



Mountains and
water regime of
transboundary
watersheds



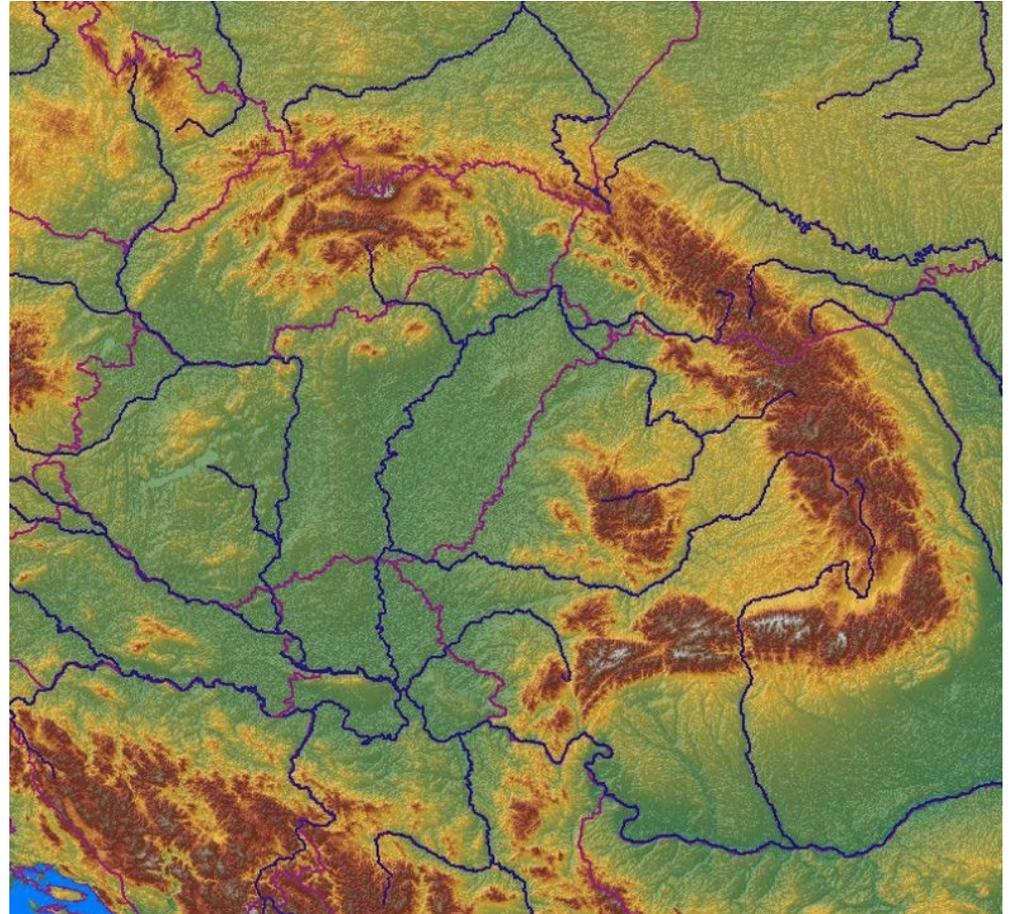
CASE STUDY: The Carpathian basin under climate change

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The Carpathians

- Largest, longest, most twisted and fragmented mountain range in Europe
- Over 50% of the territory natural and semi-natural forests
- Providing essential ecosystem goods to communities in seven countries
- High vulnerability to climate change



EU Strategy for the Danube Region and the Carpathians

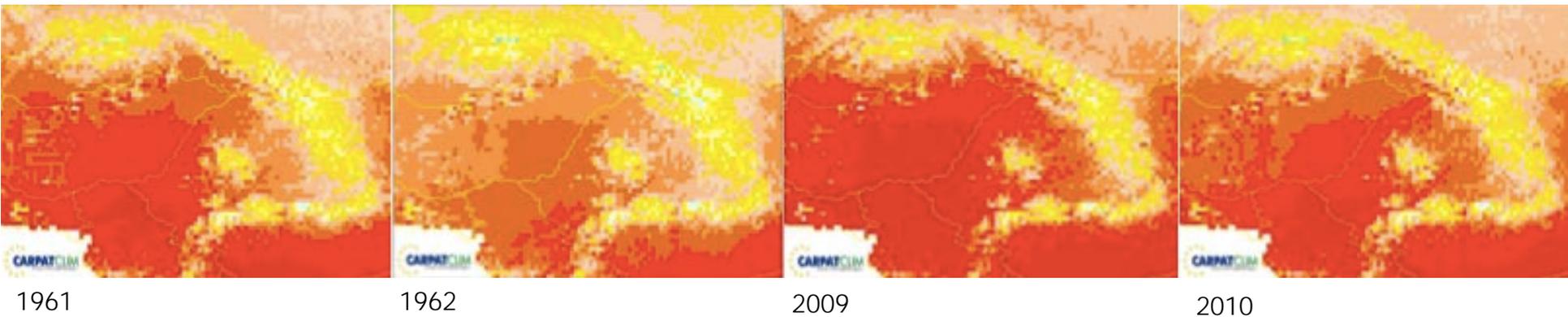


The importance of the Carpathians



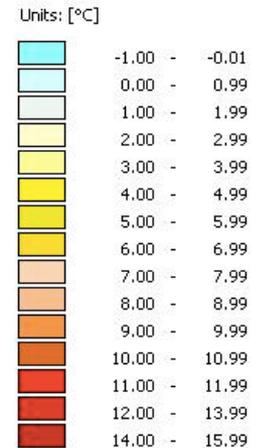
- The Carpathians are a major source of freshwater. The majority of the Carpathian region is part of three river basins: the basins of Danube, Dniester and Vistula
- The Carpathians are rich in biodiversity: native flora is among the richest on the European continent.
- They are home to Europe's largest populations of brown bears, wolves, lynx, European bison and rare bird species including the globally threatened Imperial Eagle. Some 45% of the continent's wolves — a species extirpated in many Western and Central European countries — can be found here

Climate Change in the Carpathians- temperature trends

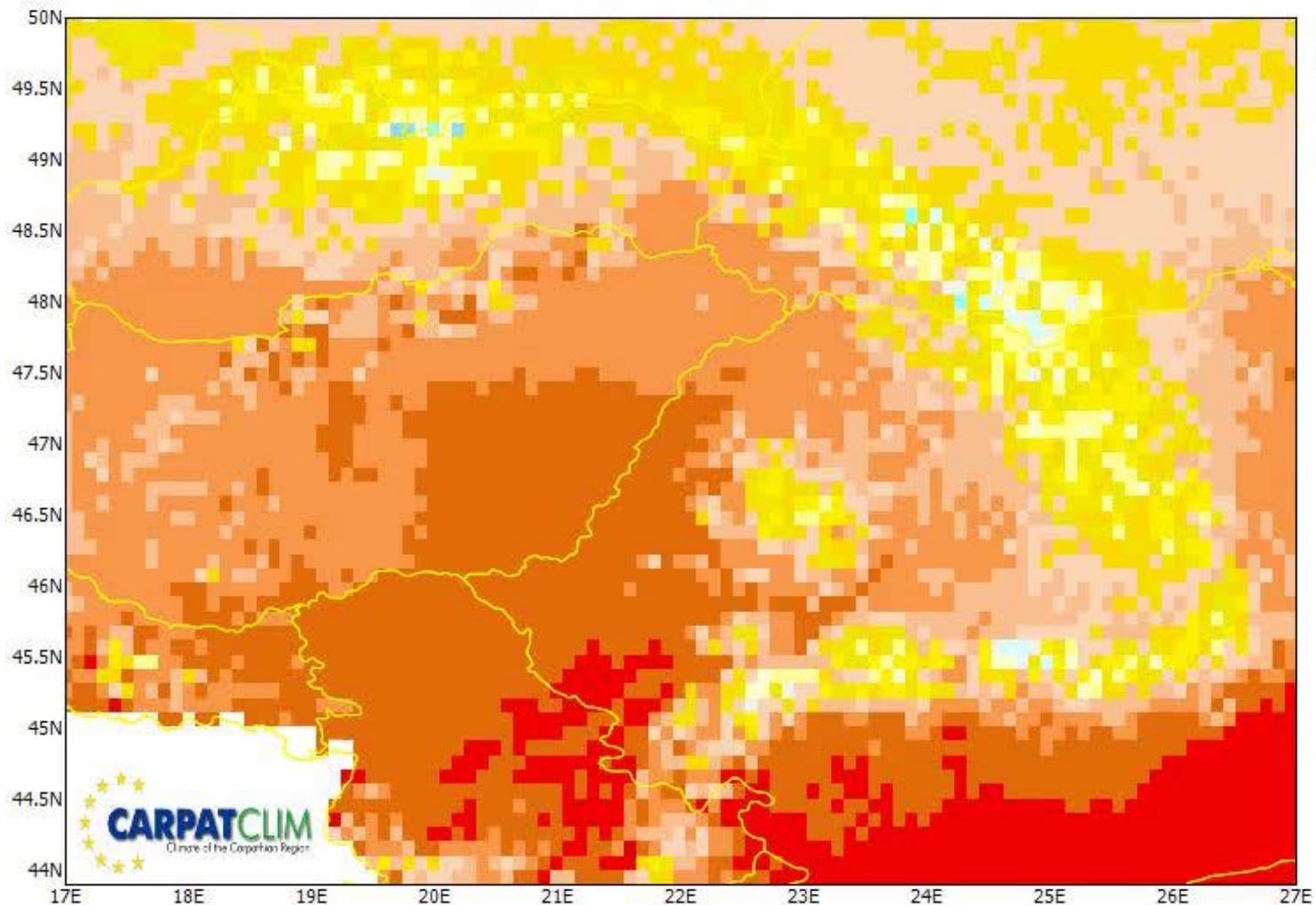


In the Carpathian Region the average annual temperature has increased between 0.6°C and 1.6°C.

Projections estimate that it will increase by between 3°C and 4.5°C by the end of the century. This trend can be seen in the picture above showing a comparison between two cold years (1962 - 2010) and two hot years (1961 - 2009) and in the video in the next slide.

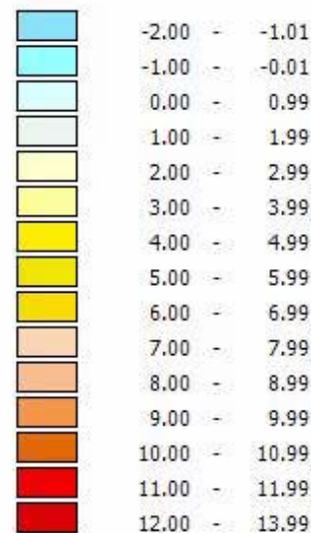


Mean air temperature

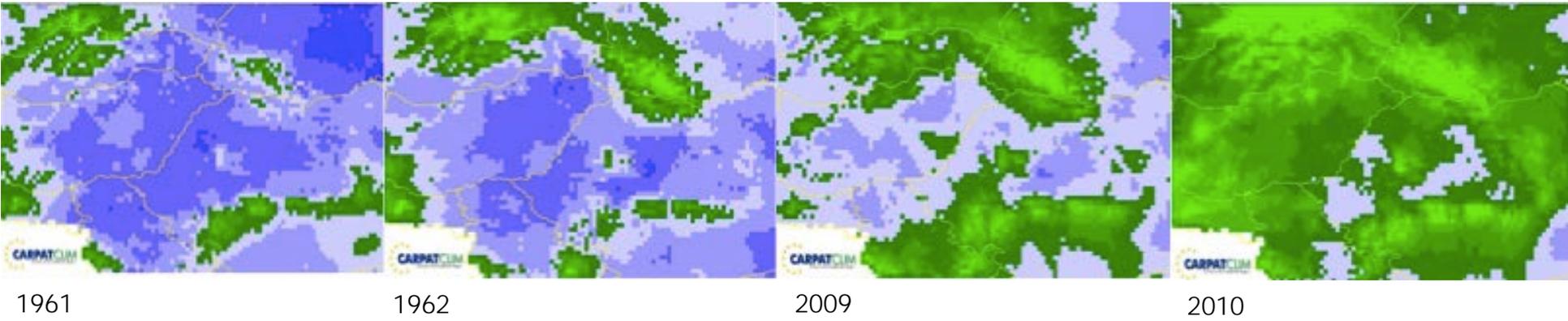


Region: CARPATCLIM
Period Type: Yearly
Start Year: 1962
End Year: 1962
Min. Altitude: 11 [m]
Max. Altitude: 2337 [m]

Units: [°C]

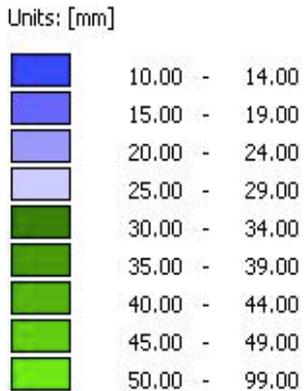


Climate Change in the Carpathians- precipitation trends

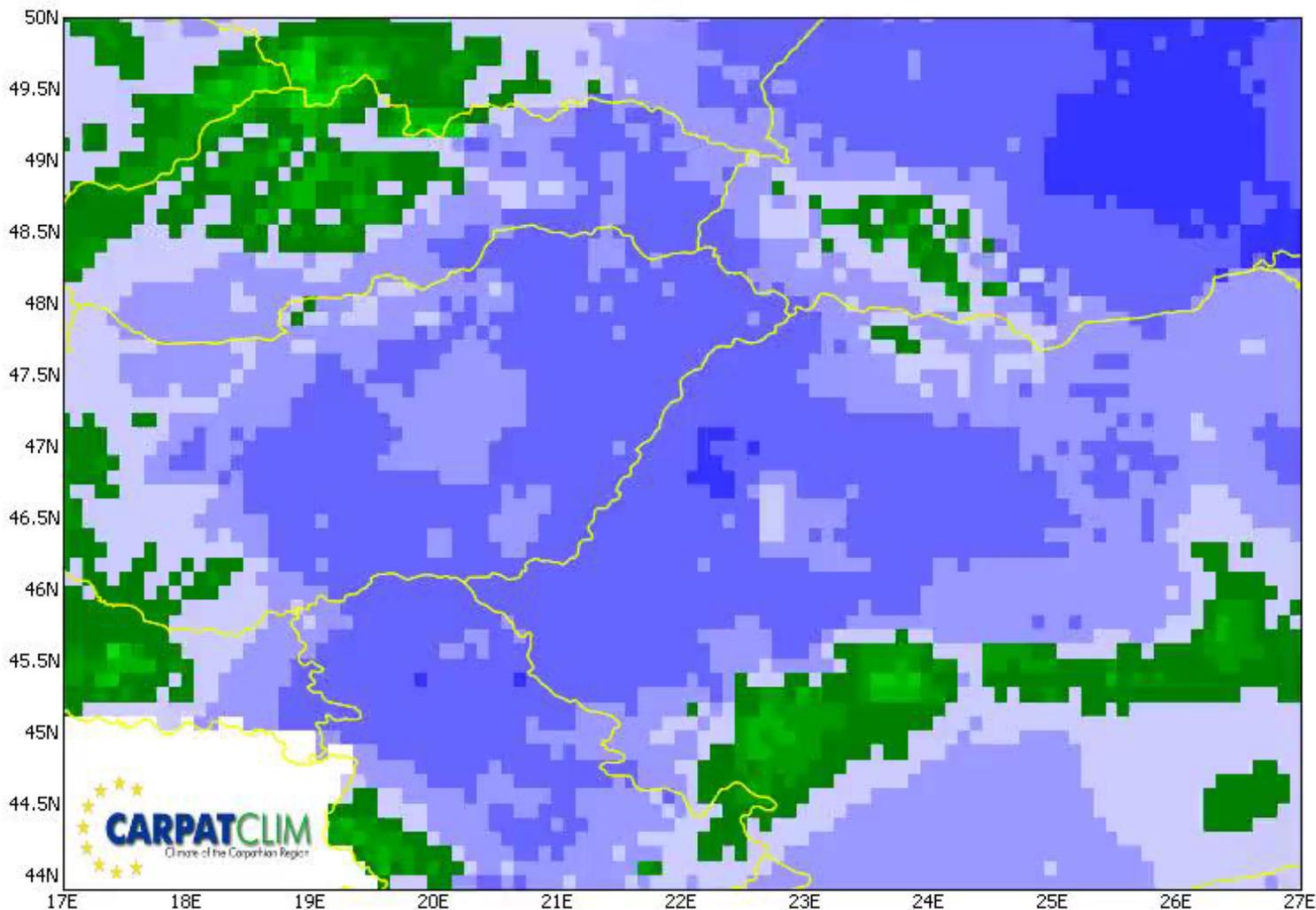


A change in precipitation patterns and a higher inter-annual variability has been recorded in the Carpathian region.

This trend can be seen in the picture above showing a comparison of precipitation trends (maximum total 5 day rainfall) between two year 50 years ago and today. The same increasing inter-annual variability and growing likelihood of extreme weather events is shown the video in the next slide.



Maximum 5-day total rainfall



Vulnerability - soil quality



The expected variation in temperature and precipitation trends will have a negative impact on the quality of soil:

- More concentrated precipitation in shorter periods of time will increase landslide risks
- In some areas the decline of river levels in summer will increase the likelihood of drought events
- The higher probability of extreme weather events is expected to increase soil erosion

Vulnerability - water quality



The expected variation in precipitation trends and extreme weather events will have a negative impact on the quality of water:

- The expected variation in precipitation trends will increase the risk of floods, especially flash floods
- Declining groundwater levels might affect the availability and quality of drinking water for communities that depend on them
- In periods of drought less flow will enhance eutrophication and can trigger toxic algal bloom. Additionally, pollutants that originate from point and diffuse sources might be less diluted, increasing concentrations of dangerous and emerging substance.

Vulnerability and adaptation

Wetlands

Adaptation: Integrating wetland protection with flood control practices



- High altitude wetlands are crucial for both biodiversity and flood management, acting as sponges that reduce flood peaks in winter and low flows in summer.
- Projected temperature increases threaten to dry out wetlands and increase the length and severity of droughts.
- Wetland loss reduces habitats for many plant and animal species - habitat fragmentation could threaten migratory birds and amphibians at the regional level.
- The most vulnerable wetland habitats are peatlands (limited resilience to climate variability, sensitivity to human activities changes in land use)

Vulnerability and adaptation

Grasslands

Adaptation: Preserving traditional managing through grazing and mowing, avoiding the abandonment of land or mulching and fertilizing techniques



- The Carpathian grasslands are among the richest grasslands in Europe thanks to their high biodiversity value, that direct results from hundreds of years of traditional management and animal husbandry.
- An increase in temperature, the occurrence of more extreme droughts and floods, soil erosion, and the tree line shifting upward, as well as agricultural intensification, are all expected to reduce grassland quality and coverage, leading to habitat fragmentation and species loss.

Vulnerability- affected sectors

The projected decline in water availability and the combined effects of droughts and floods will negatively impact many sectors

AGRICULTURE:

- Agriculture might become feasible at higher altitudes in some parts of the region, but the overall agricultural productivity is expected to decline (increased vulnerability to pests, soil erosion, groundwater depletion, and extreme weather events)



FORESTRY

- Climate projections show conditions threatening to the survival of several currently dominating forest tree species across large areas of the Carpathians (wind damage, insect pest outbreaks, negative effect of droughts)

TOURISM:

- The possibilities of winter sports may become more limited because of a projected decline in snow depth and duration

Sharing water resources

- In many parts of the world, freshwater is already a scarce resource: it constitutes only 2.5% of all available water on the planet, and only about 0.4% of it is easily accessible for human consumption
- River basins need to be managed (floods are primary concern)
- Approximately 200 of the world's major rivers flow through more than one country (transboundary)

NEED: effectively manage transboundary river basins

SOLUTION: international agreements and close international co-operation between all the countries within the river basin



example: ICPDR

Sharing water resources and climate change

Climate Change is posing more serious threats to water resources than ever before and international cooperation in river basin management might not be enough

NEW NEED: recognize interdependence and interlinkages between water resources and land use

NEW SOLUTION: Integrating land use and its impacts on water resources in the face of climate change

example: - Carpathian Convention



Sharing water resources and climate change - New solutions

- Joint declaration between the ICPDR Tisza group and the Carpathian Convention on the sustainable Development of the Tisza river basin within the Carpathian region

- Strengthens relationship between mountain sustainable development and river basin management in the Carpathian Region/Tisza river basin
- Recognizes interdependence between mountains and river

Intelinkages between land use and water resources



The role of the Carpathian Convention

Adopted on 22nd May 2003

Entered in force on 4th January 2006

Ratified by all the seven Carpathian countries

- A framework Convention for cooperation and multi-sectoral policy coordination
- Only existing legally binding framework and active stakeholder platform in the region...as well as project factory



Goal: Environmental Protection and Sustainable Development of the Carpathian Region



Thank you for your attention!

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