SOUTH EAST EUROPE
Transnational Cooperation Programme
Co-funded by the EUROPEAN REGIONAL DEVELOPMENT FUND

CC-WaterS

Climate Change and Impacts on Water Supply

SOUTH EAST EUROPE Transnational Cooperation Programme
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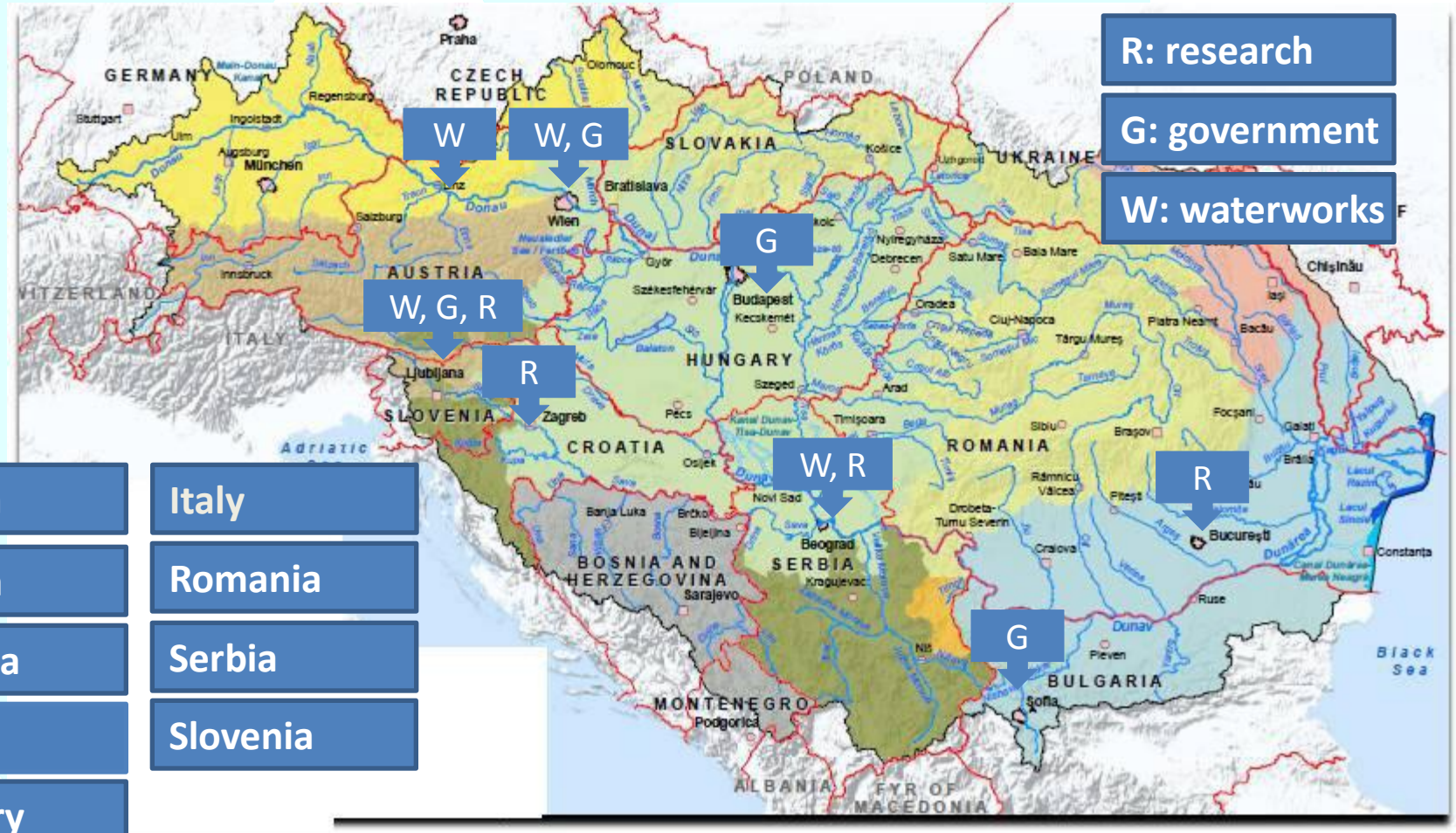
Countries participating in the project CC-WaterS



- Austria
- Croatia
- Bulgaria
- Greece
- Hungary
- Italy
- Romania
- Serbia
- Slovenia

Challenges

- Supply of drinking water is vital for social and economic development
- Climate Change as natural driver may cause severe harmful effects on water supply and other water services
- Economic crisis as social driver may affect on water resource uses through land use changes
- Water suppliers are aware of potential problems emerged by Climate Change.
- To get information on „optimal" catchment scale (10-10.000 km²)
- Adaptation of new supply and demand management

Objectives

Water ressources availability

- Survey of changes of water regime (water level, flow, etc.)

Landuse concerns

- Changes according to climate and landuse change
- Methods is to be developed to assess the impacts

Water Supply

- Implemantation of measures in order to adapt water management to climate and land use changes

The participating partners through the pilot areas chosen by them represent the geographical and meteorological diversity of SEE and show complementary expertise.

Target groups

Water works

- The project aims to provide new methods and tools for water works in order to help them for supplying by new management rules

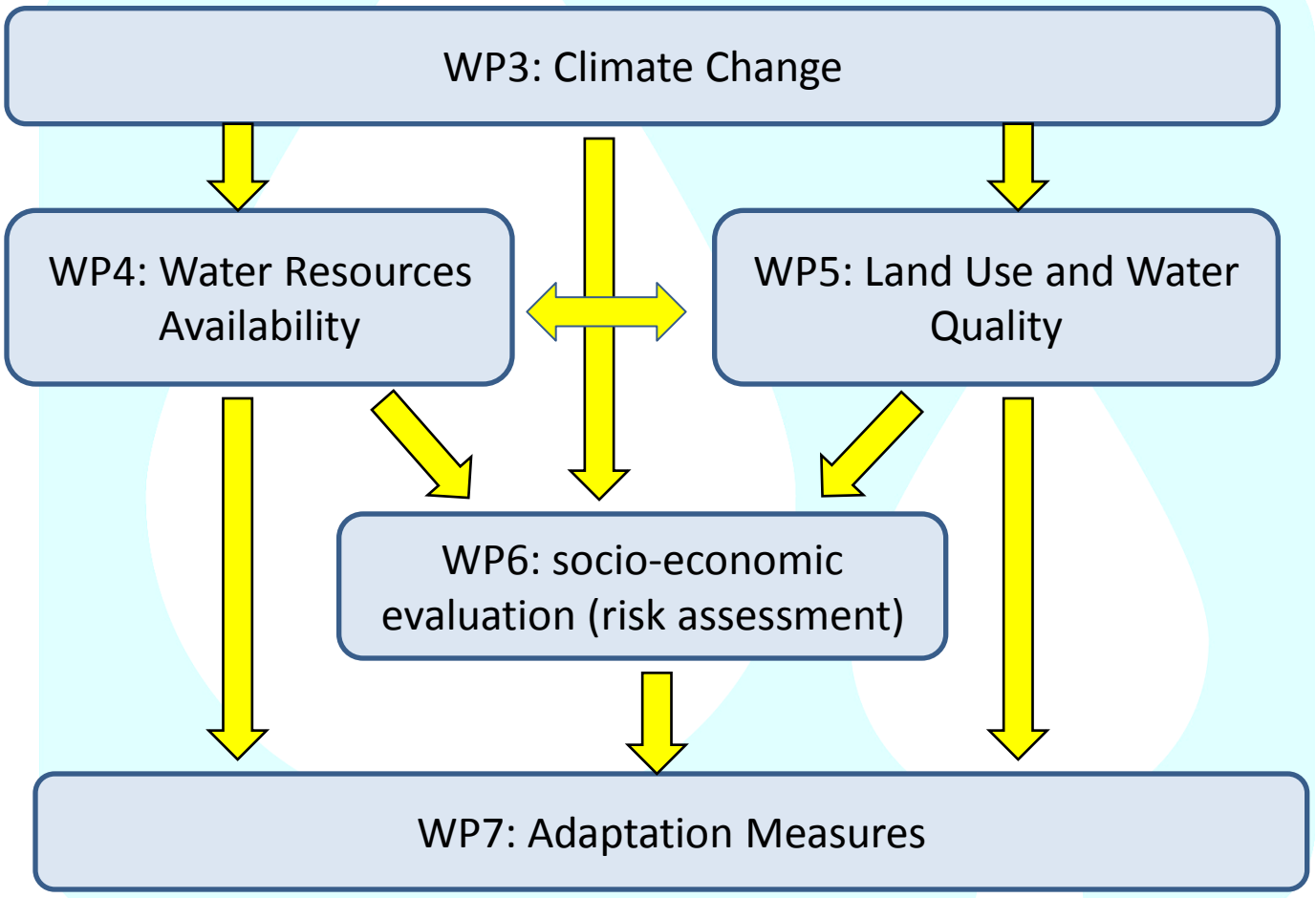
Governmental Institutions

- Proposal for new legal instruments

Research Institutions

- Project supporting with scientific and applied input.

Working structure



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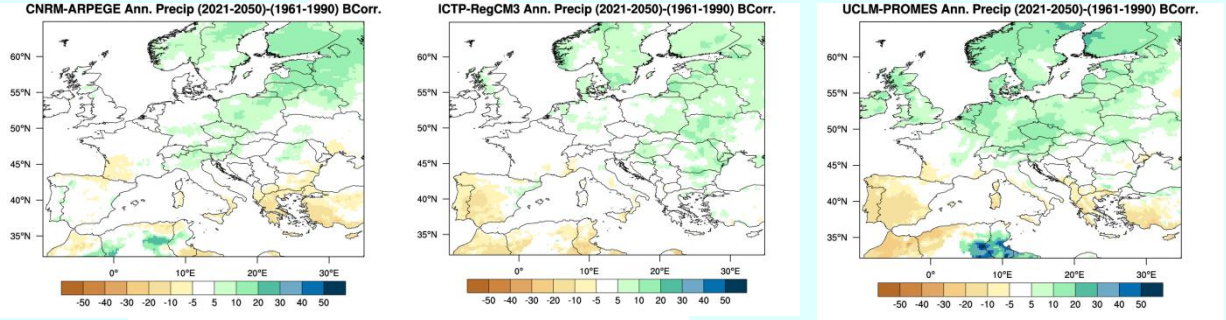
Results Climate Change on maps

Changes of precipitation until 2050



Bias corrected climate change signal - mean annual precipitation for the period 2021-2050.

Changes of temperature until 2050

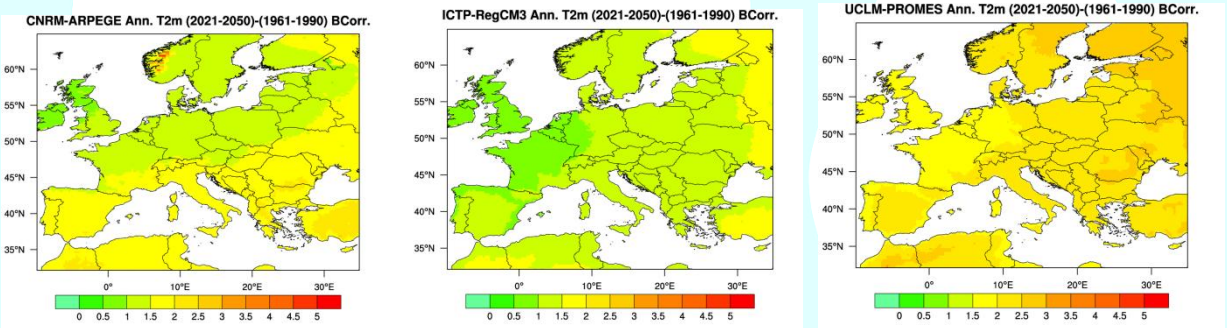


Figure 14: Bias corrected climate change signal - mean annual temperature for the period 2021-2050.

Using different RCMs at different timescales

ARPEGE

RegCM3

PROMES

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Results Climate Change on maps

Changes of precipitation until 2100

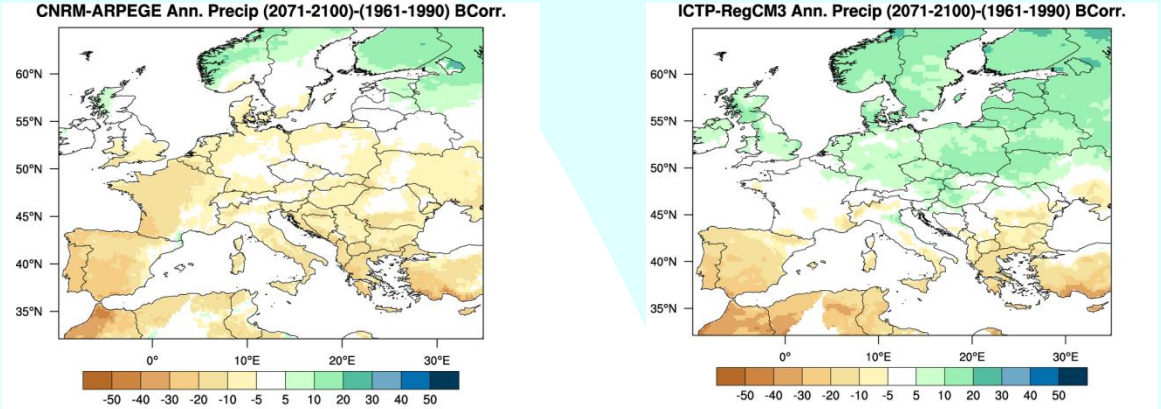

Figure 17: Bias corrected climate change signal - mean annual precipitation for the period 2071-2100.

Changes of temperature until 2100

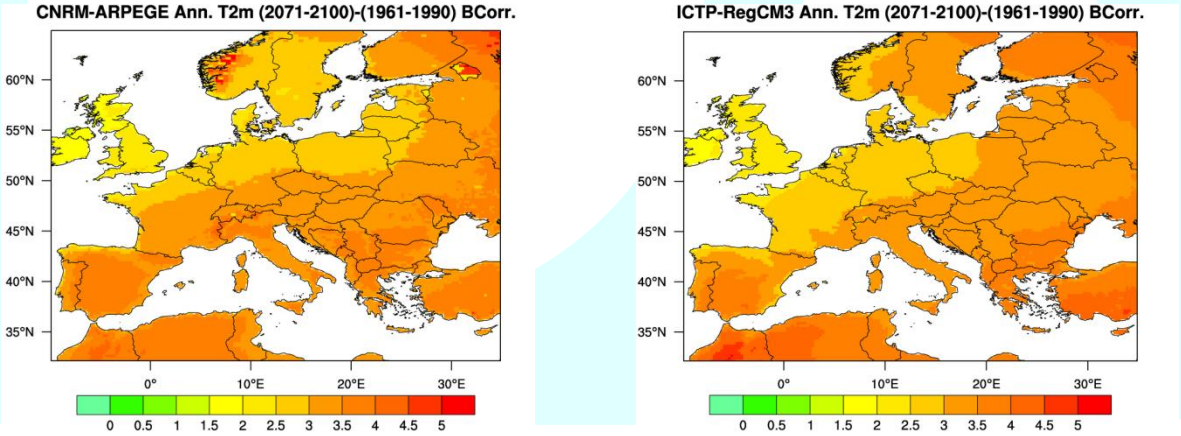

Figure 19: Climate Change signal [°C] of the annual temperature of the CNRM-ARPEGE model (left side) and RegCM3 (right side) for the period 2071-2100 versus 1961-1990.

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Summarized results on Climate Change till 2050

- **PRECIPITATION by**
  - ARPEGE: annual rainfall over Central Europe (Austria, Slovenia) is expected to increase by about 10-20 %. No changes were detected for major parts of Romania, Serbia, Croatia and Hungary while a decrease a decrease by about 20-30 % is found in Bulgaria and Northern Greece.
  - RegCM3: stable conditions and in some countries like Hungary, Romania, Bulgaria a slight increase
  - PROMES: an increase in annual precipitation for Central Europe (Austria, Slovenia) by about 10-20 %, and stable conditions for the rest of the Balkans except Greece where the rainfall should decrease by about 20 %

Spatial precipitation pattern over Europe is similar in the different RCMs. An increase in mean annual precipitation towards the North while a decrease can be expected in the South, especially in the South-West Europe.

- **TEMPERATURE by**

ARPEGE and the RegCM3: increase of about 1 – 1.5 °C in the mean temperature for the winter half year

PROMES: the increase is about 2 – 2.5 °C.

ARPEGE and the PROMES : the increase in the summer half year is higher and goes up to 3 °C.

RegCM3 : similar results for the winter and the summer period

Temperature simulations are quite consistent

Results Water Availability

- Setup of a transnational hydrological database

- Assessment of actual and future water resources considering climate change and climate change induces land use changes.

- Assessment of the sensitivity regarding climate change in different regions and different types of aquifers.

- Actual water demand vs. actual water resources

- Conclusions for socio-economic impacts and water management

Results Water Availability

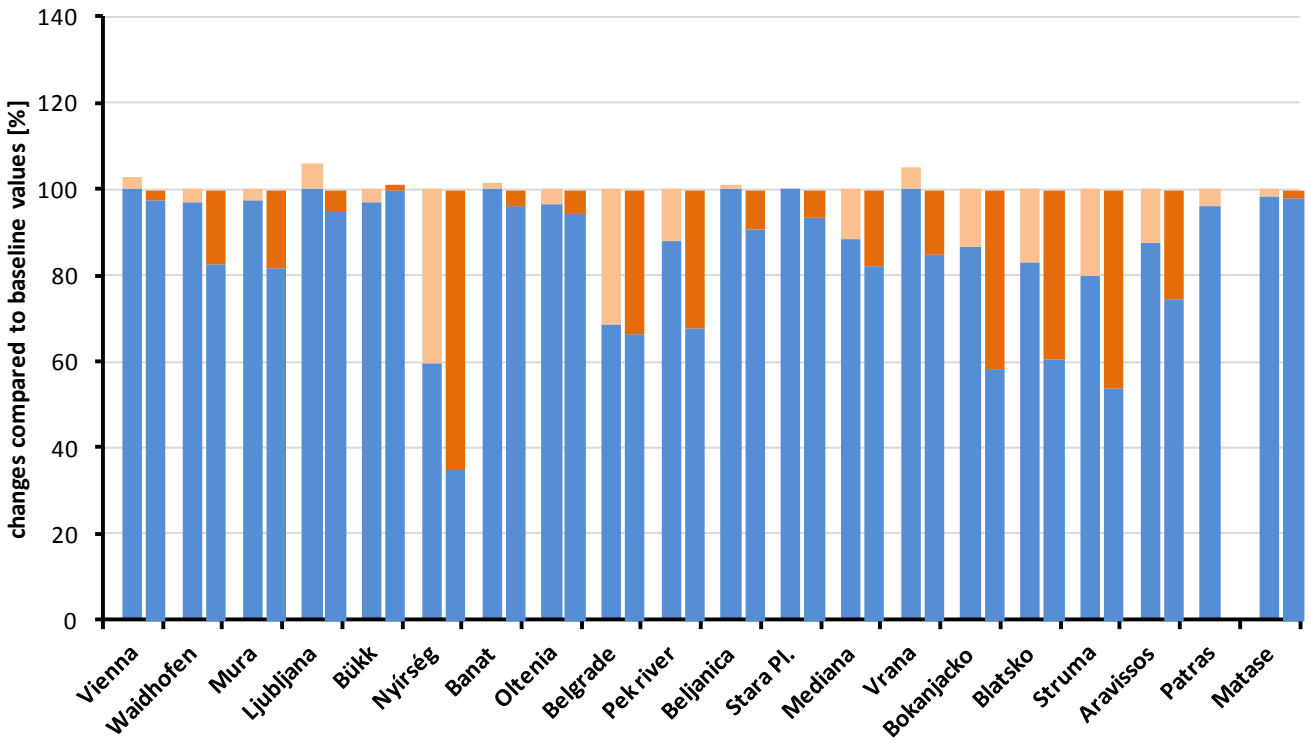
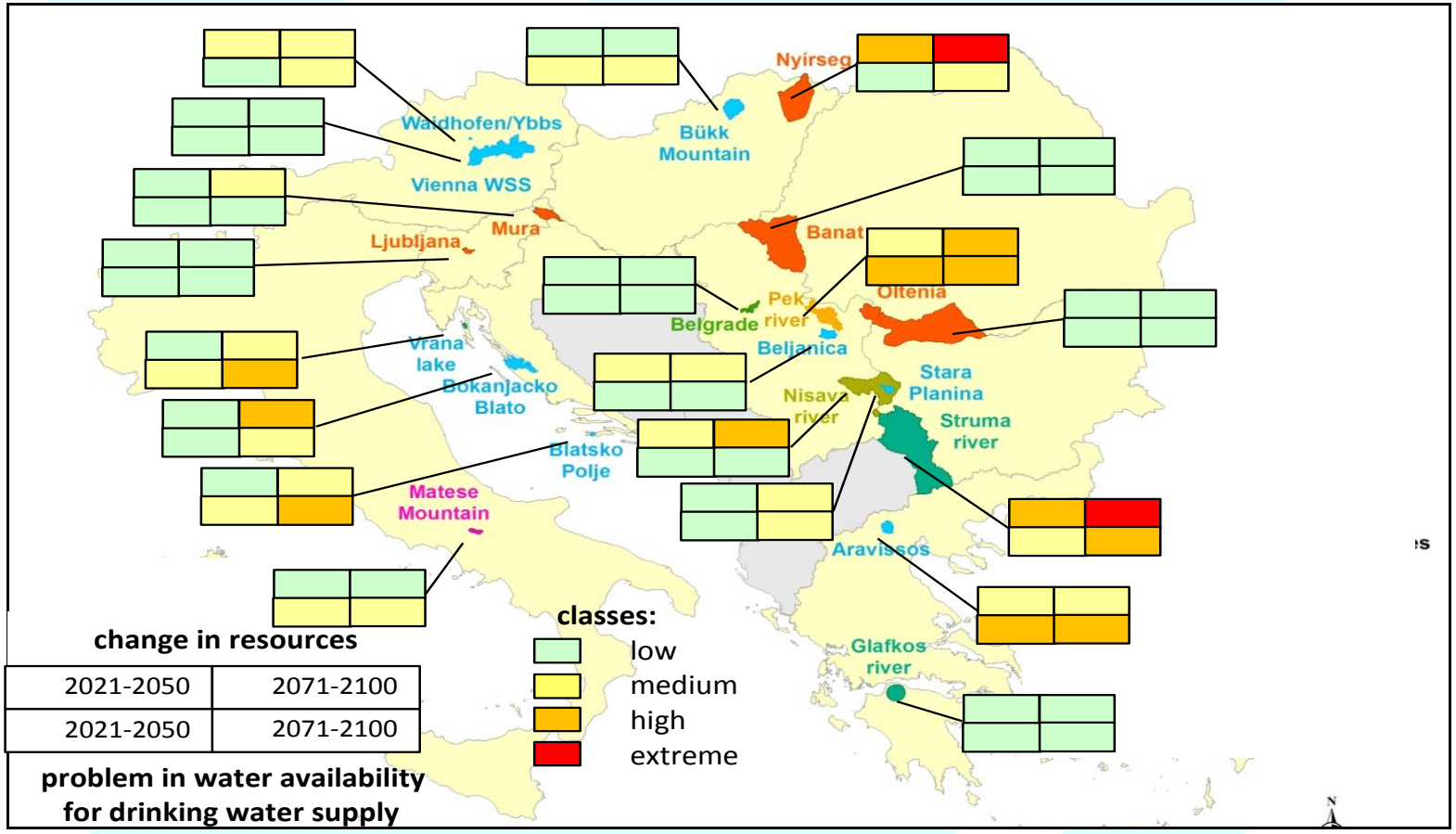


Figure 15: Changes in the water resources due to the climate change as percentage of the baseline values (1961 – 1990).

Results Water Availability

Ranking of the test areas according to problems in the field of water supply



Results Land Use Activities

- Impact of climate change signals on actual land use activities and generation of land use scenarios

- Assessment of probable impacts of future land use activities on water quality

- Analyses and synthesis using the DPSIR method

Results Land Use Activities

Mountain pasture (Molise, Italy)

Climate change causes increased micro organisms load from concentrated manure

Possible measures:

-Extending of protection areas

-Change of pasture management

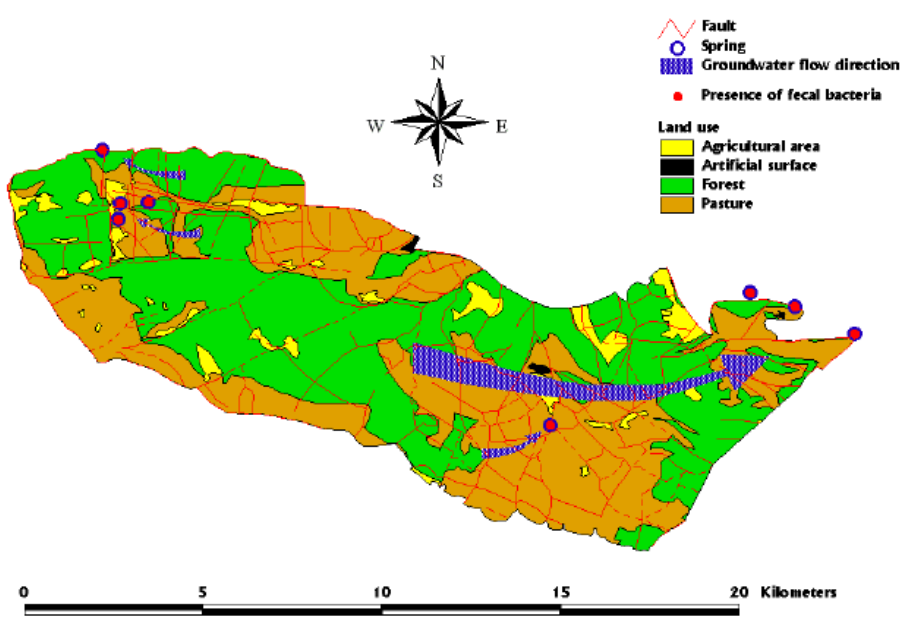


Figure 12: Land use map of the Monti del Matese test area.

Results Land Use Activities

Agriculture (Serbia)

Climate change causes

- Higher demand for intensified irrigation
- Increased erosion
- Growing pesticide using

Table 3. Future agricultural land use in test areas 18, 19, 20

YEAR	Belgrade groundwater source (ha)	The Pek River catchment area (ha)	The Nisava River catchment area (ha)
2008	13359	41685	93625
2020	12902	40326	93381
2050	11759	36928	92770
2070	10997	34662	92363
2100	9854	31264	91752

Results Land Use Activities

Forestry (Vienna)

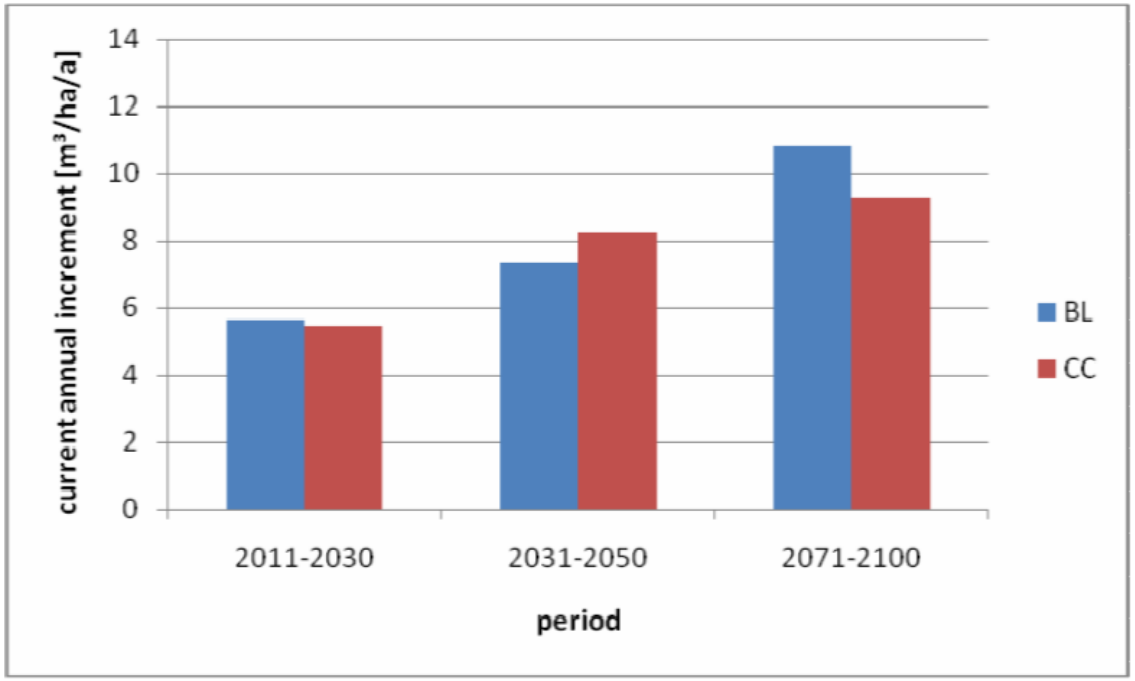


Figure 9: Current annual increment in the forest area managed by the municipality of Vienna. Illustrated are averages of simulations under BAU management for the baseline (BL) and the climate change scenario (CC) for 3 analysis periods.

Results Land Use Activities

Urban developement (Ljubljana)

Due to CC and urbanisation trend there will be a growing in demand for drinking water supply in urban area

Results socio-economic evaluation

- Assessment of the water demand of different economic sectors

- Assessment of economic impacts on water management caused by climate and land use changes.

-Assessment of impacts on environment.

Conclusions

Socio-Economic Evaluation (Risk Assessment)

No Problems: Austria, Slovenia

Marginal Problems: Leu-Rotunda Plain, RO; Bükk-mountain, HU; Aravissos, GR; Struma River BG; Kucevo, RS; Veliko Gradiste, RS; Croatia

Significant Problems: Nyirseg, HU; Timis Plain RO

Practical information

-Monograph: comprehensive handbook intended to support water suppliers for daily work

-Reports for detailed further information

-General information for broad public

-Can be downloaded from:

www.ccwaters.eu

Follow-up project CC-WARE

Project title: Mitigating Vulnerability of Water Resources under Climate Change

CC-WARE capitalises and implements results of CC-WaterS on national / regional level.

CC-WARE aims at developing an integrated transnational strategy to implement national / regional action plans.

The key target group in CC-WARE are national, regional and local authorities responsible in water, forest management and regional development.


Thank You