

**Adaptation WG**

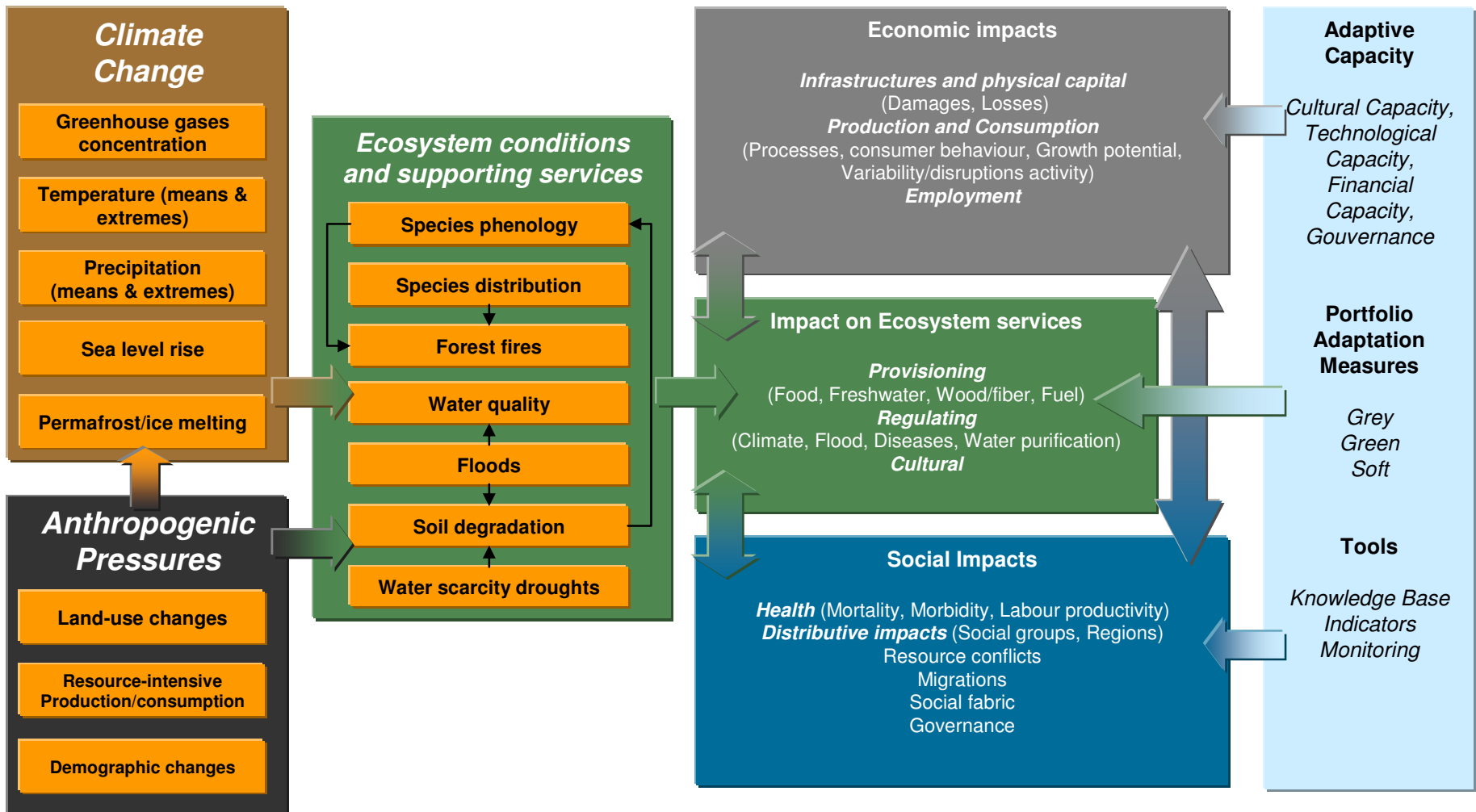
# **CARPATHIAN PROJECTS**

# Problems

- Less studied regions
  - Carpathians
  - Southeastern-Europe
- Smaller countries mostly with complex topography
- Specific effects of the Carpathian region, like summer drying

# Environmental pathway of vulnerability and adaptation

Jacques Delsalle, Evdokia Achilleos, DG Environment, Unit D1 – Protection of Water Resources



# Preparatory action

- Three projects:
  - Climate of the Carpathian region
  - Integrated assessment of vulnerability of environmental resources and ecosystem-based adaptation measures (Service contract CARPIVIA)
  - In-depth assessment of vulnerability of environmental resources and ecosystem-based adaptation measures (Framework contract CarpathCC)

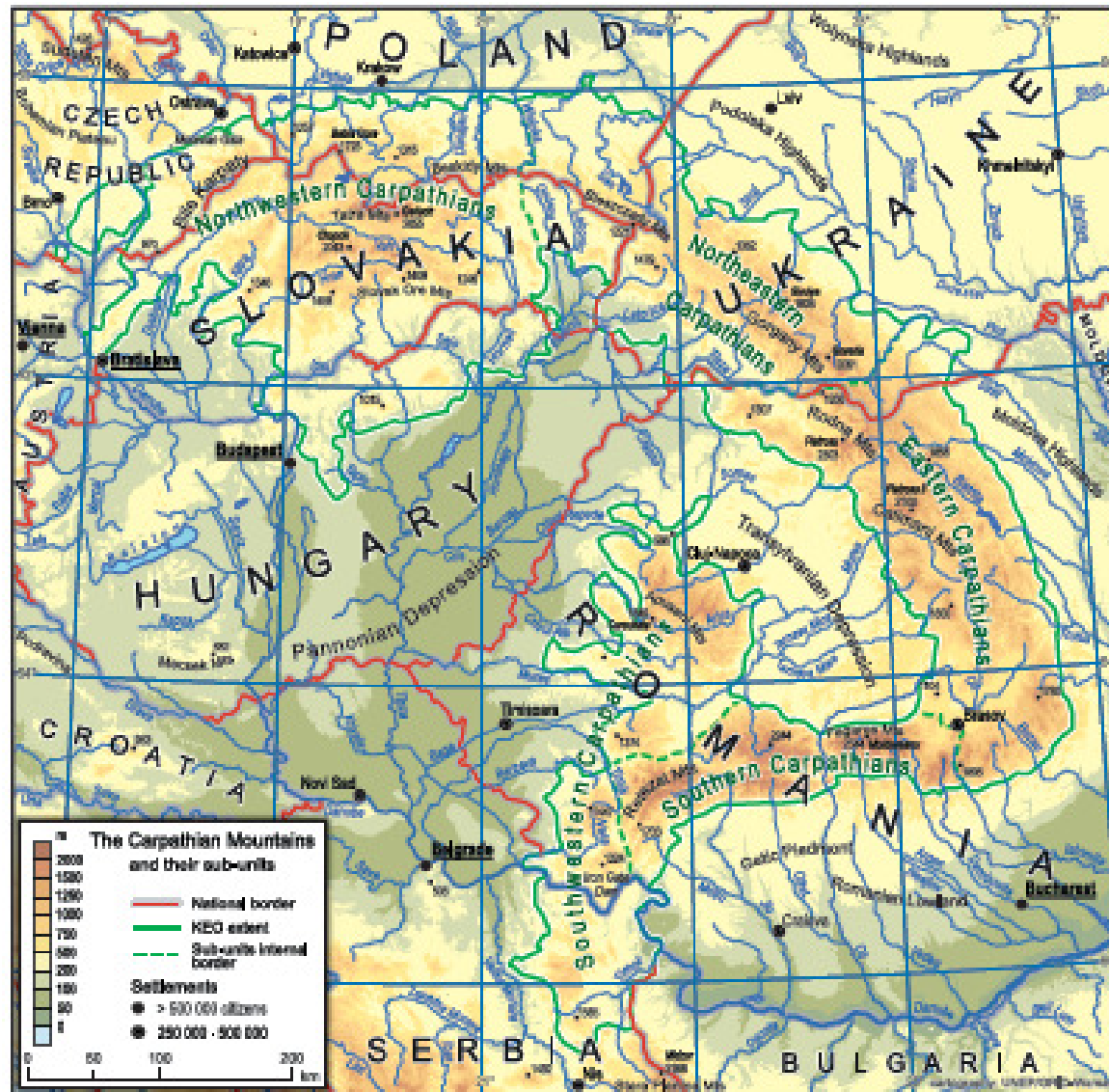
# Preparatory action

- 2010 allocation: as a follow-up of the Adaptation White Paper, the European Commission proposed to focus work on:
  - Analysis of the vulnerability of water and ecosystems of the region to climate change impacts and other man-made pressures
  - Identifying potential adaptation measures, focusing on adaptive water management and ecosystem-based approaches.
- Benefits
  - National or Regional adaptation strategies in the Carpathian Region
  - Danube Climate Adaptation Strategy
  - Contribution to the forthcoming EU Information System (Clearinghouse) on Climate Change Vulnerability and Adaptation

# Territory of the project

- For the production of the digital climate atlas, the resulting climatological grids should cover the area between latitudes  $50^{\circ}\text{N}$  and  $44^{\circ}\text{N}$ , and longitudes  $17^{\circ}\text{E}$  and  $27^{\circ}\text{E}$ , approximately.

# Map





# Countries of the Carpathian Region

Country	Area in sq. km
Croatia	14 662,66
Czech Rep.	17 570,58
Hungary	86 996,47
Poland	19 794,32
Serbia	45 015,09
Slovakia	48 520,49
Bulgaria	1 208,63
Moldova	437,90
Romania	184 434,63
Ukraine	71 530,71

# Background of the project

- Hungarian initiative in the Environmental Committee at the European Parliament in 2008
- Accepted by the Economical Committee and the Plenary in 2008
- Preparation of the tender by DG Environment and JRC Ispra in 2009
- Call in June 2010
- Duration of the project:  
22 December 2010 - 22 March 2013

# Philosophy of CARPATCLIM

- No common database of raw data
- Each country provide the same work (hope for a network as dense as possible for the project)
- Common software
- National and international consistency
- Near border data exchange (minimum number of data exchanged on equal basis)

# Participants

- Leading organisation: Hungarian Meteorological Service
- Participants:  
(Hydro)meteorological institutes and services of Austria, Croatia, Czech Republic, Poland, Serbia, Slovakia, Ukraine  
National Research and Development Institute of Environmental Protection of Romania  
Szent Istvan University from Hungary

# Structure

- Module 1: Data rescue, quality control, and data homogenisation by the use of MASH. (Leader: SHMU)
- Module 2: Data harmonisation and gridded datasets by the use of MISH. (Leader: OMSZ)
- Module 3: Climate Atlas, publicly accessible dedicated web site, gridded climatological datasets and searchable metadata catalogue (Leader: RHMSS)

# Data rescue

Country	Nb. of digitalized dat
Croatia	0
Czech Republic	0
Hungary	1 303050
Poland	389455
Romania	1525700
Serbia	107100
Slovakia	394200
Ukraine	9 964 500

# Set of meteorological variables in daily temporal resolution to be provided

2 m mean daily air temperature,  
minimum air temperature,  
maximum air temperature  
precipitation  
10 m wind direction  
10 m horizontal wind speed  
sunshine duration  
cloud cover  
global radiation  
relative humidity  
surface vapour pressure  
surface air pressure  
snow depth

# Set of variables and indicators to be provided for the Digital Climate Atlas of the Carpathian Region

Average air temperature (2 m), average mean air temperature (2 m), minimum air temperature, maximum air temperature, precipitation, maximum 10 m horizontal wind speed, average 10 m horizontal wind speed, sunshine duration, cloud cover, global radiation, relative humidity, vapour pressure, surface air pressure, snow depth, snow water equivalent, number of frost days, number of days with Tmax above 25 °C, number of days with Tmax above 30 °C, Palfai Drought Index, Standardized Precipitation Index averaged over a three-months period, Reconnaissance Drought Index, Palmer Drought Severity Index, percentage of days without defrost (ice days), percentage of extremely hot days, percentage of severe cold days, growing season length, percentage of wet days, percentage of wet days above 20 mm/d, greatest 1-day total rainfall, greatest 5-day total rainfall, aridity index, moisture index, Ellenberg index



# Outcomes

- High-resolution (10 km\*10 km) freely available databases
- Data availability on monthly and daily level
- Time frame: 1961-2010



Explore the Climate of the Carpathian region

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**Atlas**

more>>

**Metadata**

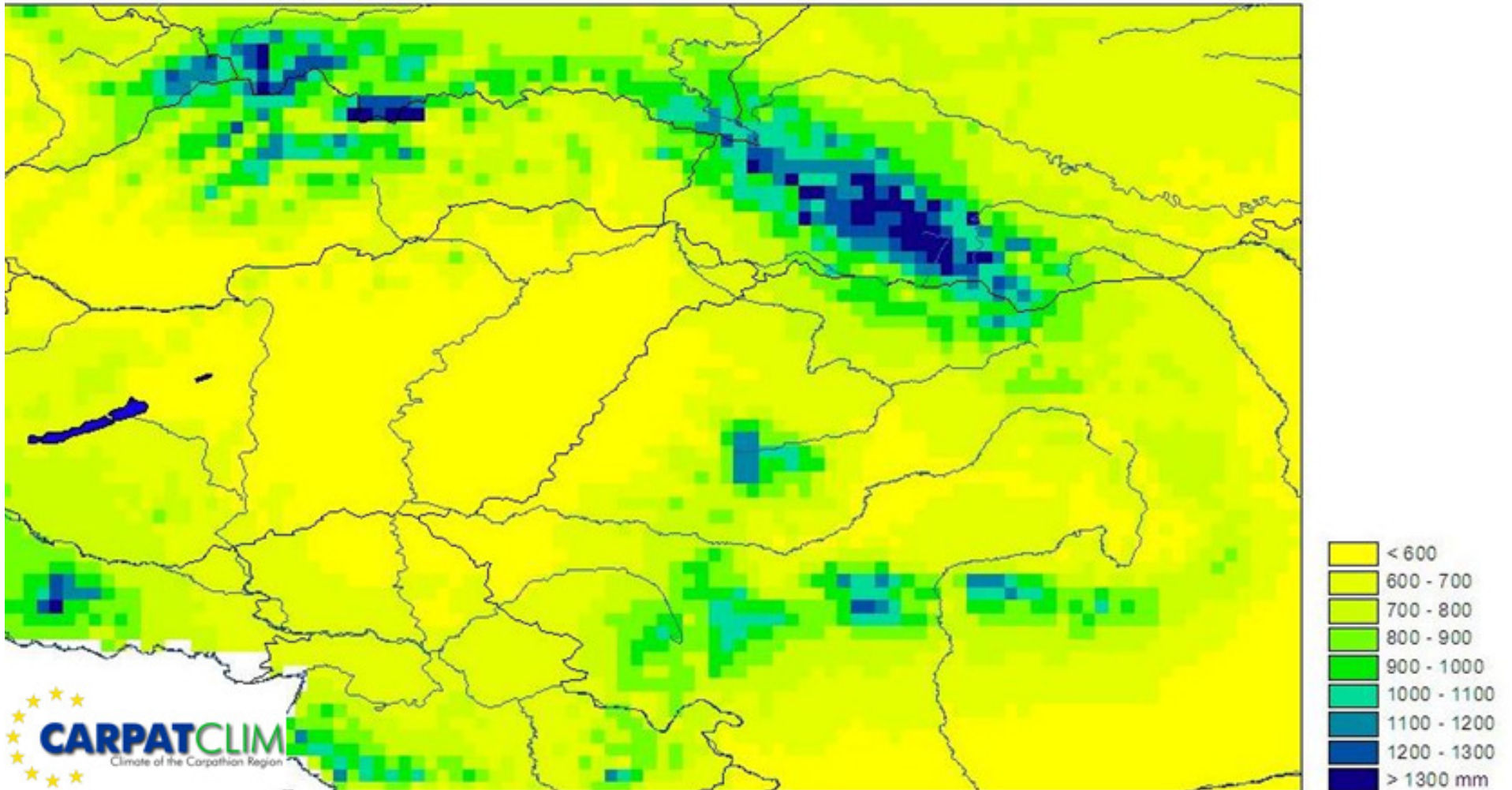
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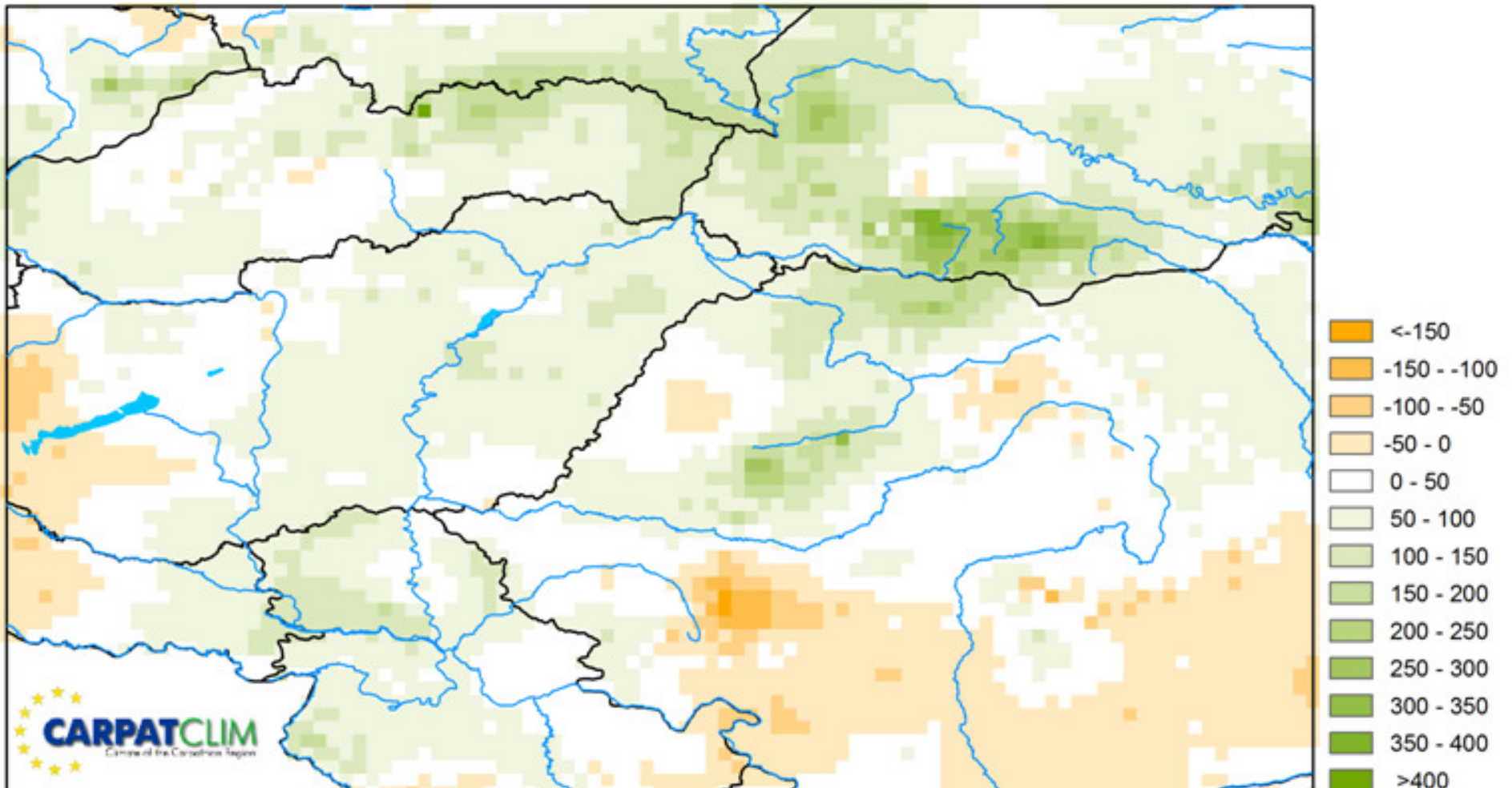
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# Annual average precipitation sum 1961-2010

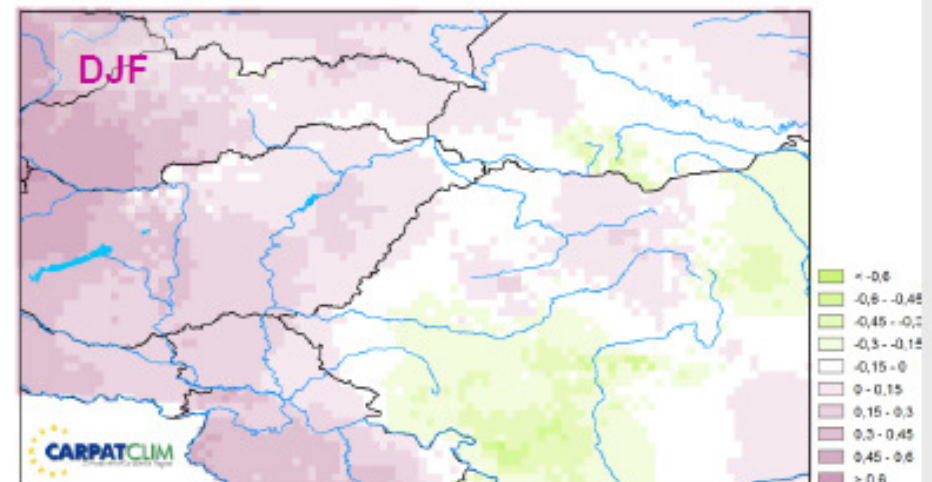
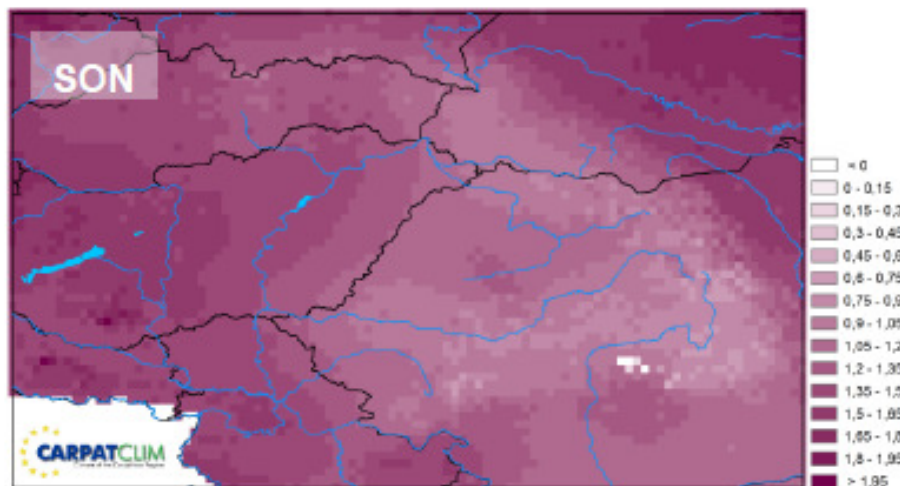
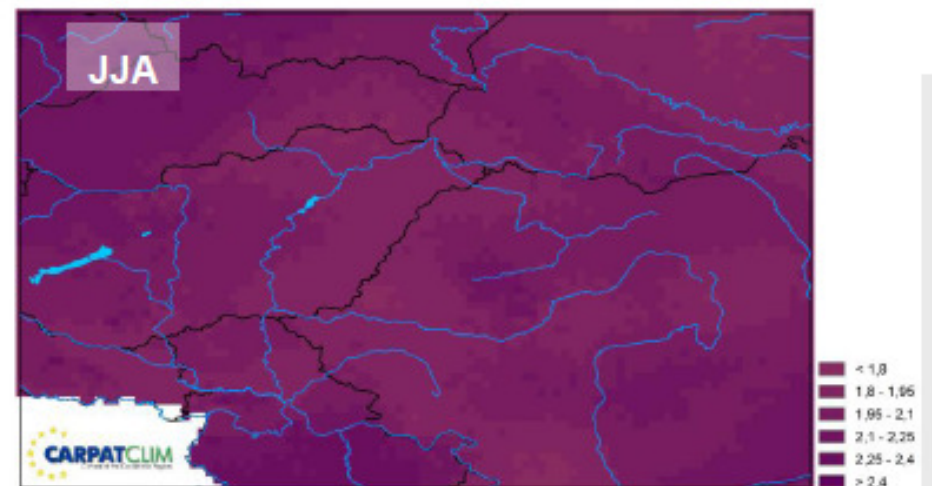
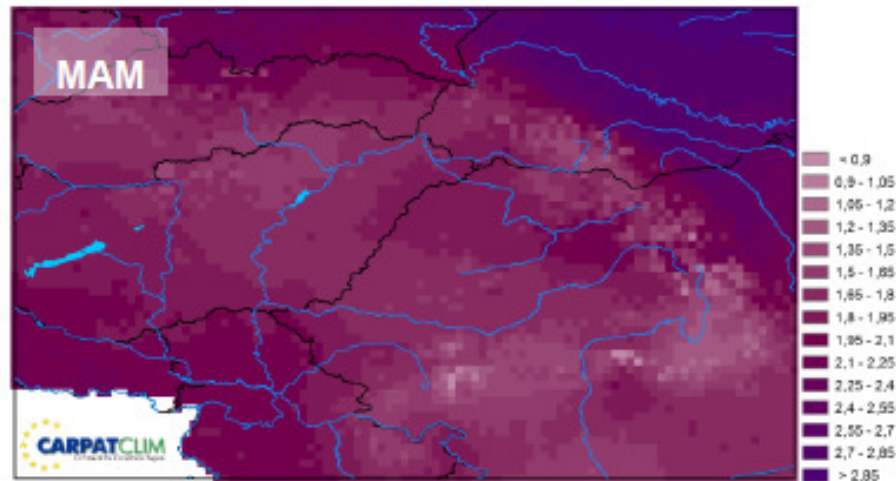




# Change in the annual precipitation sum 1961-2010



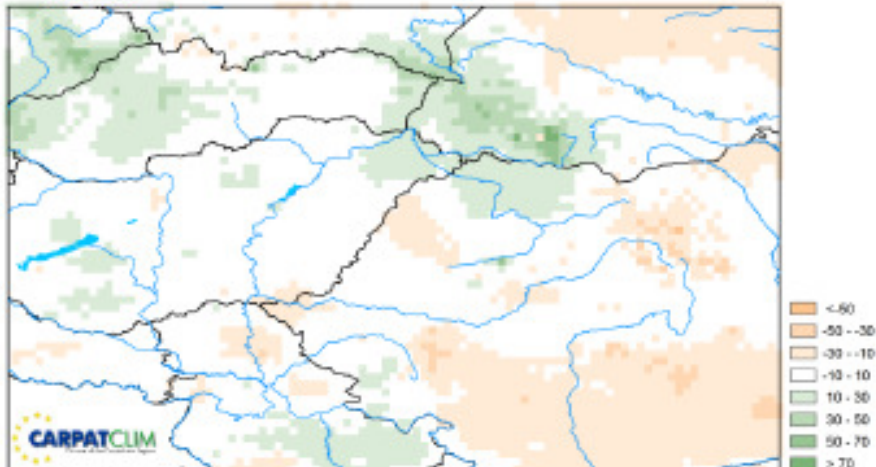
# Seasonal temperature changes, 1961-2010



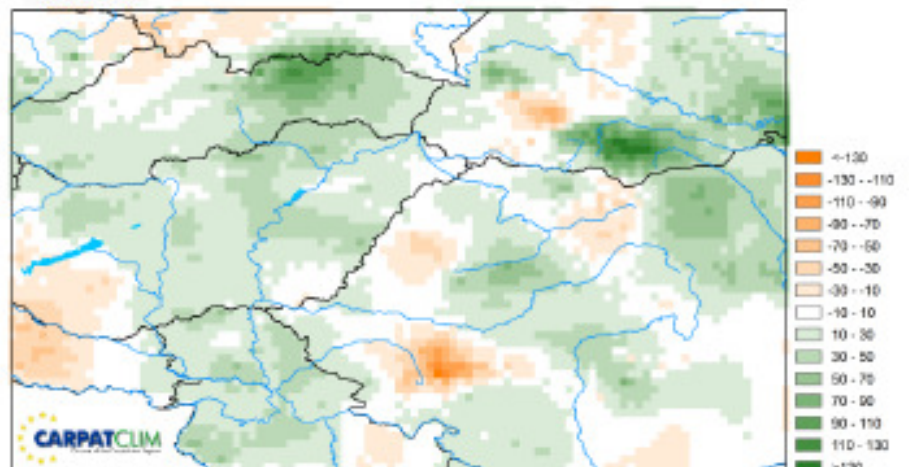


# Seasonal precipitation changes 1961-2010

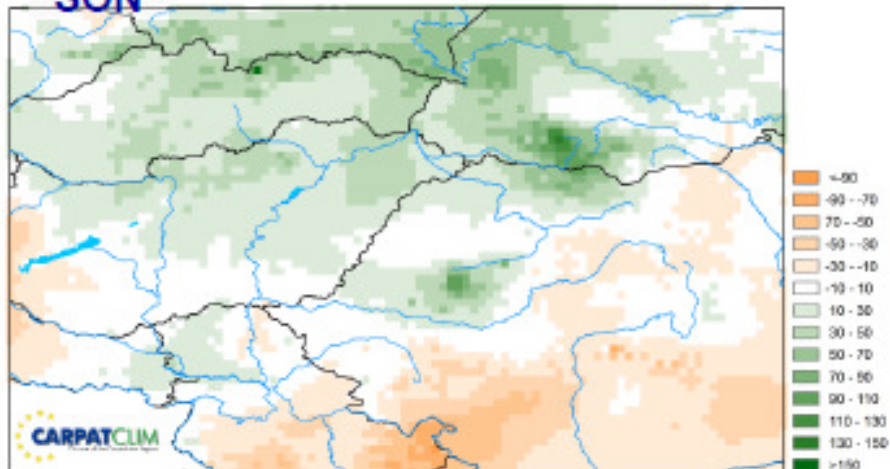
MAM



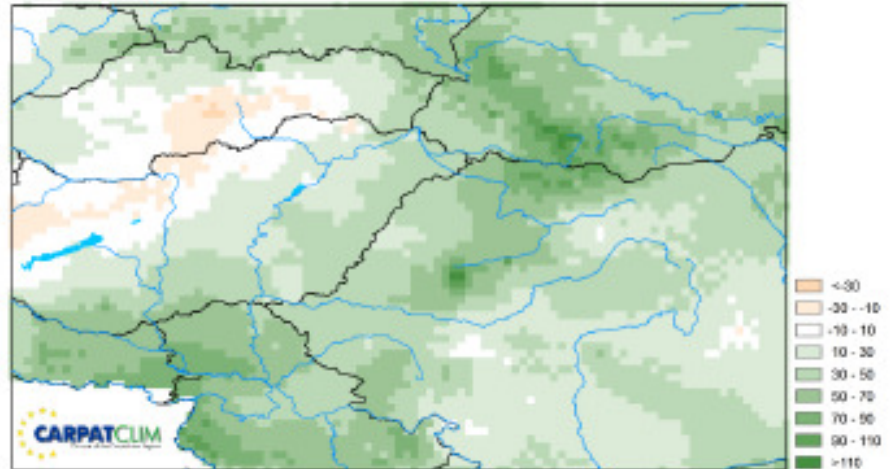
JJA



SON



DJF



# Benefits

- Improvement in the climate modelling
- Climate adaptation and vulnerability studies
- Strong development in the applied sciences
- Damage estimation, crop-yield forecast
- Development of early warning systems
- More accurate determination of crop sites
- Choosing of production sites, etc.



# CARPIVIA

CARPATHEAN INTEGRATED ASSESSMENT OF VULNERABILITY TO CLIMATE CHANGE AND ECOSYSTEM-BASED ADAPTATION MEASURES

[Home](#) | [About CARPIVIA](#) | [Vulnerability Framework](#) | [Vulnerability Explorer](#) | [Events](#) | [Cooperation](#) | [Knowledge gaps](#)

[Objectives](#) | [Background](#) | [Output](#) | [Partners](#)

## **CARPIVIA funded by European Commission**

**Contributes to preparatory action "Climate of the Carpathian Basin" approved by the European Parliament. Action proposed to:**

- *Vulnerability of water, ecosystems & ecosystem based production systems to climate change and other man-made pressures*
- *Adaptation measures, particularly adaptive water management & ecosystem-based approaches*

### **Focus selected to:**

- *Benefit national and regional authorities of Carpathian Region*
- *Support policy proposals in line with Commission White Paper on Adapting to Climate Change, National or Regional adaptation strategies, or a Danube Climate Adaptation Strategy*
- *Contribute to EU Information System on Climate Change*

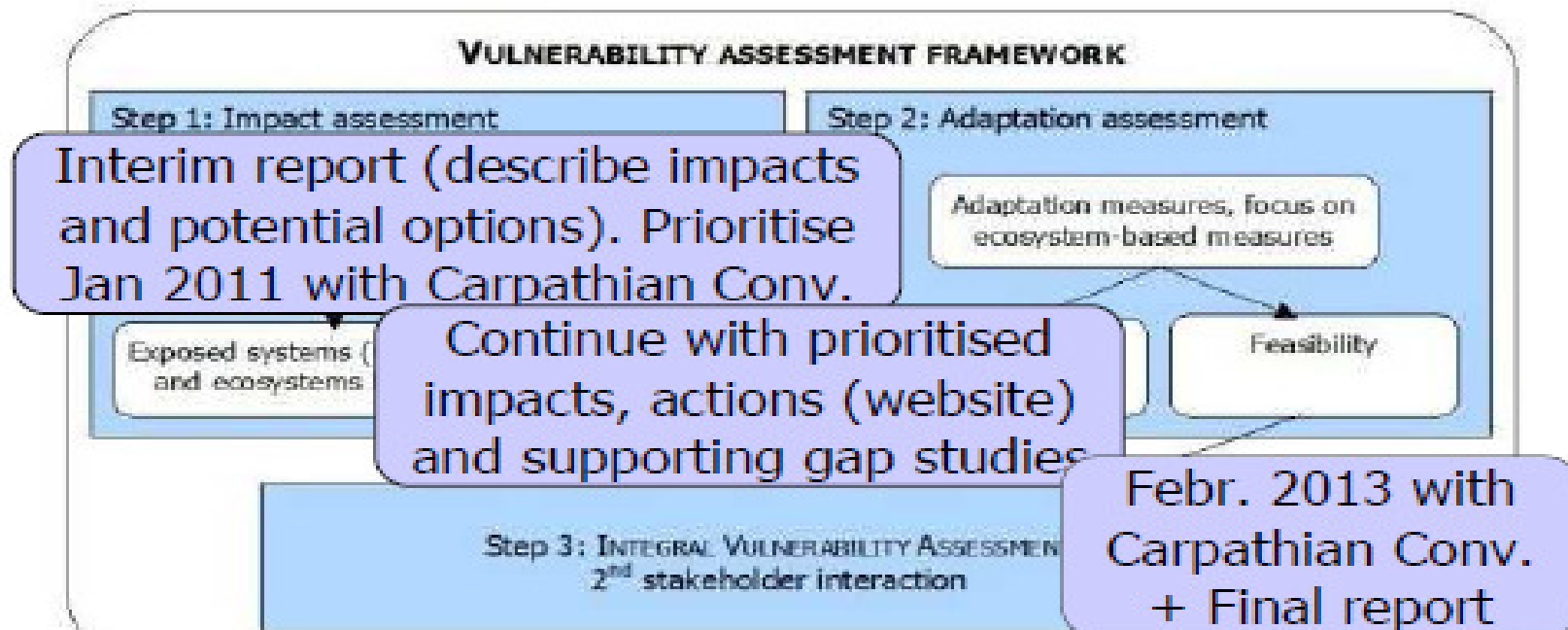


**Step 1: Assessment of the potential climate change impacts on ecosystems and ecosystem based production systems, including:**

- Description of exposed systems (water resources, ecosystems and ecosystem based production systems)
- Development of a long list of possible consequences of climate change for the ecosystems and sectors
- Prioritization of climate change trends and impacts, analysis of policy objectives to contribute to selection of impact indicators and impact threshold values.

**Step 2: Identification and assessment of potential climate change adaptation measures, focusing on adaptive water management and ecosystem based approaches.**

**Step 3: Integration of the impact assessment and adaptation assessment along with results from supporting studies into a comprehensive vulnerability assessment.**



# CARPIVIA project

Werner, 2012

## CARPIVIA Tasks and Outcomes:

- Integrated assessment & discussion of key of vulnerabilities & adaptation measures, including cost-benefit analysis and policy recommendations
- Data inventory & knowledge gap analysis (->framework proj)
- Web-supported information system
- Stakeholder consultation and cooperation with Carpathian Convention

CARPIVIA runs until 2013. Partners: Alterra Wageningen UR with ECNC, ECORYS, Grontmij and WWF-DCP

# CarpathCC framework project

# In-depth study on the key climate change threats and impacts on water resources

- Produce maps for projected floods, droughts and changes snow cover
- Assess projected seasonal shift in water balance and impacts on soils
- Assess the potential impacts of climate change on the implementation of the water framework directive and flood directive
- Assess the risk of landslides in relation to changing precipitation patterns and flash floods
- Impact of changes in ecosystems and adaptation measures on water resources

# In-depth study on the impacts of climate change threats on ecosystems

- Assessing the effect of pests and pathogens on the Carpathian forests; climate change-induced increase in virulence; change in distributional and outbreak ranges, and change in populations dynamics of both resident and newly-emerging forest pests and pathogens will be addressed;
- Assessing the effect of climate change on protective function of montane and subalpine forests in the Carpathians;
- Evaluating the effect of management practices on forest vulnerability to climate change, including expected adaptation potential of forest management;
- Evaluating the anticipated changes in species composition of forests, wetlands and grasslands, including climate change effect on grasslands productivity

# In-depth study on the impact of climate change on ecosystem based production systems

- Positive and negative climate impacts on ecosystem services with specific reference to multifunctional landscapes and grasslands
- Assessment of the vulnerability of the tourism sector

# In-depth study on adaptation measures

- Ex post evaluation of adaptation measures
- Supporting costs and benefits studies
- Ecological networks and ecosystem fragmentation
- Assessing and tailoring adaptation measures for the Carpathian region
- Agri-environmental schemes and other farmer support

# Supporting stakeholder interaction

- series of stakeholder workshops will be organised and managed using knowledge-based facilitation techniques in order to generate: a) a number of action scenarios in relation to the impacts of climate change, based on key impacts and assessments of vulnerability; b) generate a number of adaptation options in relation to these scenarios; c) evaluate the costs and benefits of the options along with their feasibility; and d) identify preferred options and adaptation pathways



# Integral vulnerability assessments in focal areas

- Tatra mountain, including Zakopane
- Rodnei and Maramures
- Tarnava Mare area
- Irongate national park and foothills
- Bükk mountains

# Meetings

- Kick-off: 06.02.2012 - 07.02.2012, Brussels, Belgium
- Workshop "Sharing of experiences on adaptation to climate change in mountain areas" & Second Meeting of the Carpathian Convention Working Group on Adaptation to Climate Change  
23.10.2012 - 24.10.2012, Eger, Hungary

# Climate Change adaptation WG at Carpathian Convention

- Decision COP3/15 on Climate change of the COP 3 of the Carpathian Convention: a Working Group on Adaptation to Climate Change under the Carpathian Convention has been established

# Workplan

- Preparation of strategic agenda on adaptation to climate change in the Carpathians
- Comments and feedbacks to the list of adaptation measures developed within the CARPIVIA and CarpathCC projects
- Develop communication strategy
- Contribution to the establishment of a web based information system on adaptation to climate change for the Carpathians

# 2nd meeting

- WS + WG

## WS

- L'Observatoire Pyrénéen du Changement Climatique
- C3-Alps – Capitalising Climate Change Knowledge for Adaptation in the Alpine Space
- Climate of the Carpathian region
- CarpathCC Project In-depth assessments of vulnerability of environmental resources and ecosystem-based adaptation measures
- Climate change in Central Asia:Tienshan – trends and future
- DMCSEE as a center and a project
- Programme: Institutionalization of Climate Change Adaptation and Mitigation in Georgian Regions
- UNEP activities on climate change adaptation in Eastern Europe, the West Balkans, the South Caucasus and Central Asia

# **STRATEGIC AGENDA on ADAPTATION to CLIMATE CHANGE in the CARPATHIAN REGION**

- Opportunities exist to steer the Carpathian region onto a sustainable, climate-proofed path. This document aims to assist governments and other stakeholders in formulating responses to climate change towards this goal. The document offers a draft Strategic Agenda on Adaptation to Climate Change as a basis for consultation<sup>1</sup> with signatories and observers of the Carpathian Convention as well as interested stakeholders.

# Chapters

- Background: Climate Change in the Carpathians, and What does Adaptation Mean?
- The Issues: Impacts of Climate Change in the Carpathians
- Priorities for the Signatories: Policy Responses to create a Path to a Climate-Proofed Carpathian Economy
- A Carpathian Space: Naturally Adapting to Changes in the Heart of Europe
- Improving the Information Base and Monitoring
- Coordination with the Danube, Tisza, Dniester processes
- Cross-Cutting Opportunities
- Opportunity for the EU Funds from 2014-2020: Steer the Region's Development Towards a Climate-Proofed Carpathian Space
- Actions

# Climate Change Strategic Agenda (Info28)

- Matrix of potential climate change adaptation measures in the Carpathians (May 2012)

Working Group Measures	C.C. Threatened Policy Objective	Actors	National or Transnat	Policies + Funding	Links with	Timescale / Calendar	Type of Measure and other notes
<u>WG Adaptation to Climate Change</u>							
<b>Over-Arching</b>							
Monitoring Programme	n/a	GOV, RES	Both				
Inventory of Information Gaps	n/a	GOV, RES	Both				
Public Awareness	n/a	GOV, NGO	Nat				Preparatory
Public Sector Capacity Building	n/a	GOV	Nat				and
Establish Carpathian Space Adaptation Capacity/Body/Network	n/a	GOV, RES, NGO, PRIV	Transnat		Builds on VASICA initiative WG CC		„No Regrets“ 