

DISASTER RISK MANAGEMENT

Universita di Roma Tor Vergata
B.A. Global Governance

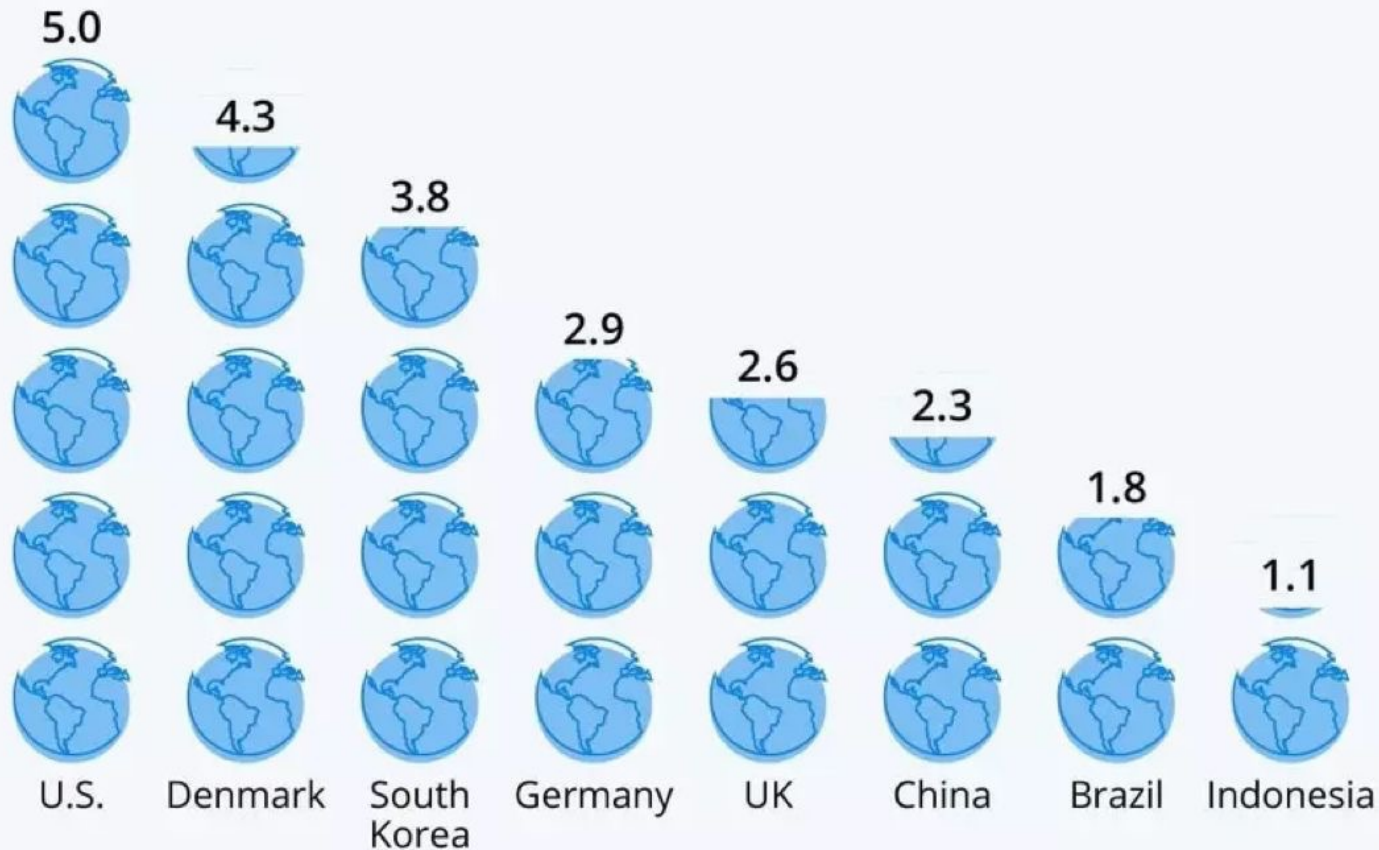
Spring 2022

Session 14 – Wednesday May 25, 2022

Instructor: Erdem Ergin

The World Is Not Enough

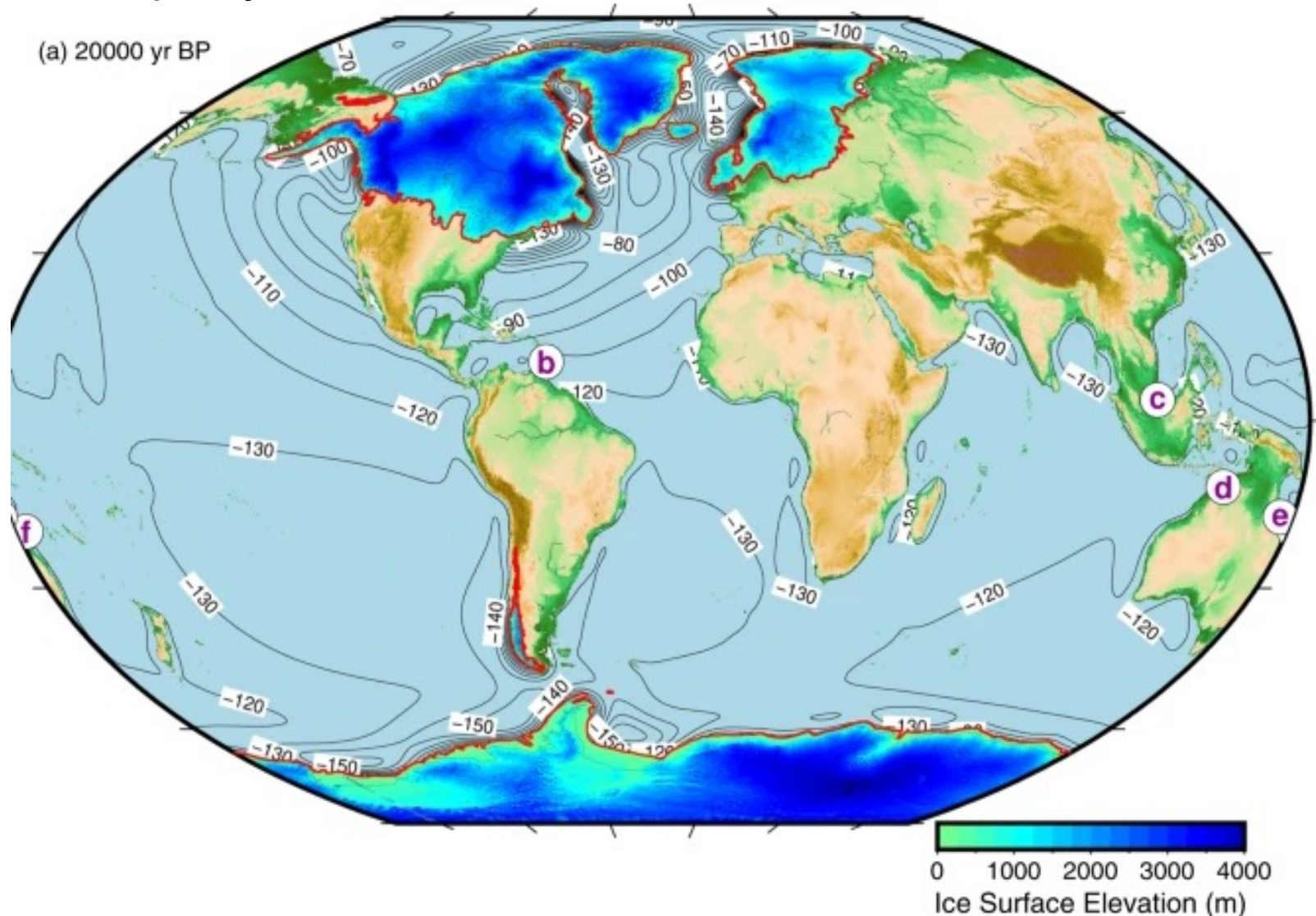
Number of earths/its resources needed if the world's population lived like the following countries



Selected countries. Calculated based on 2021 Earth Overshoot Days/2017 data
Source: Global Footprint Network

Did *you* know ...?

During the last glacial maximum, about 23,000 years ago, European soil was partly frozen and the sea level was about 116 meters lower.



Did *you* know ...?

The English Channel was dry and we could therefore reach England walking.

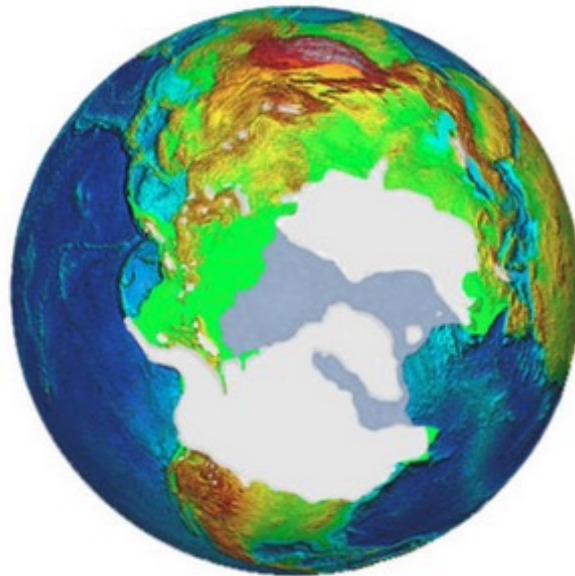


Did *you* know ...?

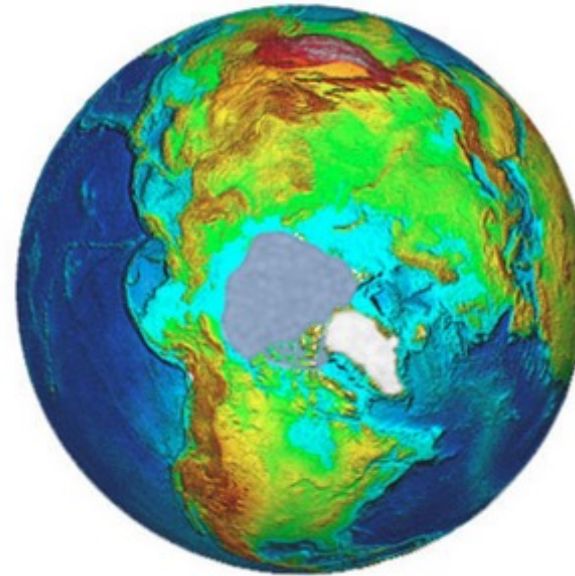
Huge ice caps covered about half of North America, Europe, South America, and many parts of Asia.

The flora and fauna, adapted to the cold, thrived: penguins and seals bathed in the Mediterranean

18,000 Years Ago



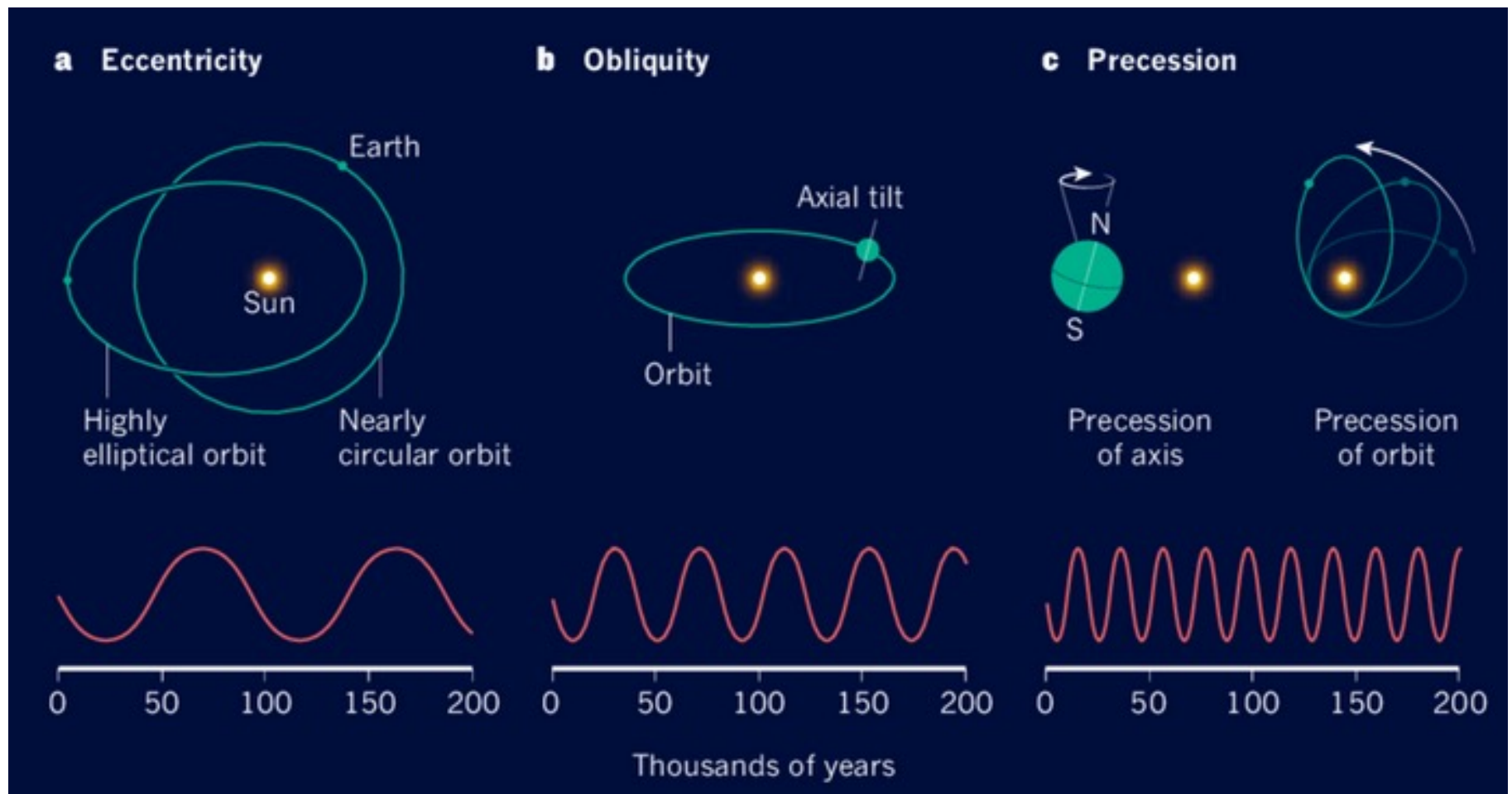
Modern Day



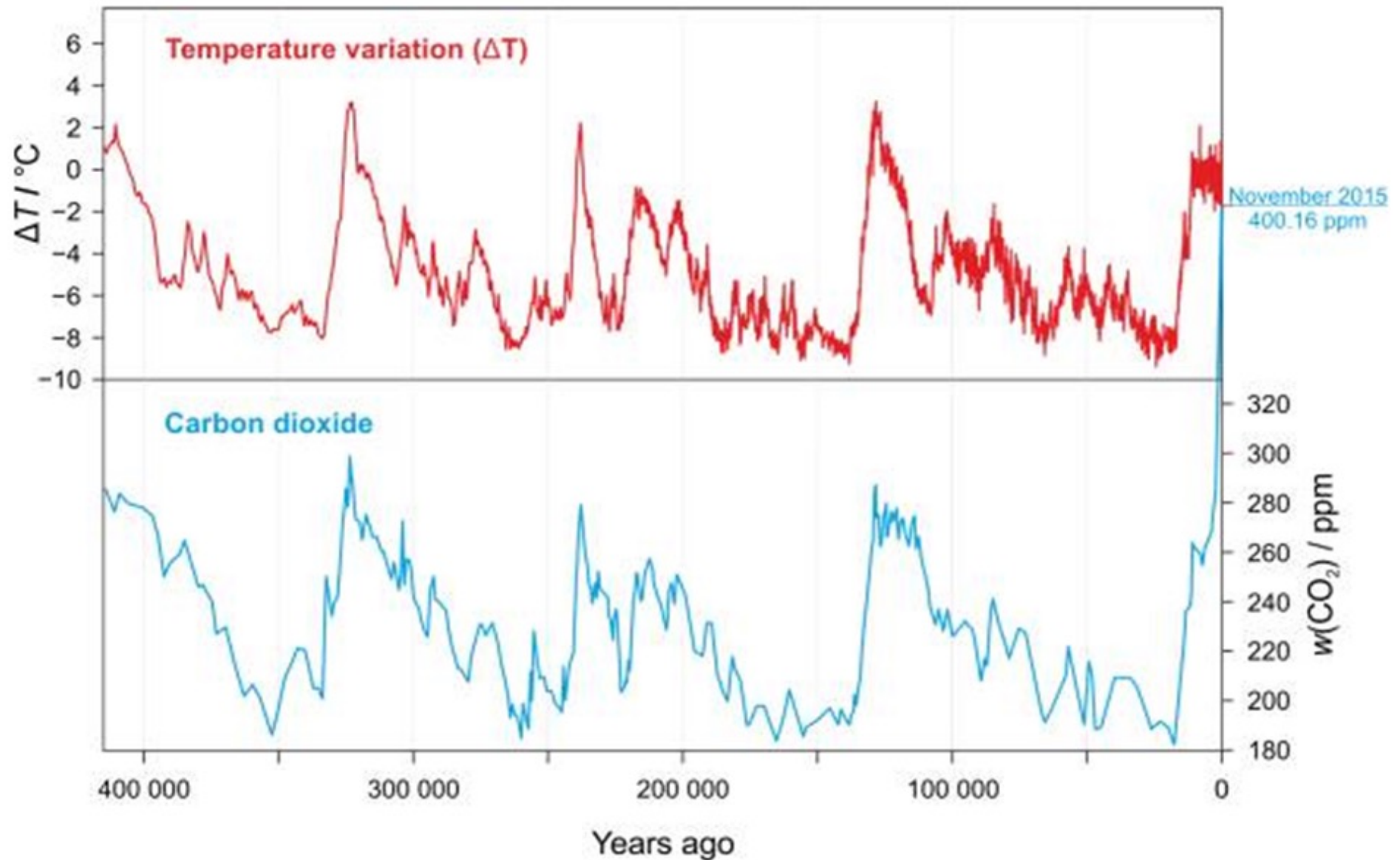
□ Glacial Ice ■ Sea Ice

Milanchovitch Cycles

The seasonal and latitudinal distribution of energy received from the Sun is modulated by oscillations of the earth's orbital parameters.

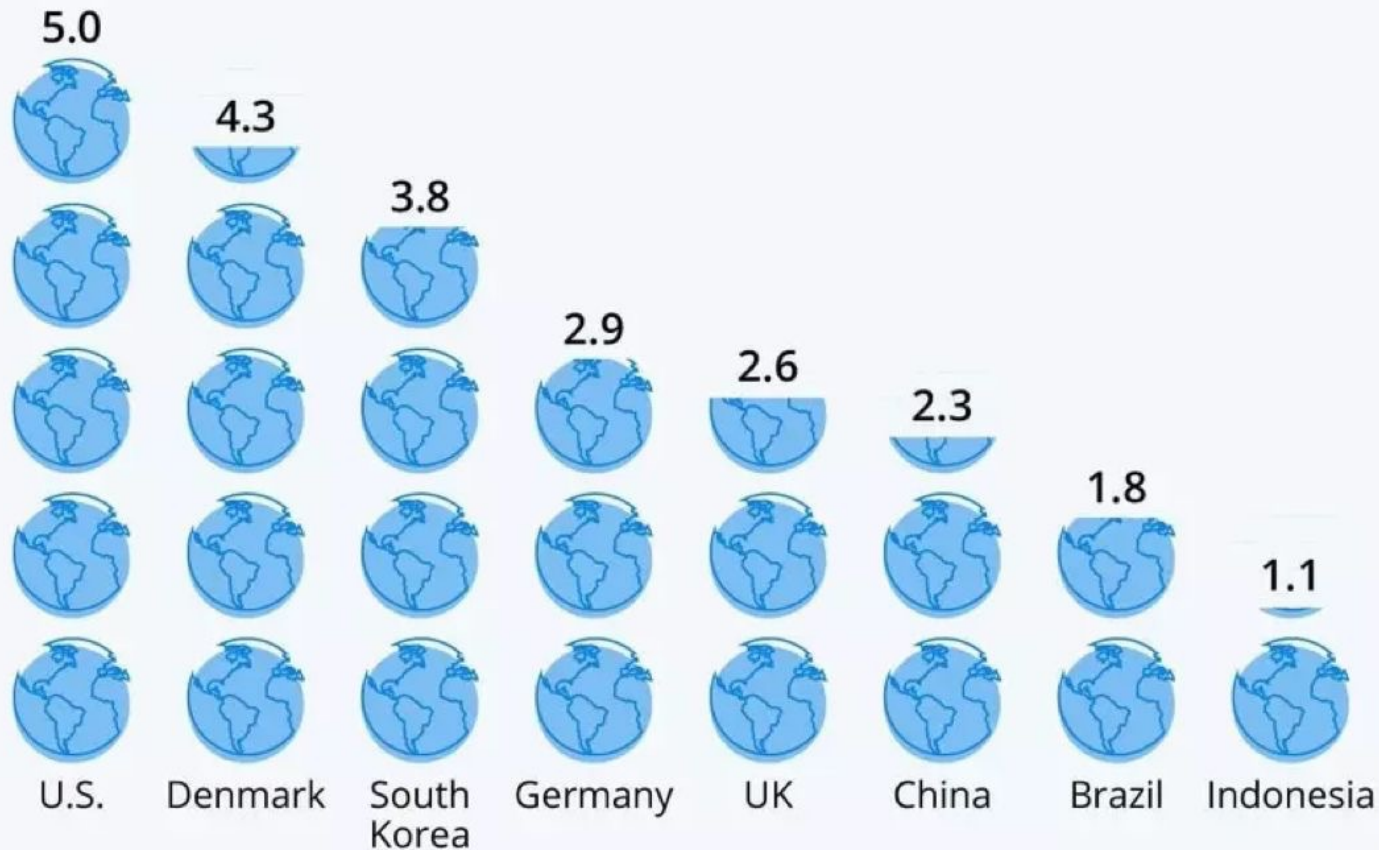


Relation between temperature and CO₂ ..



The World Is Not Enough

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1/ What is the most important cause of climate change?

- Human activity is the main cause of climate change. People burn fossil fuels and convert forest land into agricultural land. Since the start of the Industrial Revolution, people have burned more and more fossil fuels and turned vast tracts of forests into farmland.
- **Burning fossil fuels** produces carbon dioxide, a greenhouse gas. This gas is so called because it produces a "greenhouse effect". It warms the planet, just as the inside of a greenhouse is warmer than the environment around it.
- **Carbon dioxide is the main cause of man-made climate change.**
- It stays in the atmosphere for a very long time. Other greenhouse gases, such as nitrous oxide, stay in the atmosphere for a long time. Other substances only produce short-lived effects.

2/ What are climate forcing agents?

- Carbon dioxide and other substances are considered to be forcers, as they cause or cause the climate to warm or cool. They do this by altering the energy flows in and out of the Earth's climate system.
- Small variations in the solar energy reaching Earth can affect the climate. But, **since the industrial revolution, the increase in greenhouse gases has exerted an effect 50 times more powerful than the changes resulting from solar radiation.** The excess greenhouse gases in Earth's atmosphere have had a powerful warming effect on Earth's climate.
- **Future greenhouse gas emissions, especially carbon dioxide, will determine how much the climate warms.**

3/ What can we do to counter climate change?

- In addition to being linked to climate change, carbon dioxide is the main cause of human-induced global warming and associated climate change. Because this gas has a very long lifespan, relentless human activity causes it to accumulate in the atmosphere and remain there for centuries.
- Global warming can only be stopped by completely eliminating global carbon dioxide emissions from human fossil fuel combustion and industrial processes. Despite this, the global temperature will remain near its current average, higher than before. In addition, emissions of other substances that contribute to global warming will also need to be reduced. These facts demonstrate how difficult the challenge will be.

4/ What are climatic changes?

- Climate change is a long-term modification of weather conditions. Various indicators bear witness to this, especially in the form of changes in temperature, precipitation and winds. Climate change can include both a change in average weather conditions and a change in variability, such as extreme events.
- The Earth's climate is naturally variable at all time scales. However, it is the balance between the amount of energy received and the amount of energy output that determines the Earth's energy balance, long-term climate state, and the average temperature of the planet. Any factor that causes a sustained change in the amount of energy received or output can lead to climate change. Different factors act at different time scales.
- Not all factors that caused Earth's climate to change in the distant past play a role in contemporary climate change. The factors responsible for climate change can be divided into two categories: those linked to natural processes and those linked to human activity. In addition to natural causes, internal changes in the climate system, such as changes in ocean currents or atmospheric circulation, can also influence the climate for brief periods of time. This natural internal climate variability is superimposed on long-term climate changes caused by forcing agents.

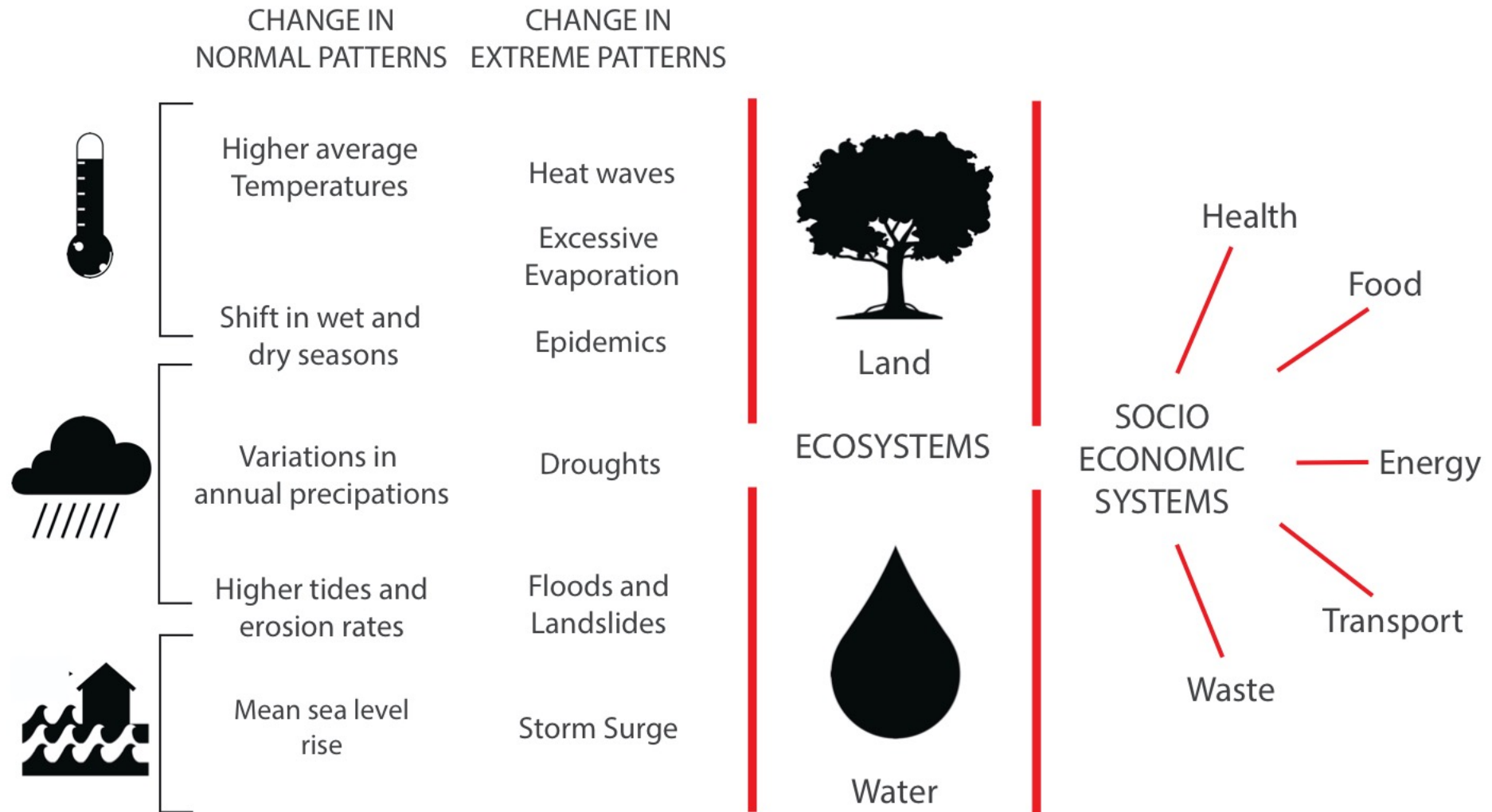
5/ Does climate change have natural causes?

- Natural factors external to the climate system, such as changes in volcanic activity, solar energy output, and the Earth's orbit around the Sun, can alter the planet's climate. Of these, the two factors that are determinants at timescales for contemporary climate change are changes in volcanic activity and changes in solar radiation.
- With regard to the energy balance of the Earth, these factors act mainly on the amount of energy received. Volcanic eruptions are episodic and affect the climate for a relatively short period of time. Changes in solar irradiation have contributed to climate trends over the past century, but since the industrial revolution, the effect of greenhouse gas inputs into the atmosphere has been about 50 times greater than that of greenhouse gases. changes in solar energy emission.

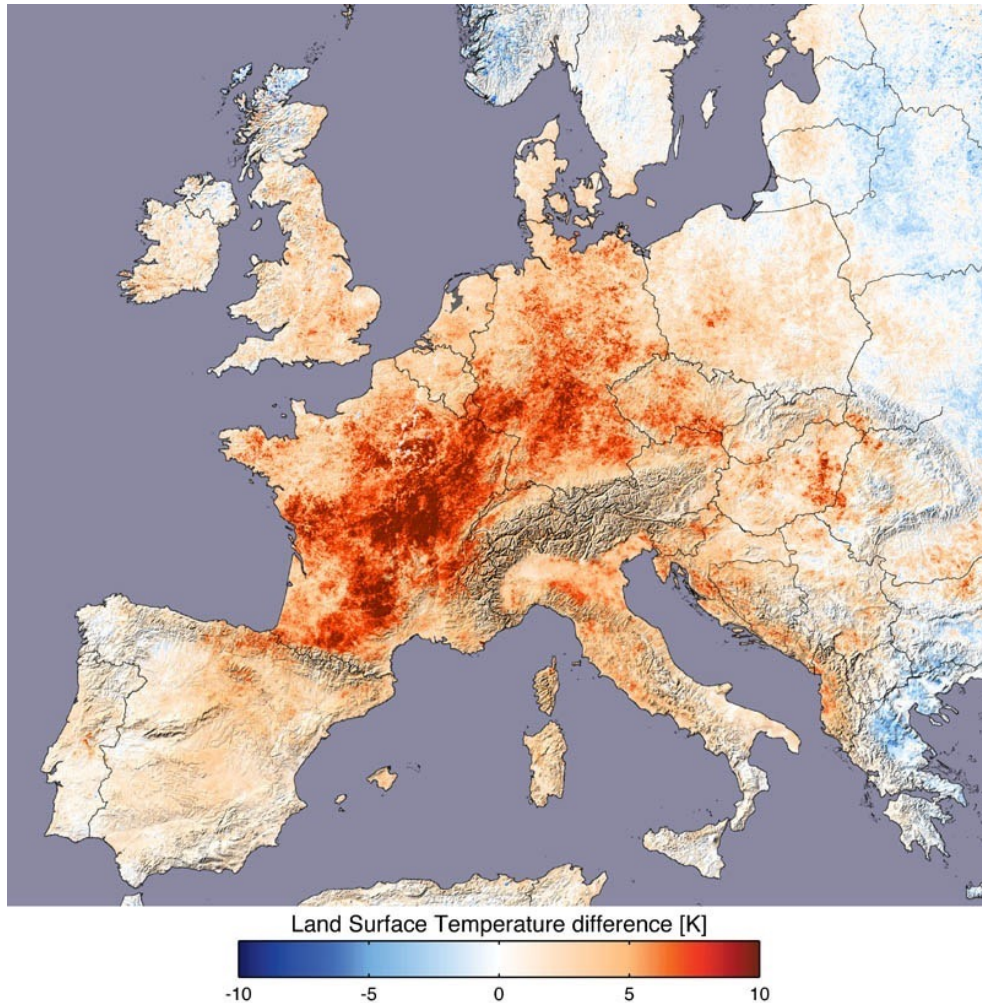
6/ Anthropogenic causes?

- The overall effect of human activities since the start of the Industrial Revolution has been a warming effect, fueled primarily by carbon dioxide emissions and intensified by emissions of other greenhouse gases.
- The build-up of greenhouse gases in the atmosphere has led to an increase in the natural greenhouse effect. It is this increase in the greenhouse effect by human activity that is of concern, as continued greenhouse gas emissions have the potential to warm the planet to levels unprecedented in human history. Such climate changes could have serious unpredictable environmental, social and economic consequences.

Climate Change* Mitigation and Adaptation



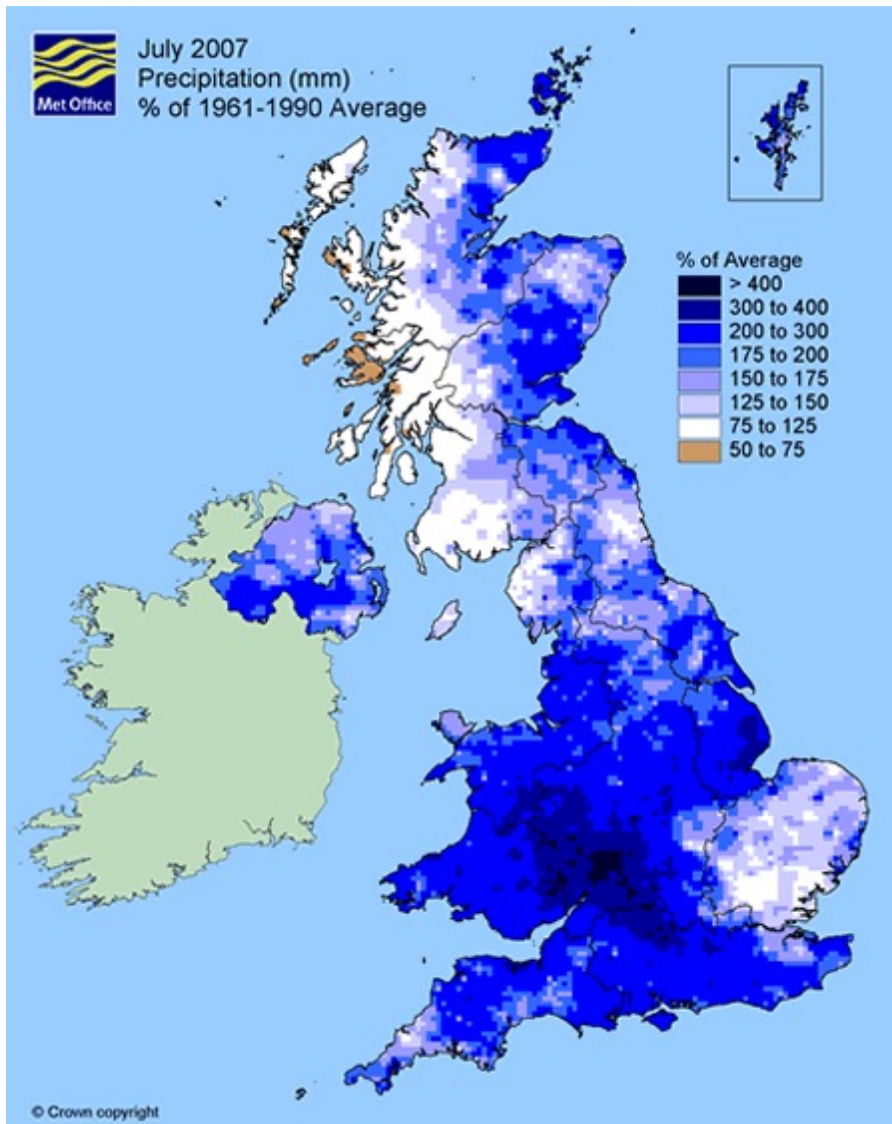
EU 2003 Heat wave



Heat Wave + Drought

Health	35,000 fatalities
Ecosystem	Forest fires River/basin drought Extreme melting in glaciers
Infrastructure	Energy shortages Transportation disruptions
Production	Decline in agricultural yields
Total Frequency	13 billion Euros once in 200-300 years

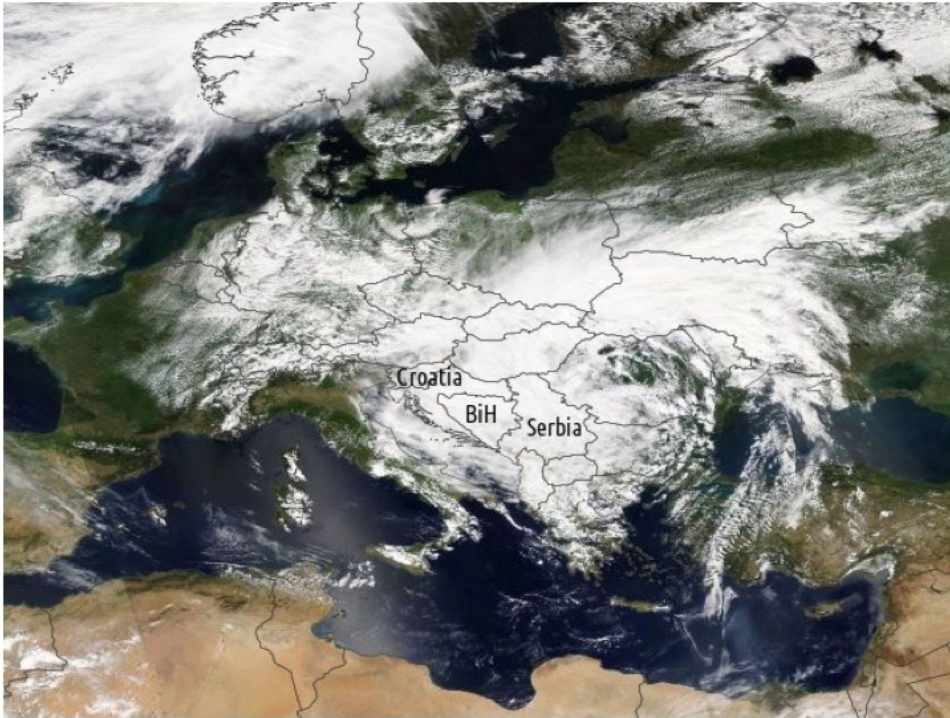
UK 2007 Floods



Flood

Health	13 fatalities
Ecosystem	River/basin pollution Forest/vegetation erosion
Infrastructure	Energy and water shortages Transportation disruptions (road/rail)
Production	Business disruptions
Social	Property (home) damage/loss
Total Frequency	7.1 billion Euros once in 150 years

Balkan 2014 Floods



Hurricane (wind/rain/landslide)

Croatia, Serbia, Bosnia

Health 150 fatalities
4 million affected

Ecosystem Forest landslides
River/basin pollution

Infrastructure Energy mines/production/
distribution
Transportation (roads)

Production Agriculture
Commerce
Social Homes

Total 4,5 billion Euros
Frequency once in 120 years

Source: ECHO (2014)

Turkey 2016 Winter



Mersin city and Mersin Port Flood

Hinterland of 600km (Anatolian cities)

Main port for Irak and Syria

Total duration of business disruption and cost unknown

Impacts on production and export/import unknown

Source: Mersin Port (2016)



Turkey 2016 Winter



Transportation and Food Supply

Bursa/İzmir 40km queue

Roads blocked in Toros mountains

Fruits/vegerable entry to Istanbul decreased 60%

Consumer prices increased



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EU's vulnerability to water scarcity and drought

The EU uses approximately 668km² of water for all of the goods it produces, consumes and exports annually.

Around 38% of this water comes from outside its borders.

EU is highly dependent on the availability of water in other parts of the world.

2/3 of the foreign water comes from 9 countries: Brazil (20%), Argentina (11%), Indonesia (8%), Ivory Coast (8%), Ghana (4%), USA (4%), Ukraine (4%), Malaysia (3%) and India (3%).

98% is for agricultural commodities and 2% for industrial production

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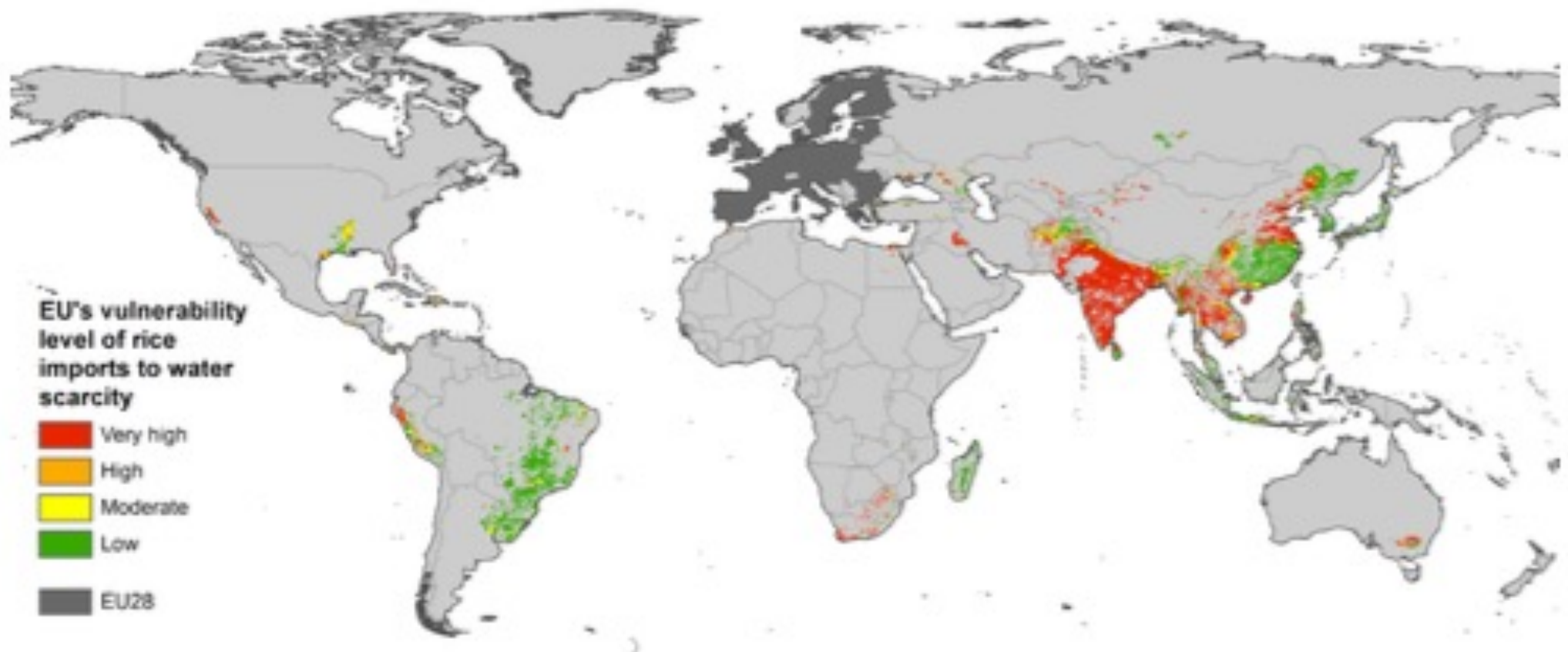
EU's vulnerability to water scarcity and drought

In the near future, supplies of certain crops to Europe could be disrupted due to water scarcity in other parts of the world;

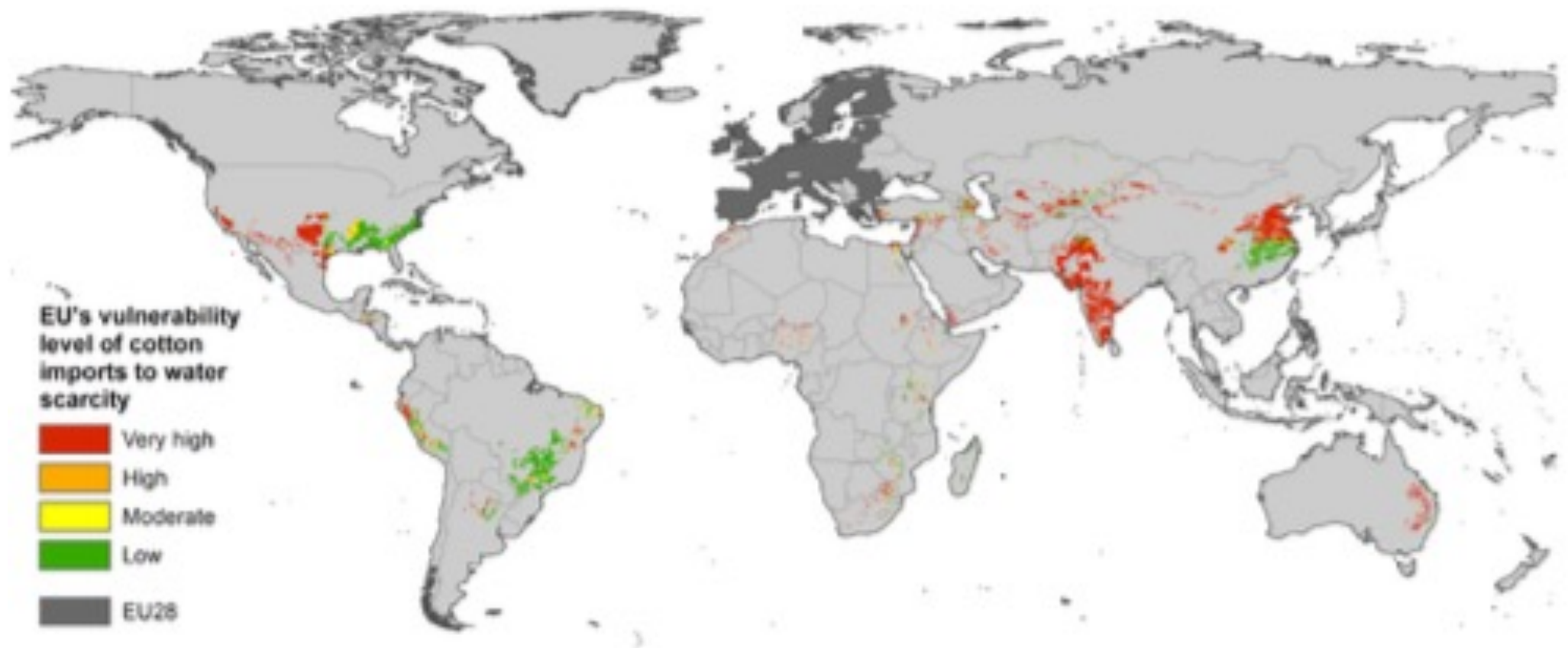
91% of almond imports are categorized as “highly vulnerable”.
87% of pistachio imports, 74% of grape imports, 70% of rice and cotton imports, 57% of soybean and 56% of sugar cane imports are all considered vulnerable.

Europe's reliance on soybean imports could disrupt the meat and dairy prices.

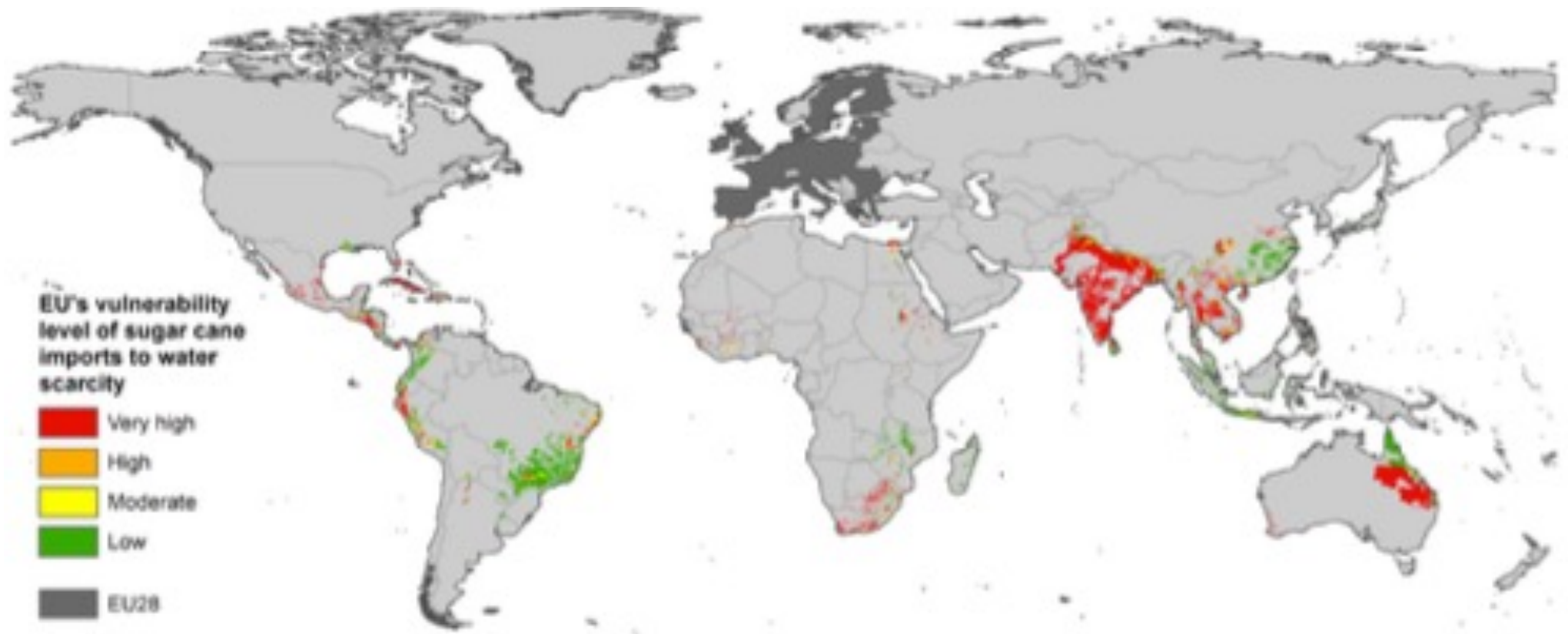
Rice



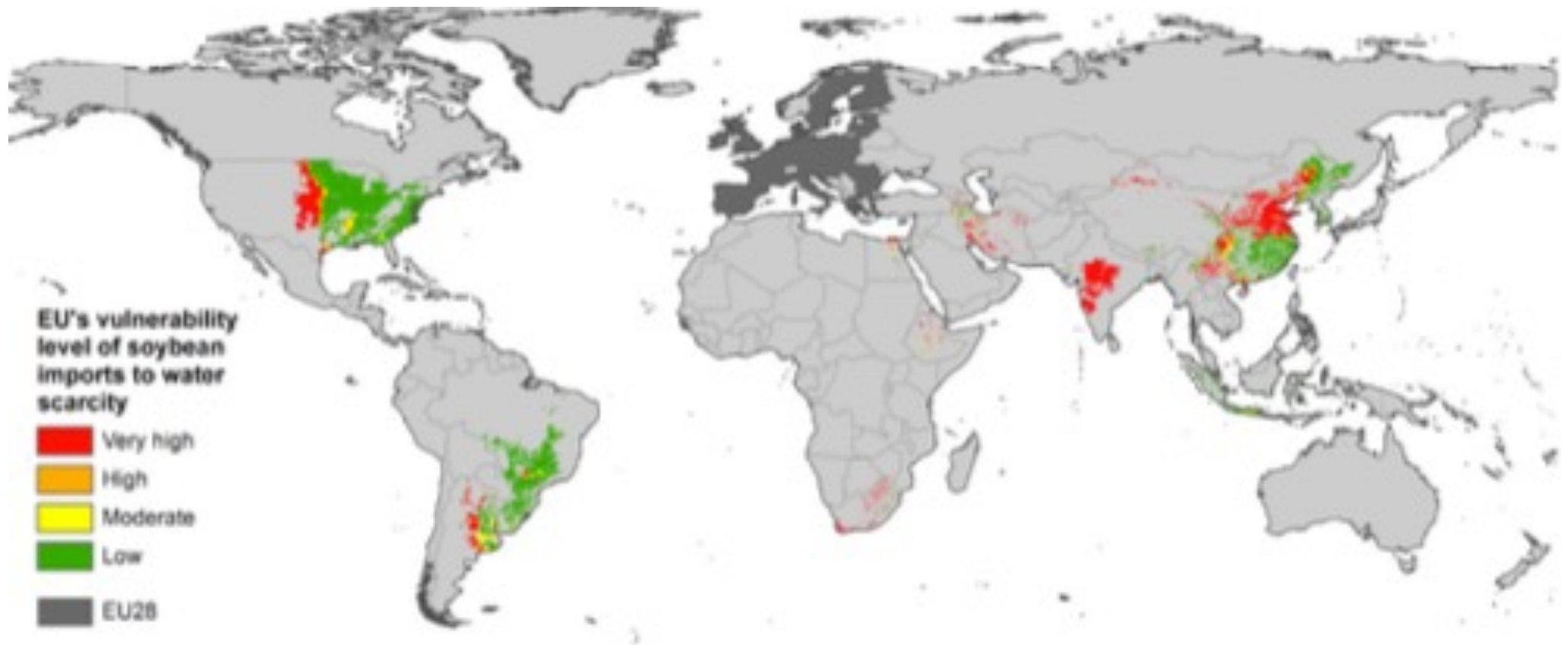
Cotton



Sugar Cane

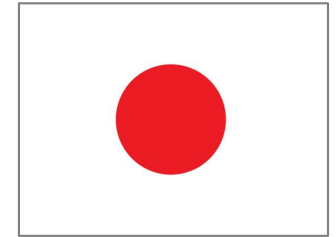


Soybean





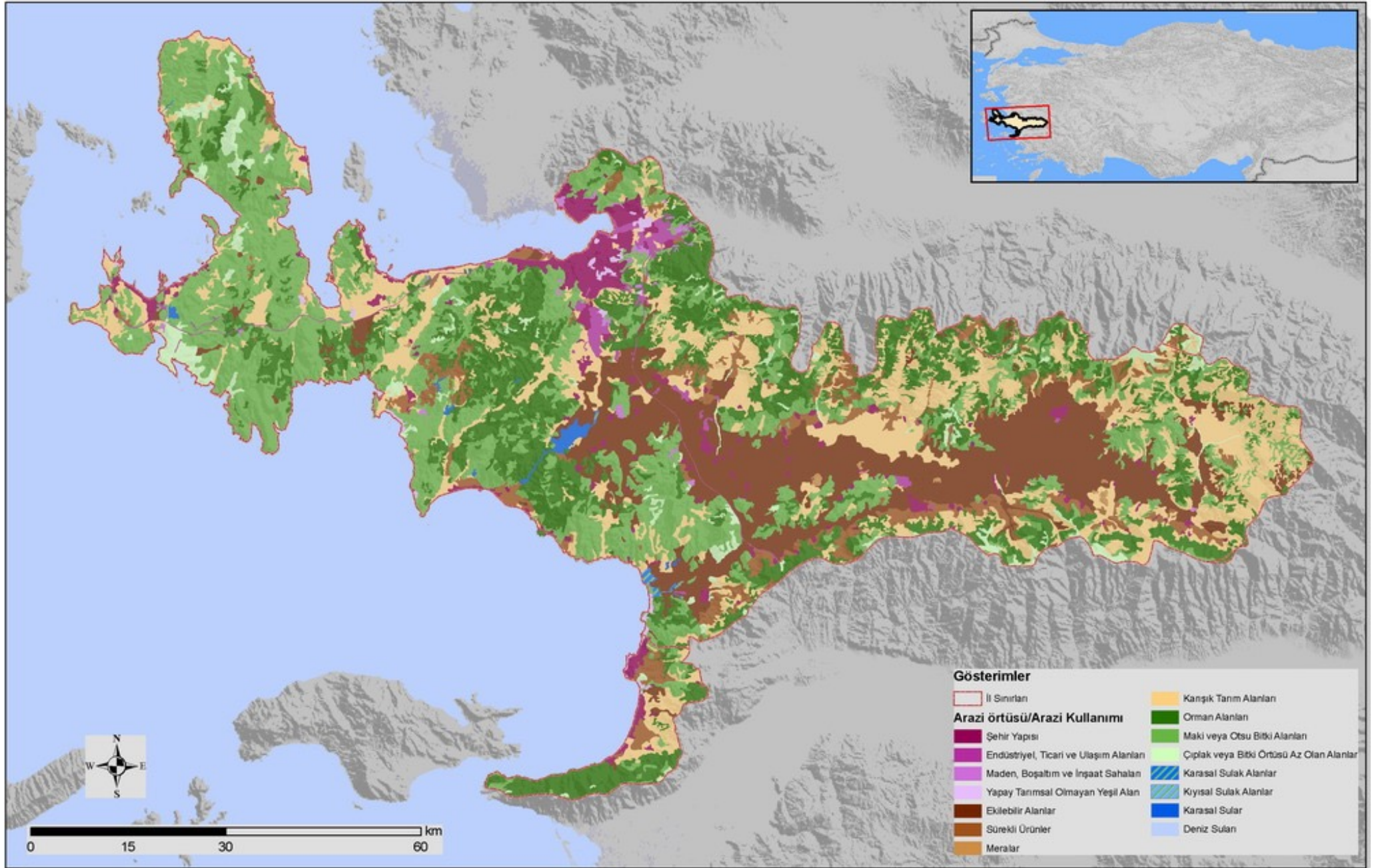
GFDRR
Global Facility for Disaster Reduction and Recovery



Key agricultural product risk assessment



The World Bank partnered with the Izmir Regional Development Agency to strengthen agricultural resilience to climate change. The primary focus is on the lifeline utilities of gas, electricity, water, rain water, waste, transport, and telecommunication.



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