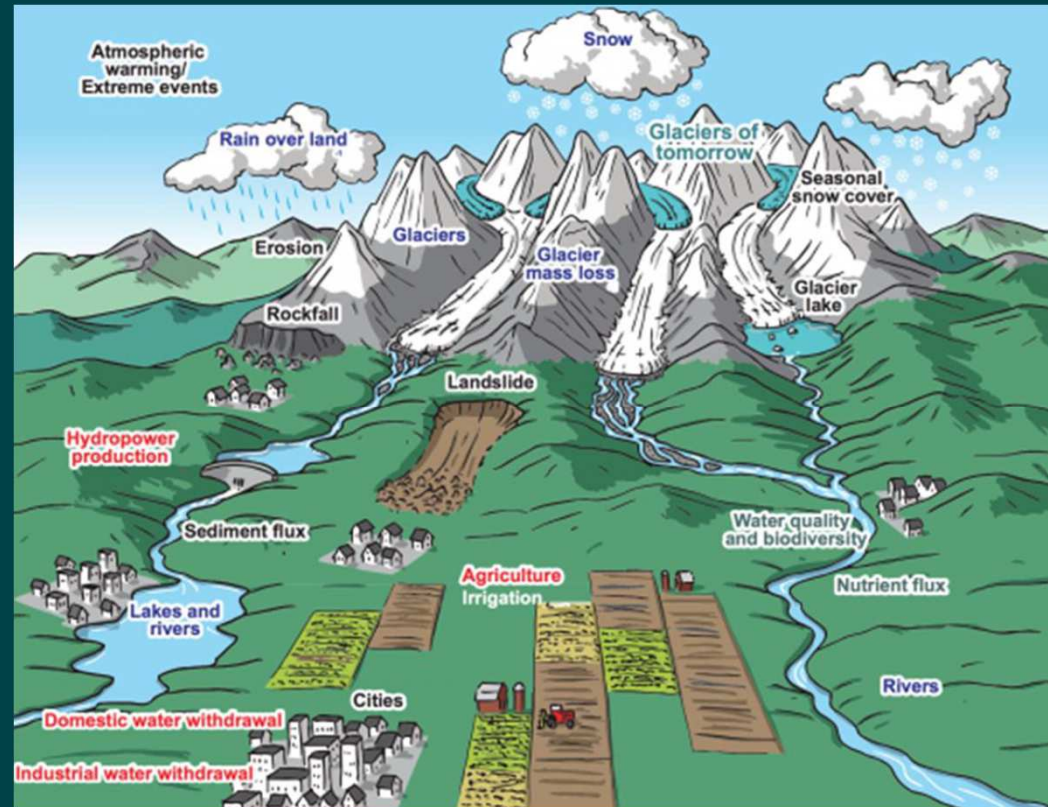
Livestock

Industry

Energy production

...

+ EMISSIONS + ...



SOME HUMAN ACTIVITY RISKS



EXPLOITATION



POLLUTION

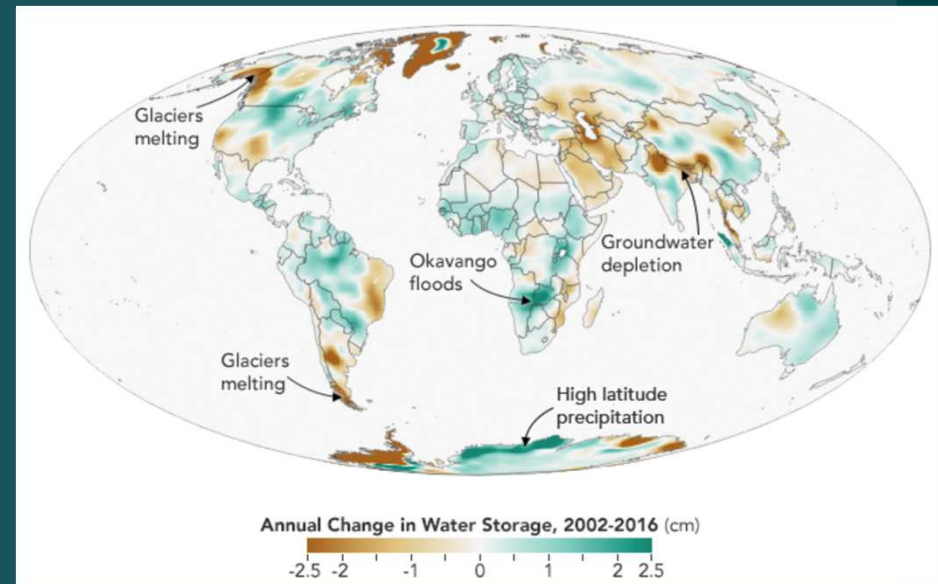
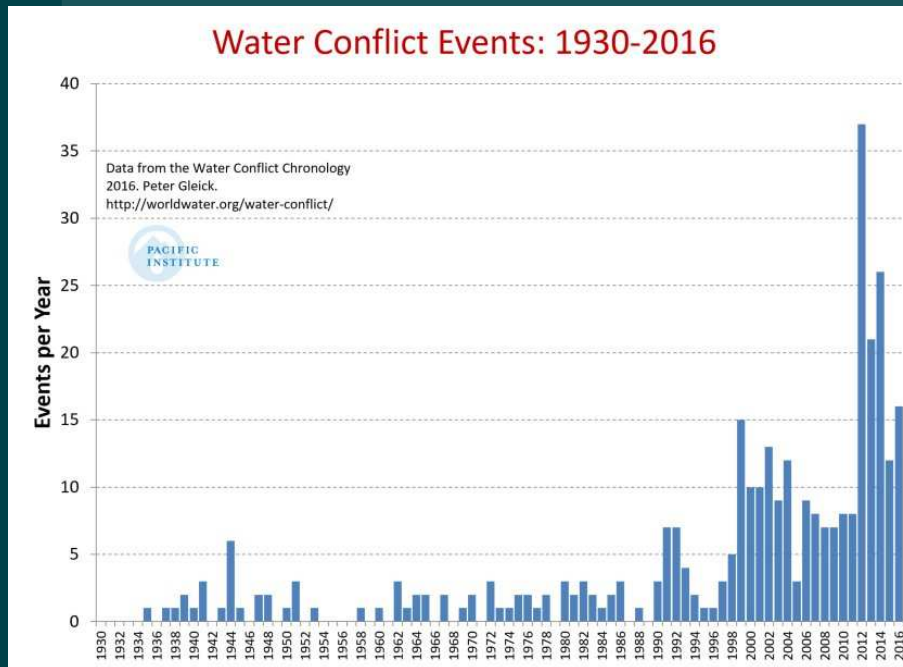


URBAN GROWTH



CLIMATE CHANGE

This is going to be the WATER CENTURY

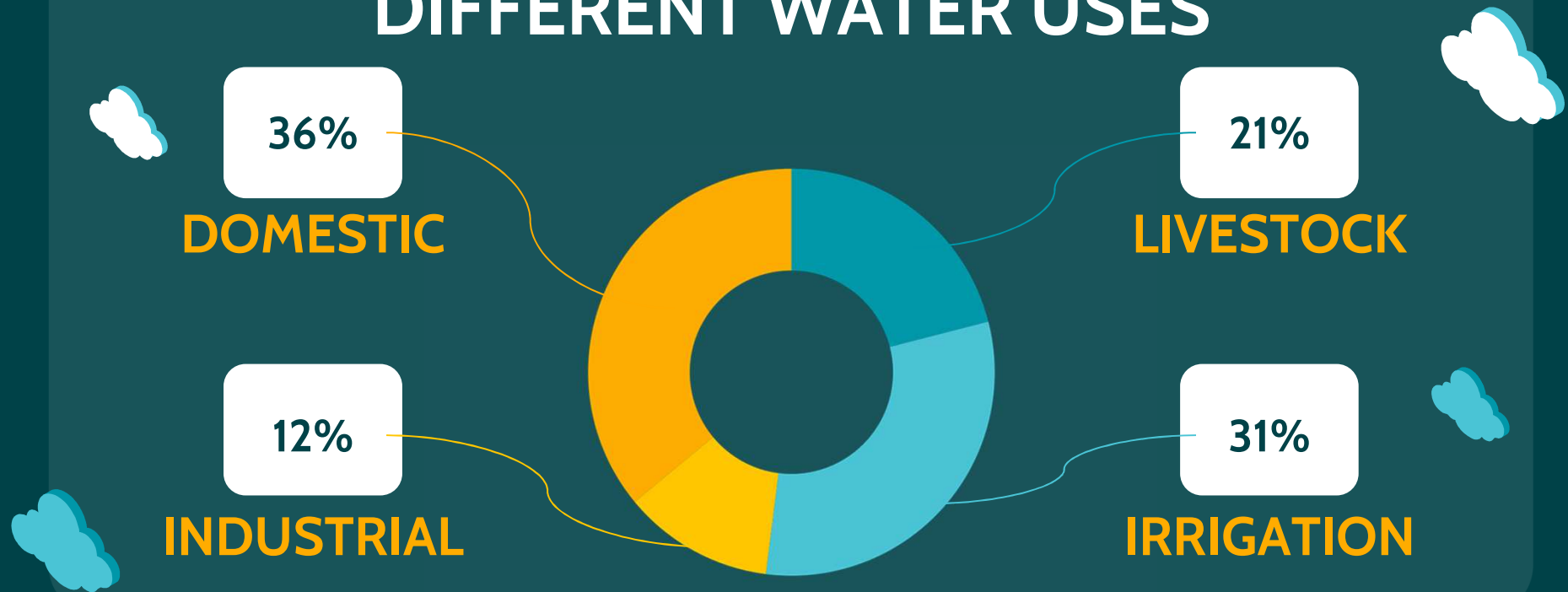


GRACE experiment (NASA):
https://www.youtube.com/watch?v=MaxBOvQ2a_o



EXPLOITATION

DIFFERENT WATER USES





POLLUTION



WATER CONTAMINATION



**CHEMICAL
WASTE**



**FERTILIZER
RUN-OFF**



**SEWAGE
DISPOSAL**



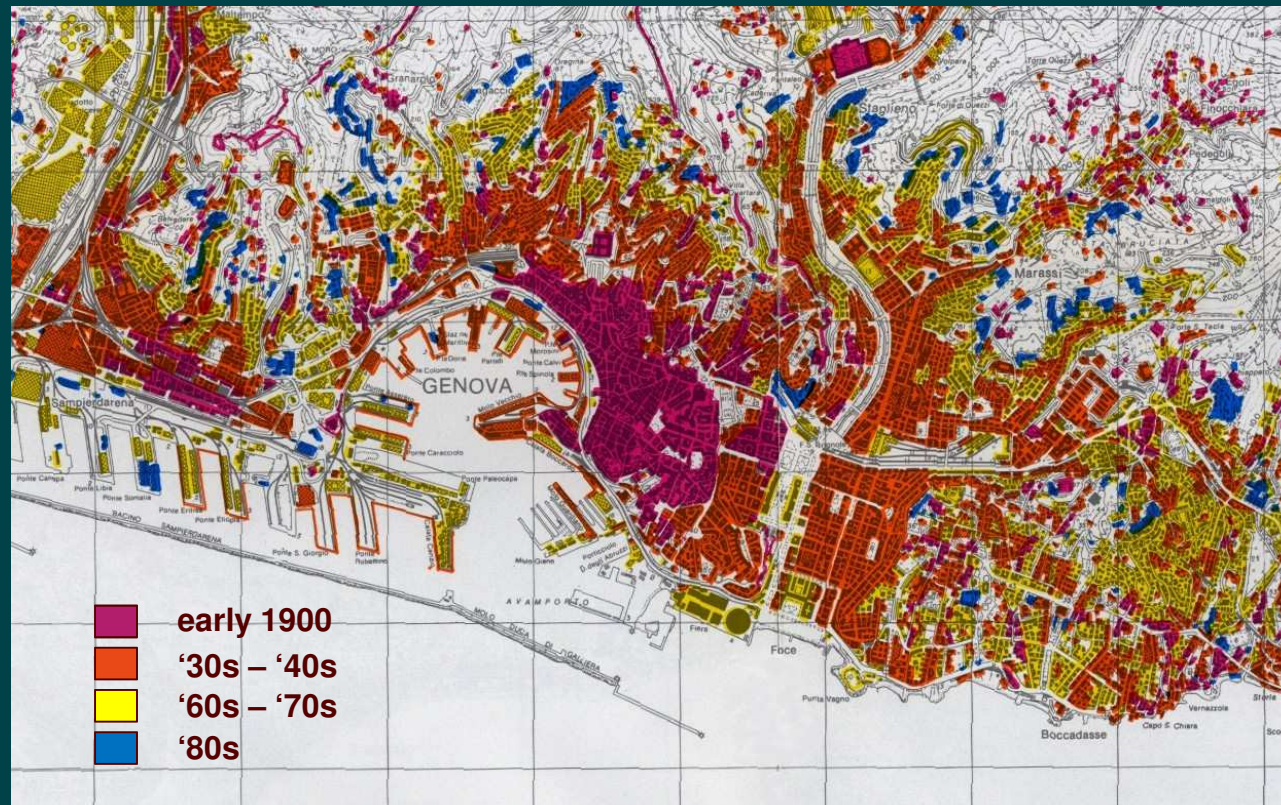
**MARINE DEBRIS,
OIL SPILLS,
CARBON SOAKING**



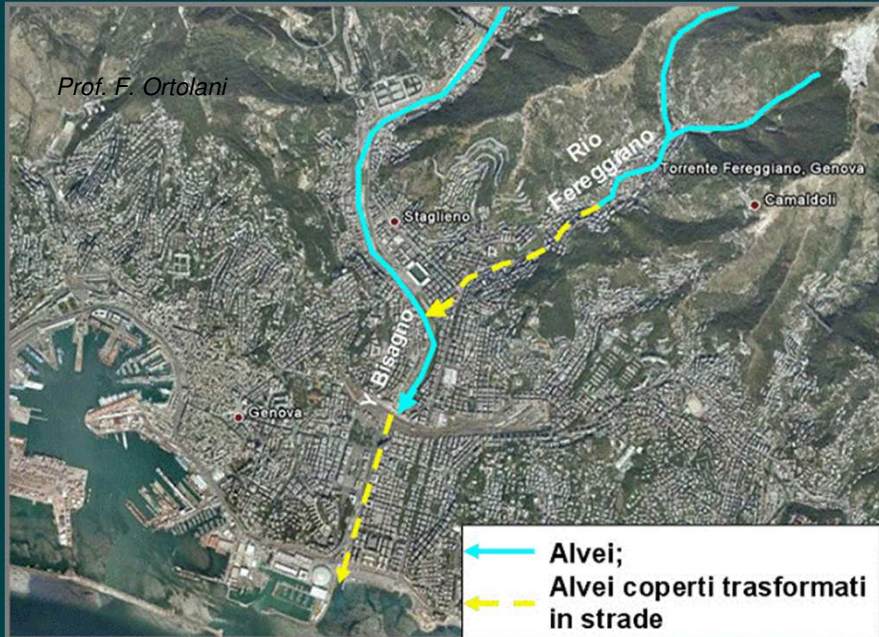


URBAN GROWTH

City of Genoa: growth since 1900



Prof. F. Ortolani

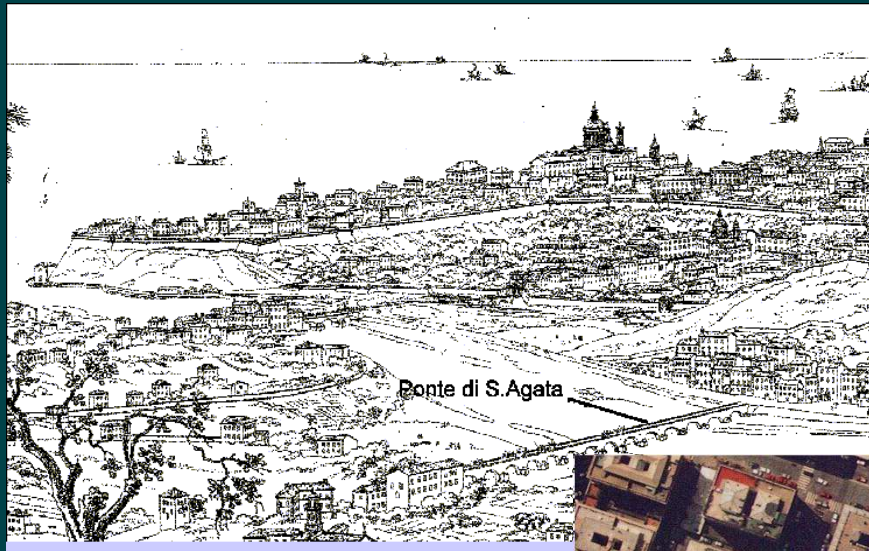


BISAGNO and **FEREGGIANO** torrents:
riverbeds →
transformed into
roads - - -



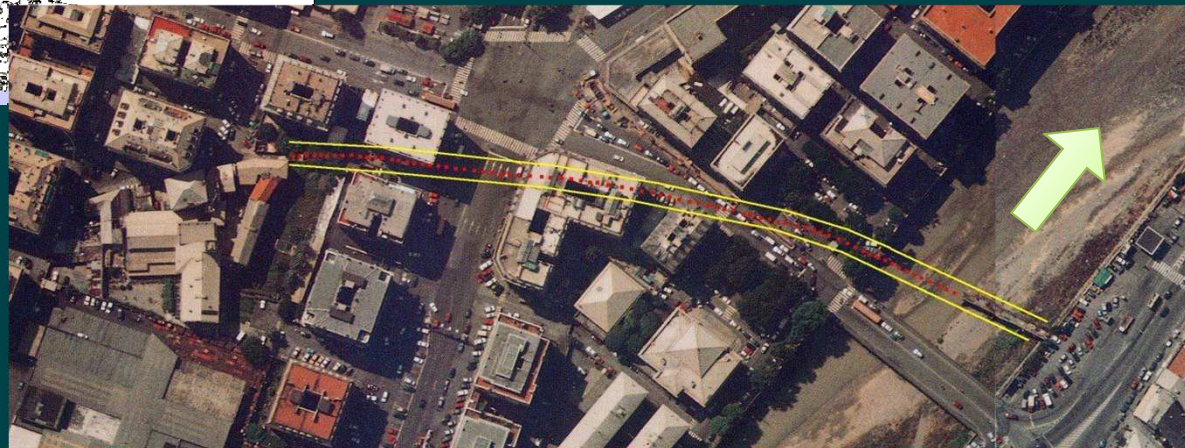
Prof. F. Ortolani

S.Agata bridge



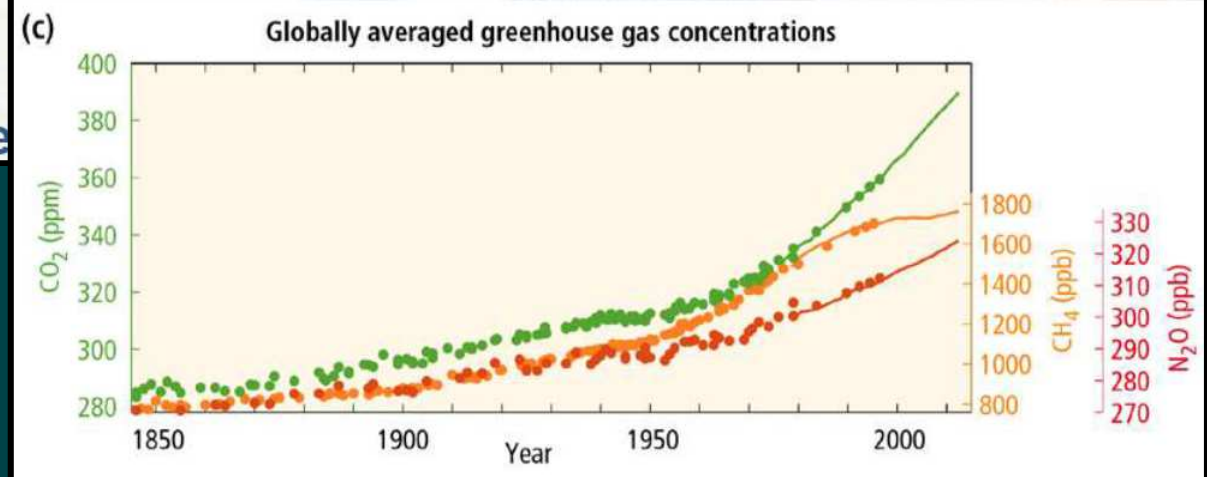
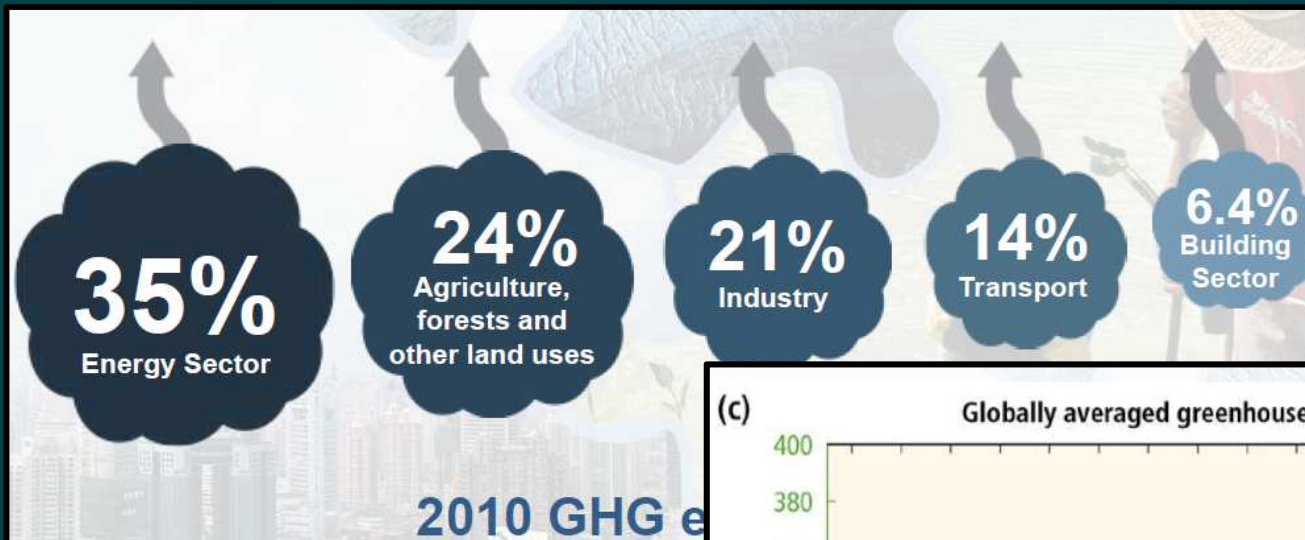
BISAGNO torrent:

riverbed shrinking
from Middle Ages to today





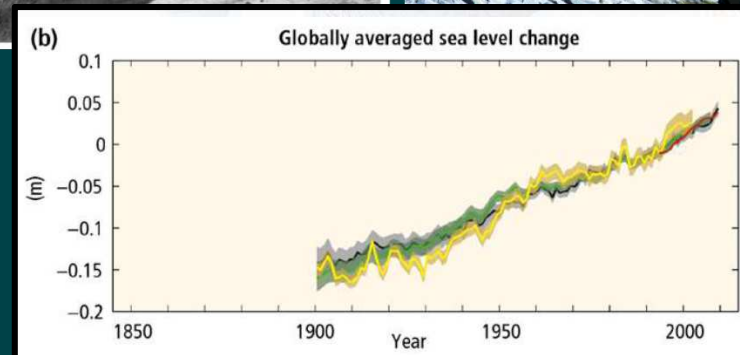
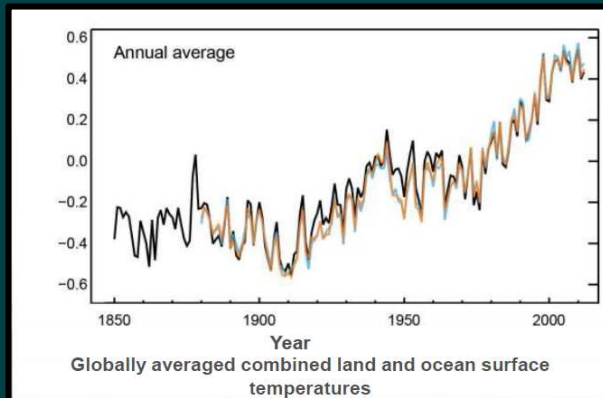
CLIMATE CHANGE: the causes





CLIMATE CHANGE: the effects

- Air **Temperature** increasing
- **Oceans** warming
- **Ice** shrinking
- **Snow** cover decreasing
- **Sea Level** rising



Sixth Assessment Report FACT SHEET

The Sixth Assessment Report (AR6) comprises three Working Group contributions: Working Group I (the physical science basis), Working Group II (impacts, adaptation and vulnerability) and Working Group III (mitigation) and a Synthesis Report.

The Synthesis Report integrates the three Working Group reports as well as the findings from the three cross-Working Group Special Reports prepared during this assessment cycle: *Special Report on Global Warming of 1.5°C* (SR15, October 2018), *Special Report on Climate Change and Land* (SRCCL, August 2019) and *Special Report on the Ocean and Cryosphere in a Changing Climate* (SROCC, September 2019).

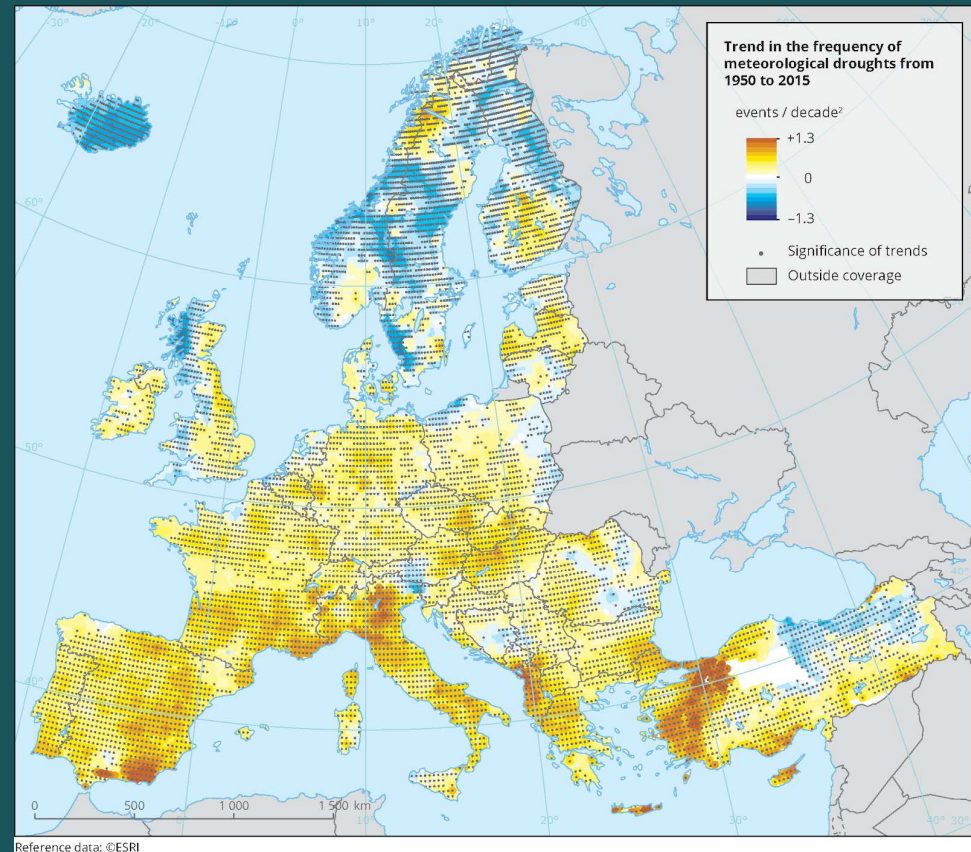
During the AR6 cycle the IPCC also updated its methodologies with the *2019 Refinement to the 2006 Guidelines on National Greenhouse Gas Inventories* (May 2019).





CLIMATE CHANGE: the effects

EUROPE:
Meteorological
DROUGHTS
already
increasing





CLIMATE CHANGE: the effects



THIS MEANS LESS WATER...

but there is MORE...



03

Extremes

Water availability can change dramatically in both directions (too little or too much)

CLIMATE CHANGE and the weather EXTREMES

- **Heat waves** more frequent and more intense since the 1950s
- **Intense precipitation events** increased frequency and intensity since '50s
- **Increased agricultural droughts** due to increased evapotranspiration over land
- **Strong tropical cyclones** (category 3-5) likely to have increased and shifting north



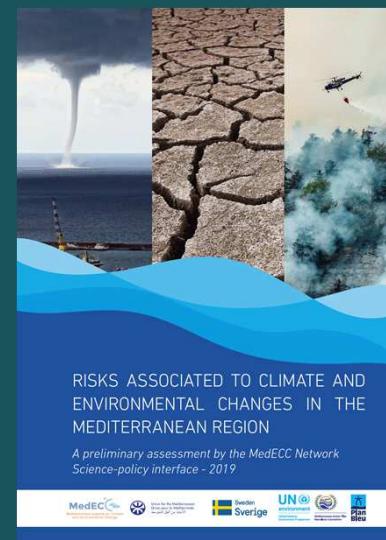
MEDITERRANEAN is an «hot spot»

Not only the quantity of groundwater decreases, but also its quality deteriorates because of overexploitation, pollution, increasing urbanization, and salt-water intrusion caused by sea level

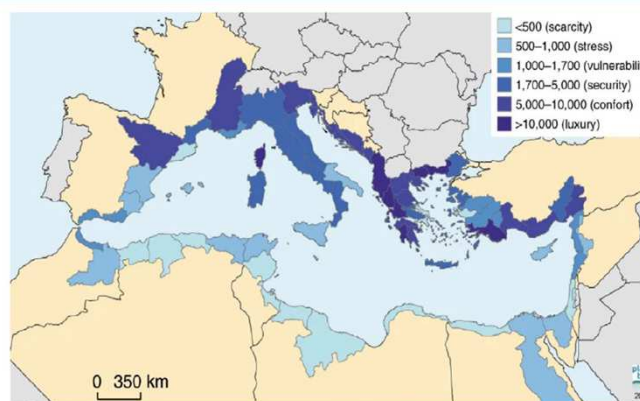
FRESH WATER AVAILABILITY
IN THE **MEDITERRANEAN REGION**
IS LIKELY TO **DECREASE** SUBSTANTIALLY

By **2 to 15%**
for **2°C**
warming

AMONG THE **LARGEST**
DECREASES IN THE **WORLD**



.....
Figure 5
Annual natural renewable water re-
sources per capita in the main Medi-
terranean watersheds, expressed as
levels of shortage for human use³⁵
.....



Source: https://ufmsecretariat.org/wp-content/uploads/2019/10/MedECC-Booklet_EN_WEB.pdf

Europe severe DROUGHT in 2022

The combination of a severe drought and heatwaves has created an unprecedented stress on water levels in the entire EU

(Source: Joint Research Center (JRC), European Commission, Technical report "Drought in Europe August 2022")

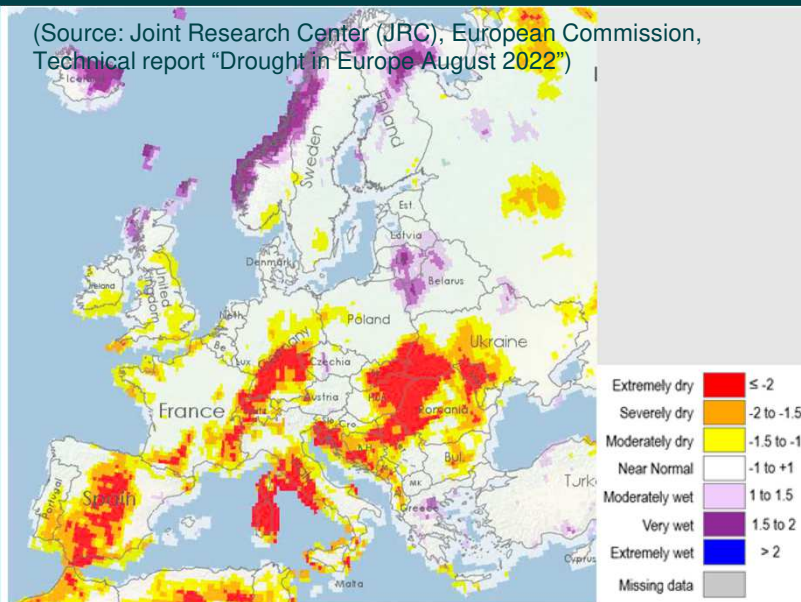
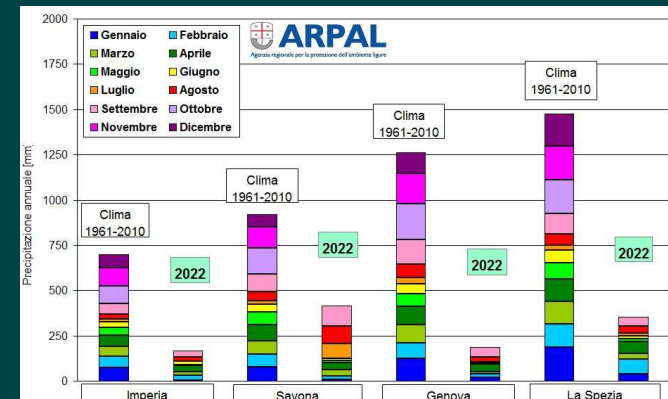


Figure 2: Standardized Precipitation Index SPI-3, three months ending 10th of August 2022.

I torrenti a secco simbolo della crisi idrica

Arpal: «L'Argentina al livello più basso in 56 anni, da quando è monitorato. L'ultima pioggia significativa a febb



Mediterranean SEA Ecosystem is vulnerable



IN THE **MEDITERRANEAN SEA**,
THE AVERAGE MAXIMUM BODY
WEIGHT OF FISH IS EXPECTED
TO SHRINK BY

**4 to 49% FROM
2000 to 2050**

DUE TO **WATER WARMING** AND
DECREASED OXYGENATION, AND
ALSO BECAUSE OF **OVERFISHING**

Non-indigenous species (NIS) in the Mediterranean Sea: size of pie charts proportional to number of NIS in a country.
Proportion of Erythraean species in red.

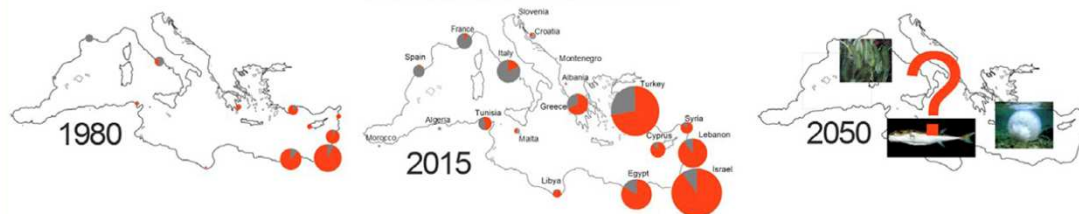
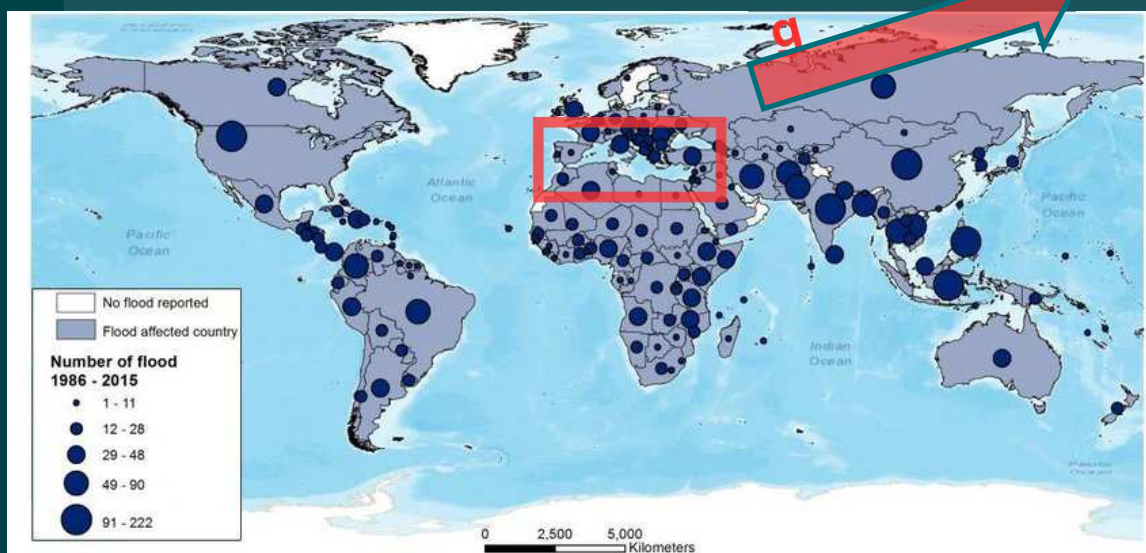


Figure 8

Non-indigenous species (NIS) in
the Mediterranean Sea; size of pie
charts proportional to number of NIS
in a country; proportion of Lessep-
sian species in red⁹¹.

Source: https://ufmsecretariat.org/wp-content/uploads/2019/10/MedECC-Booklet_EN_WEB.pdf

MEDITERRANEAN Region: FLOOD RISK



UNTIL 2100
FLOOD RISK ←
MAY INCREASE BY
50% AND EROSION
RISK BY 13%

Source: https://ufmsecretariat.org/wp-content/uploads/2019/10/MedECC-Booklet_EN_WEB.pdf

LIGURIA: a sad record



2011 Genova



2011 Cinque Terre



2014 Genova



2018 Storm surge, Rapallo



2020 storm Alex, FR-IT
border



04

Summing up...

Human activities impact water resources in many ways



HUMAN ACTIVITY interferes on **WATER** cycle



EXPLOITATION



POLLUTION



URBAN GROWTH



CLIMATE CHANGE



producing **IMPACTS** on **WATER**-related **Resources** and **Socio-Economic areas**



ECOSYSTEMS

Sea, rivers, lakes,
land



TURISM

Due to less snow, sea
level and temperature
rising



WATER SUPPLY

Aquifers, glaciers,
snow, precipitation



ENERGY

Due to hydrological
resources stress



AGRICULTURE

Due to increasing
temperature and dry
periods



SAFETY

Due to increasing floods



05

Taking action!

From big strategies to day by day behaviors

Sustainable Development: acting from GLOBAL to LOCAL scale



2030 Agenda: 17 Sustainable Development Goals, adopted in 2015, set out a 15-year plan



In 2019: **Liguria2030**, a multi-stakeholder working table aimed at promoting and disseminating the UN 2030 Agenda in Liguria





REGIONE LIGURIA

Regional Strategy for Sustainable Development

Setting GOALS

deemed to be strategic at regional level



Achieving them by:

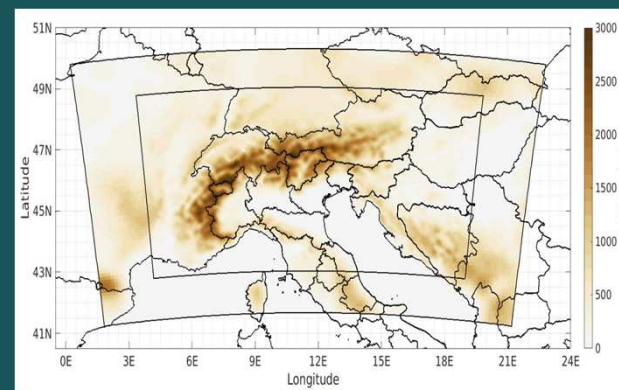
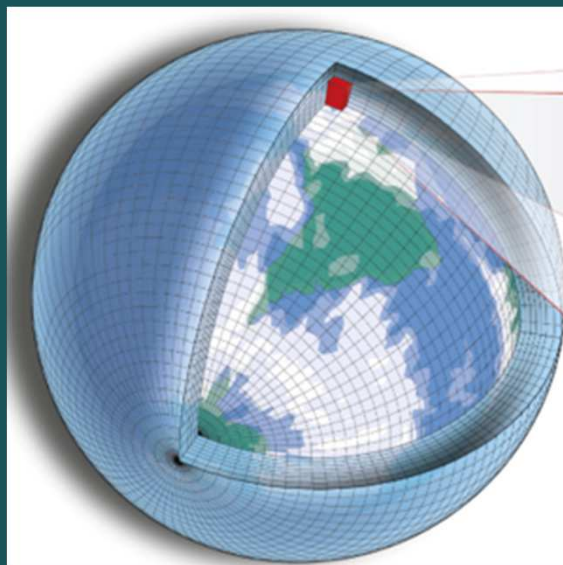
- Regulating
- Planning
- Authorizing
- Funding



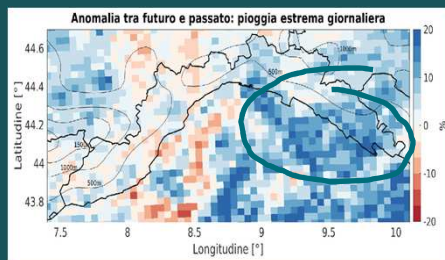
REGIONE LIGURIA

Regional Strategy for Climate Change Adaptation

Climate Scenarios
in Liguria
(2038-2068)

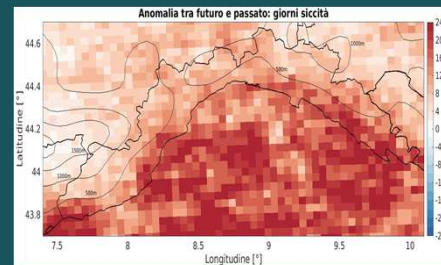


FUTURE SCENARIOS in LIGURIA



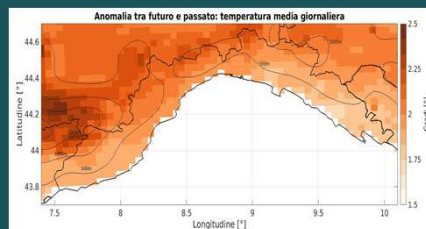
FLOODS

Eastern Liguria:
increase of extreme
precipitation and
rainy days



DROUGHTS

Consecutive days
of drought will
increase, especially
on the coasts.



TEMPERATURE and SNOW

Temperatures will increase,
especially at high altitudes (general
decrease in annual snowfall)

WATER shortage: **FOUR ACTIONS**

1) **RESILIENCE**



Diversified sources



Small reservoirs



Accumulation tanks



Interconnected sources



Rain gardens

Small and large infrastructural interventions on water networks

WATER shortage: **FOUR ACTIONS**

1) **RESILIENCE**



After 5 years

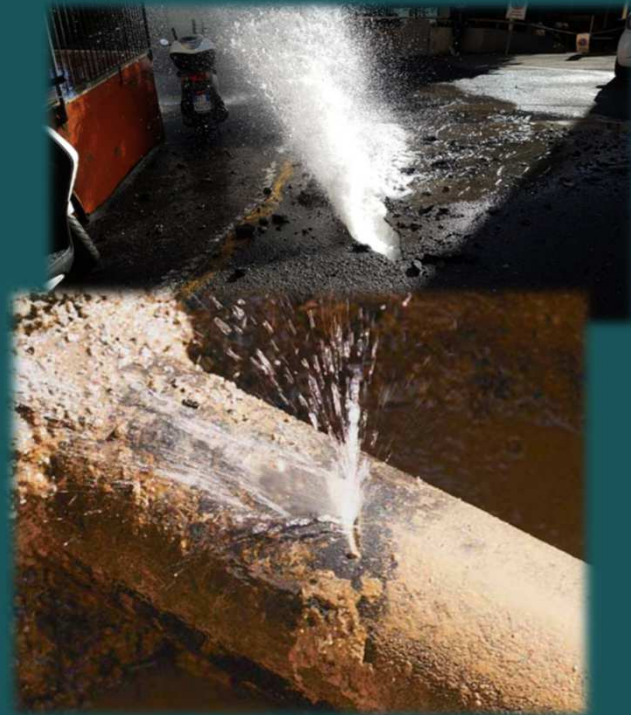
WATER shortage: **FOUR ACTIONS**

2) **SAVING**



WATER shortage: **FOUR ACTIONS**

3) NO WASTE



Small and large infrastructural interventions on water networks

WATER shortage: **FOUR ACTIONS**

4) REUSE



Purification plants for the reuse of water

FLOODS: the three phases of RESILIENCE



TO KNOW

alert system (forecasting and monitoring)



+ communicate!



TO PLAN

be organized and ready



+ communicate!



TO ACT

everyone does the right thing in emergency



+ communicate!

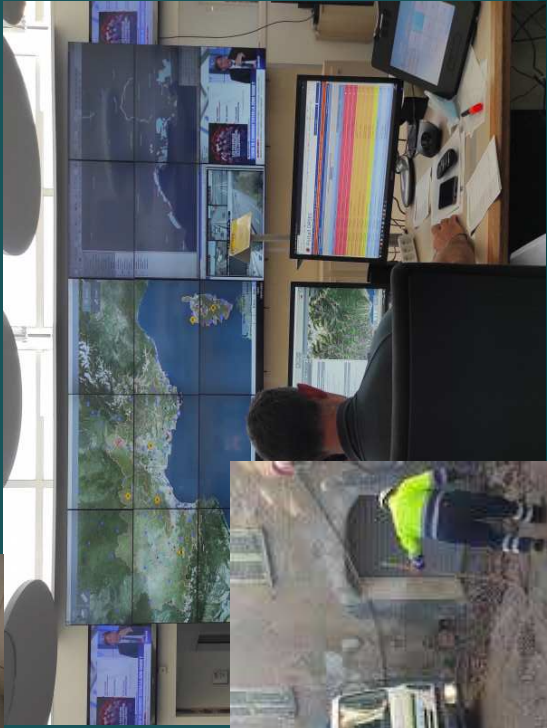
Last question for you!

Any strategy to improve the water status
and management should be based on a
collective conscience.

Everyone at every level must take part.

What role do you see for yourself now
and in your future?





THANKS!

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