



REPUBLIC HYDROMETEOROLOGICAL SERVICE OF SERBIA



Research needs on impacts of regional climate change in SEE

Milan Dacic, Director

*REPUBLIC HYDROMETEROLOGICAL SERVICE OF SERBIA
Milankovitch Climate Change Center*

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Inside the PPT

- Impacts of Climate Change – global scale
- Impacts of Climate Change – Europe scale
- Nairobi Work Programme – NWP
- Limitations and needs to deal with climate change in SEE
- Research needs to assess the impact
- Belgrade Initiative
- Some examples ...

Impacts of Climate Change – global scale

- Observational evidence - all continents, most oceans - many natural systems affected
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- **High confidence:**
 - natural systems related to snow, ice and frozen ground affected (e.g. enlargement and increased numbers of glacial lakes; increasing ground instability in permafrost regions and rock avalanches in mountain regions; changes in some Arctic and Antarctic ecosystems).
 - hydrological systems affected (through increased runoff and earlier spring peak discharge in many glacier- and snow-fed rivers and through effects on thermal structure and water quality of warming rivers and lakes)
 - terrestrial ecosystems (earlier timing of spring events, such as leaf-unfolding, bird migration and egg-laying; and poleward and upward shifts in plant and animal ranges)
 - marine and freshwater systems (shifts in ranges and changes in algal, plankton and fish abundance - associated with rising water temperatures, and changes in ice cover, salinity, oxygen levels and circulation).
- **Medium confidence:**
 - different managed and human systems: agricultural and forestry (earlier spring planting of crops, alterations in disturbances of forests due to fires and pests; some aspects of human health, such as excess heat-related mortality in Europe, changes in infectious disease vectors in parts of Europe, and earlier onset of and increases in seasonal production of allergenic pollen in Northern Hemisphere high and mid-latitudes; some human activities in the Arctic (e.g. hunting and shorter travel seasons over snow and ice) and in lower-elevation alpine areas (such as limitations in mountain sports).
- Of the more than 29,000 observational data series, from 75 studies, that show significant change in many physical and biological systems, more than 89% are consistent with the direction of change expected as a response to warming.
- **However, there is a notable lack of geographic balance in data and literature on observed changes, with marked scarcity in developing countries.**

Impacts of Climate Change – Europe scale

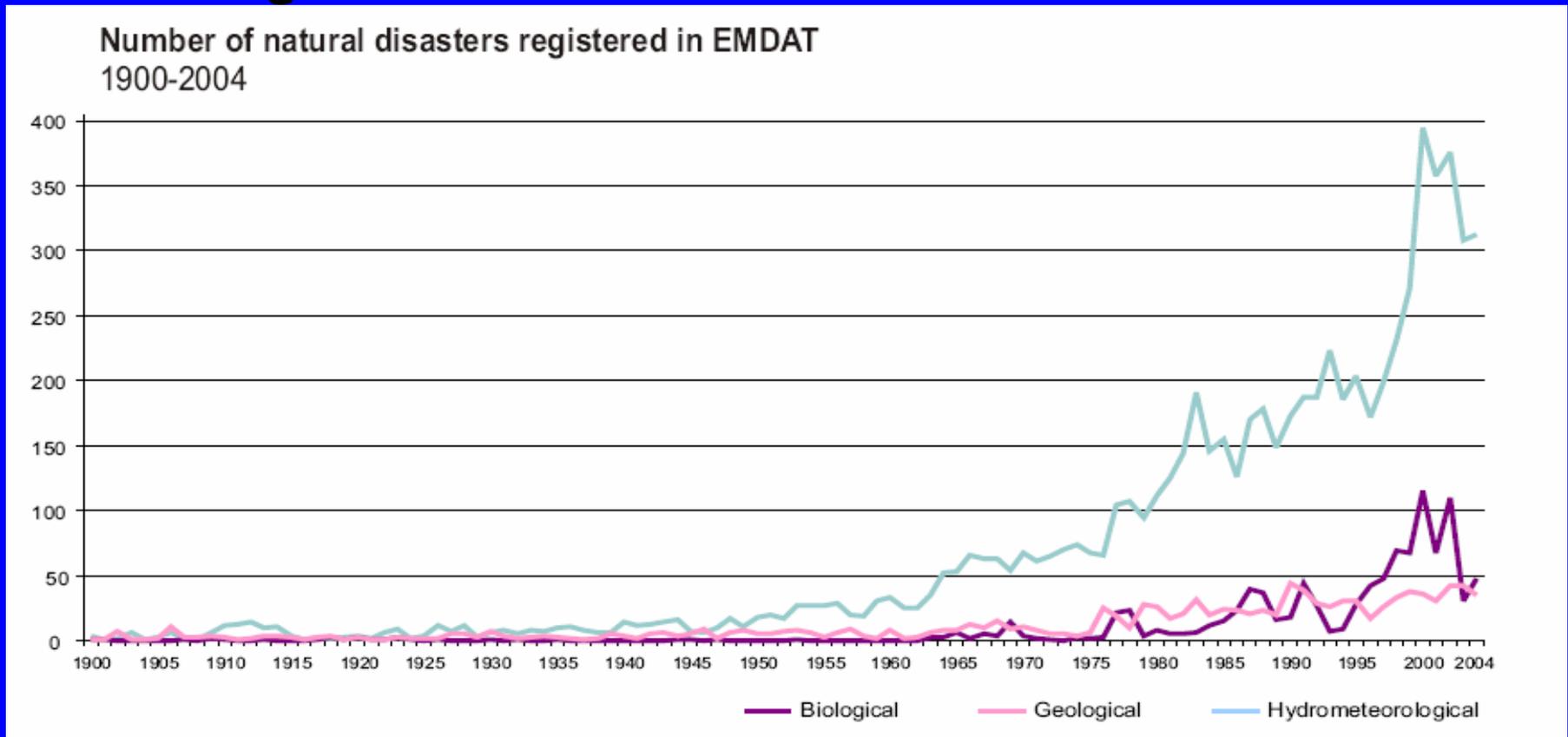
- expected to magnify regional differences
- increased risk of inland flash floods and more frequent coastal flooding and increased erosion
- glacier retreat, reduced snow cover and winter tourism, and extensive species losses
- In southern Europe, climate change is projected to worsen conditions (high temperatures and drought) in a region already vulnerable to climate variability, and to reduce water availability, hydropower potential, summer tourism and, in general, crop productivity.
- increase the health risks due to heat waves and the frequency of wildfires

The most vulnerable areas in Europe:

- **Southern Europe** and the entire **Mediterranean Basin** due to the combined effect of high temperature increases and reduced precipitation in areas already coping with water scarcity.
- **Mountain areas**, in particular the Alps, where temperatures increase rapidly leading to widespread melting of snow and ice changing river flows.
- **Coastal zones** due to sea level rise combined with increased risks for storms.
- Densely populated floodplains due to increased risks for storms, intense rainfall and flash floods leading to widespread damages to built-up areas and infrastructure.
- Scandinavia where much more precipitation is expected and a larger part in the form of rain instead of snow.
- The Arctic region where temperature changes will be higher than in any other place on Earth.

Weather and climate disasters

In many regions of the world changes in the intensity and frequency of the occurrence of climate extremes were registered.



Climate variability and extremes are already a major obstacle to development in many regions including SEE

Extreme Weather Conditions 2007



Exceptional Drought in July and August 2007 in Serbia accompanied by the longest registered wave of extremely high air temperature ($\sim 45^{\circ}\text{C}$): Losses in agriculture cc. 0.5bn EUR



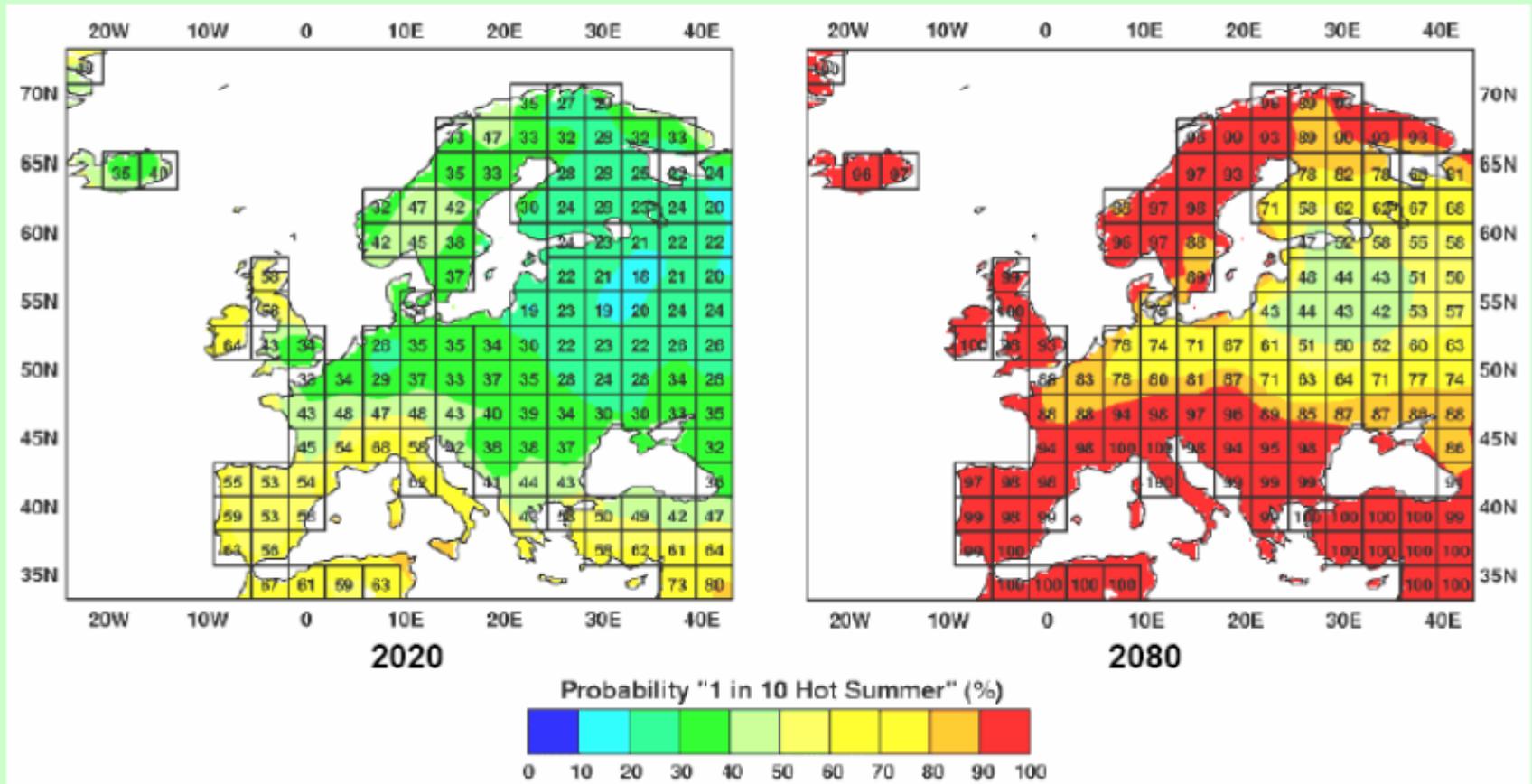
Case and effect of floods, hail and strong wind Serbia 2005, 2006



Projected impact (e.g.)

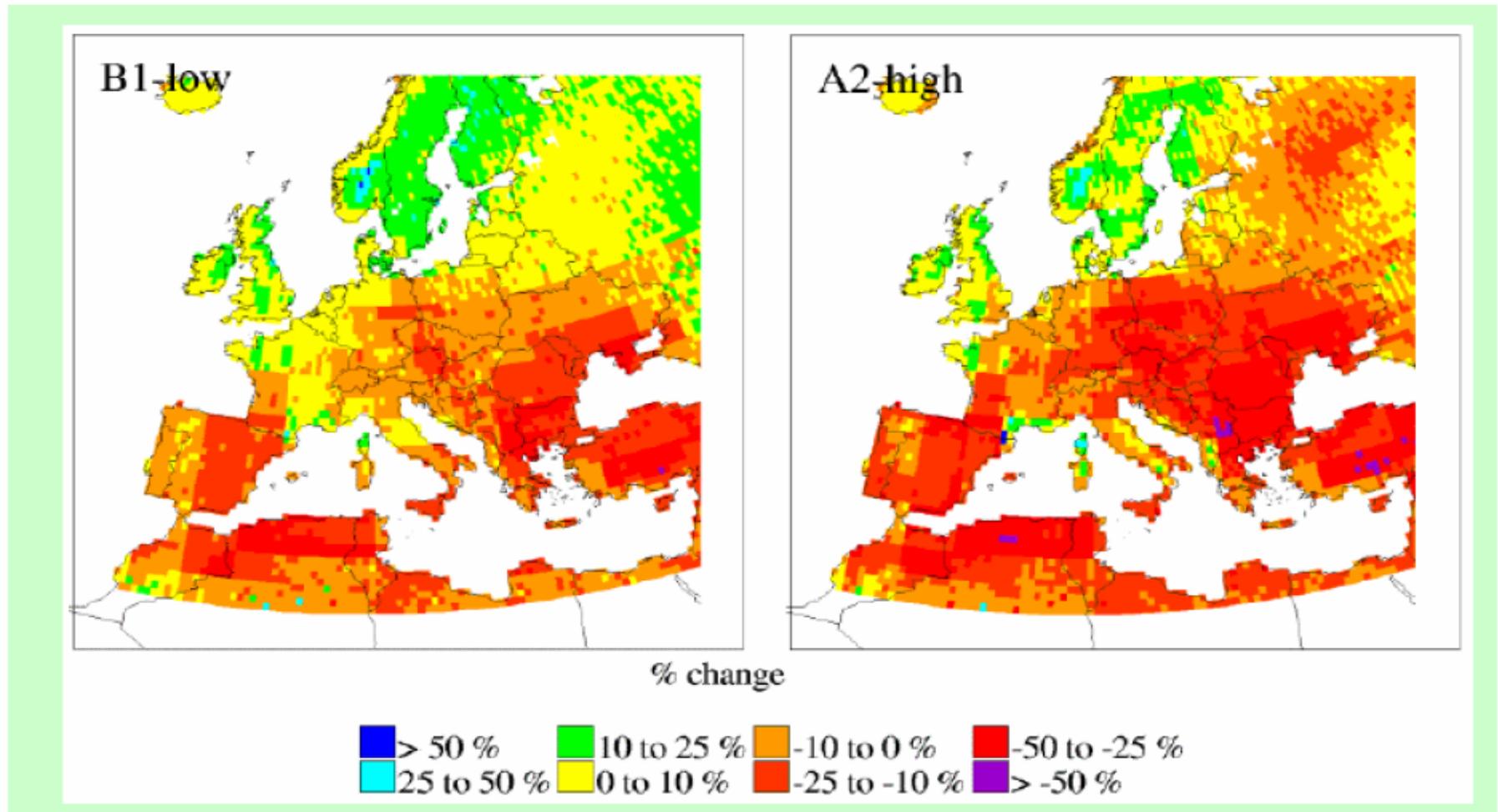
: Changing Frequency of Hot Summers (2020 to 2080). Source: Parry (2005).

A2



Projected impact (e.g.) cntd.

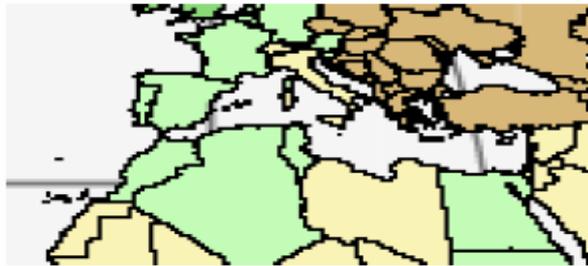
Figure 6: Water Availability in the 2050s (Change in annual runoff). Source: Parry (2005).



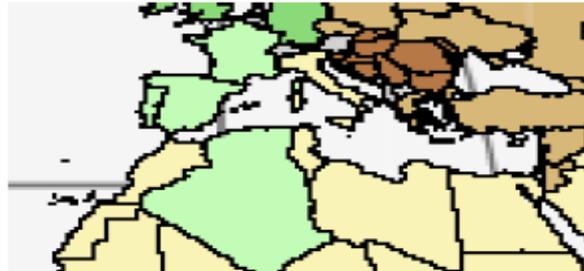
Projected impact (e.g.) cntd.

Climate Change in the Mediterranean. Changes of agricultural yield until 2020, 2050 und 2080. Source: Brauch (2006), based on WBGU (2006).

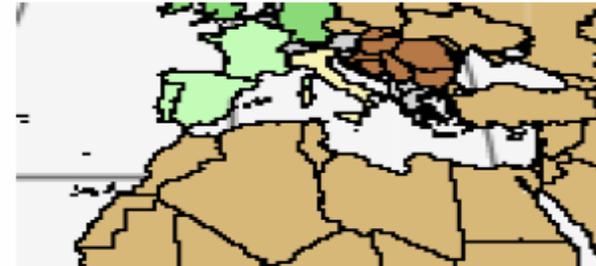
11A: Food security by 2020 (2010-2039) (HADCM3 GGa1)



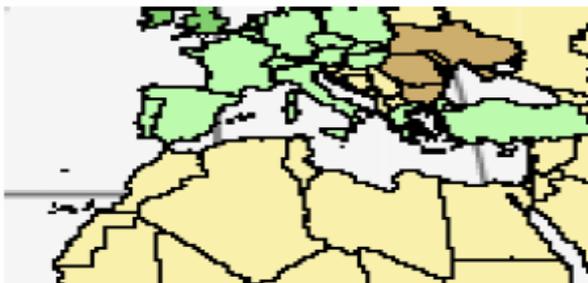
11B: Food security by 2050 (2040-2069) (HADCM3 GGa1)



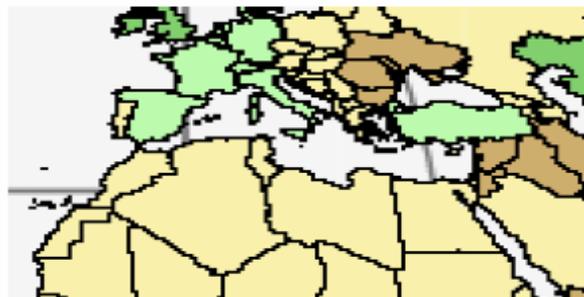
11C: Food security by 2080 (2070-2099) (HADCM3 GGa1)



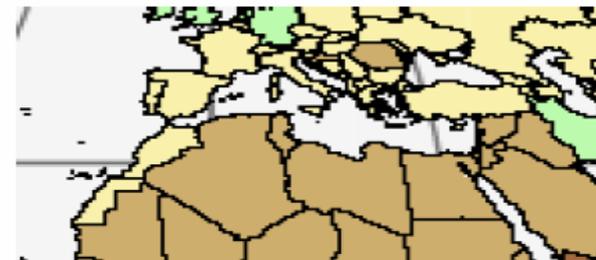
11D: Food security by 2080 (2070-2099) (HADCM2), CO2 Stabilisation at 550ppmv



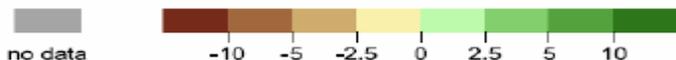
11E: Food security by 2080: 2070-2099 (HADCM2), CO2 Stabilisation at 750ppmv



11F: Food security by 2080: 2070-2099 (HADCM2 IS92a), CO2 unmitigated



potential yield change [%]



International Framework

Climate Change affect all countries, but *burden falls disproportionately on developing countries. Climate change is a result of the externality associated with greenhouse-gas emissions – it entails costs that are not paid for by those who create the emissions. Additional assistance to developing-country governments and civil society will be necessary to support adaptation.*

Key roles are with following institutions:

- 1. UNFCCC with its Capacity building framework and Nairobi Programme**
- 2. IPCC**
- 3. WMO,GCOS, and National Hydrometeorological Services**
- 4. EU Climate Change Programme (Green paper on Adaptation)**
- 5. UN/ISDR**
- 6. Regional and Sub-regional climate change and related initiatives**

Nairobi Work Programme on Impacts, Vulnerability and Adaptation - NWP

Following Decision 2/COP11 of the UNFCCC Conference of the Parties (COP), COP-12 agreed to invite relevant organizations and other stakeholders to implement the activities of the Nairobi Work Programme in 9 main areas:

- Methods and tools
- Data and observations
- Climate modelling, scenarios and downscaling
- Climate related risks and extreme events
- Socio-economic information
- Adaptation planning and practices
- Research
- Technologies for adaptation
- Economic diversification

Limitations and needs to deal with climate change in SEE

- All SEE countries face problems with responding to the obligations under the United Nations Framework Convention on Climate Change.
- Developing countries in terms of the UNFCCC, including Serbia have a twofold problem. They are faced with growing damage caused by meteorological, hydrological and climate extremes and catastrophes, and on the other hand, they have to cope with poverty and necessity for development.
- In addition, the SEE countries **have limited access to knowledge, technology and financing, and have a great need of capacity building and development (systemic, institutional and individual), that has to be coupled with the requirements of the Stabilisation and Association process to the EU.**
- **This is a key reason for launching the Belgrade Initiative on climate change that is expected to provide region-driven climate change framework action in SEE and establishment of an adequate research-to-policy interface.**

Belgrade Climate Change Initiative

- The Belgrade Initiative for enhancement of the Sub-regional SEE cooperation in the field of climate change launched by the host country Serbia in 2006, received full support of the UNECE Sixth Ministerial Conference “Environment for Europe”, which was held in Belgrade, Serbia, on October 10-12, 2007.
- Within the Initiative the project to develop a SEE Climate Change Framework Action Plan (SEE/CCFAP) commence recently which is in accordance with the principles and objectives of the United Nations Framework Convention on Climate Change (UNFCCC). In particular, this relates to Research and Systematic Observation, Education, Training, Public Awareness, Capacity Building and Nairobi Work Programme. The Belgrade Initiative also provides for the establishment of a Sub-regional Virtual Climate Change related Centre in Belgrade as a means of improving sub-regional cooperation, which would also facilitate and coordinate implementation of the SEE/CCFAP.

Belgrade Initiative – General objectives

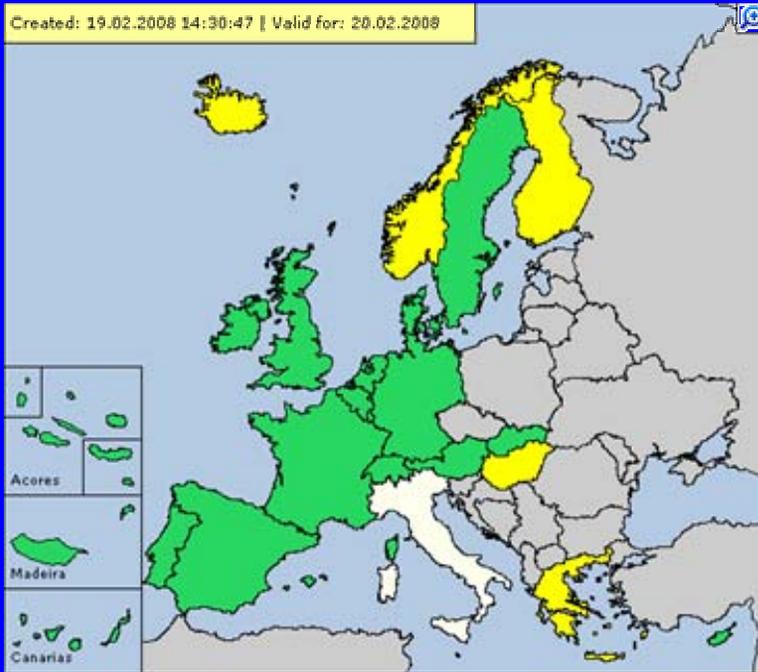
The Belgrade Initiative general objective is to support a sustainable economy development and environment in the interested SEE countries through attempts to reduce vulnerability to climate change and adaptation, effective implementation of the UN Framework Convention on Climate Change (UNFCCC) and its Nairobi Work Programme, and the establishment of the SEE network for climate change research.

Sub-regional cooperation within this Initiative will contribute to the following:

- Enhanced capacity for vulnerability and adaptation assessment;
- Enhanced development, dissemination and employment of knowledge from practical adaptation activities and other climate change issues;
- Enhanced integration of actions to adapt to climate change with those of sustainable development;
- Improved information and advice to national negotiators participating in UNFCCC and Kyoto Protocol negotiating processes;
- Enhanced cooperation among SEE countries, relevant organization, civil society, and decision makers, and
- Strengthening of partnership with relevant international organizations, conventions and protocols.

This initiative is seen as a main driver for closer cooperation among interested SEE countries, international organizations and institutions in addressing sub-regional common priority problems in the field of climate change.

Meteo-Alarm Operational in Serbia as part of the Early Warning System



- постоји потенцијална опасност. Временске појаве које се прогнозирају нису неубичајене, али будите пажљиви ако планирате активности које зависе од метеоролошких услова.
 - прогнозирана опасна временска појава. Штете и несреће се лако дешавају. Будите врло опрезни и запамтите значајне информације о детаљима прогнозираних метеоролошких услова.
 - прогнозирана веома опасна временска појава. Неубичајени интензитети временских појава су прогнозирани. Велике штете су могуће изнад просторно веће области.

Ветар	Снег/Лед	Магла	Екстремно високе температуре
Киша	Грмљавина	Шумски пожари	Екстремно ниске температуре

RHMЗ - Републички Хидрометеоролошки завод Србије Кнеза Вишеслава 66 Београд

Address: http://www.hidmet.sr.gov.yu/ciril/prognoza/meteo_alarm.php?ma_datum=2008-02-19

Прогноза времена за Србију

Прогноза времена
011 2542 184
prognoza@hidmet.sr.gov.yu

Изабери датум: 19.02.2008. ...

Бачка:	
Банат:	
Срем:	
Београд:	
Западна Србија:	
Шумадија:	
Поморавље:	
Источна Србија:	
Југоисточна Србија:	
Југозападна Србија:	
Косово и Метохија:	

Кликни регион на слици или назив региона за више детаља

	White		Wind		Extreme high temperature
	Green		Rain		Extreme low temperature
	Yellow		Snow/Ice		
	Orange		Thunderstorms		
	Red		Fog		

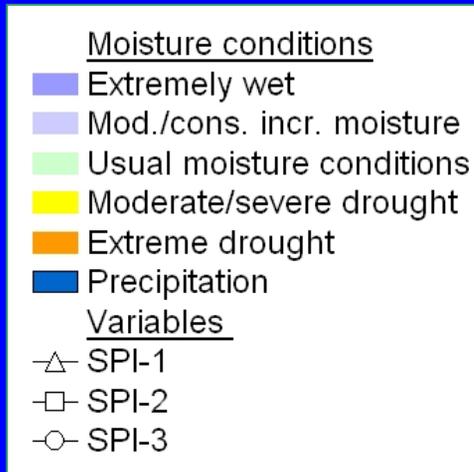
Hydro-Alarm Operational in Serbia as part of the Early Warning System

Internet warning against hazardous hydrological phenomena (high-level and flood waters, low-level waters and ice accretion) as support to efficient flood defense, navigation and other activities related to river waters.

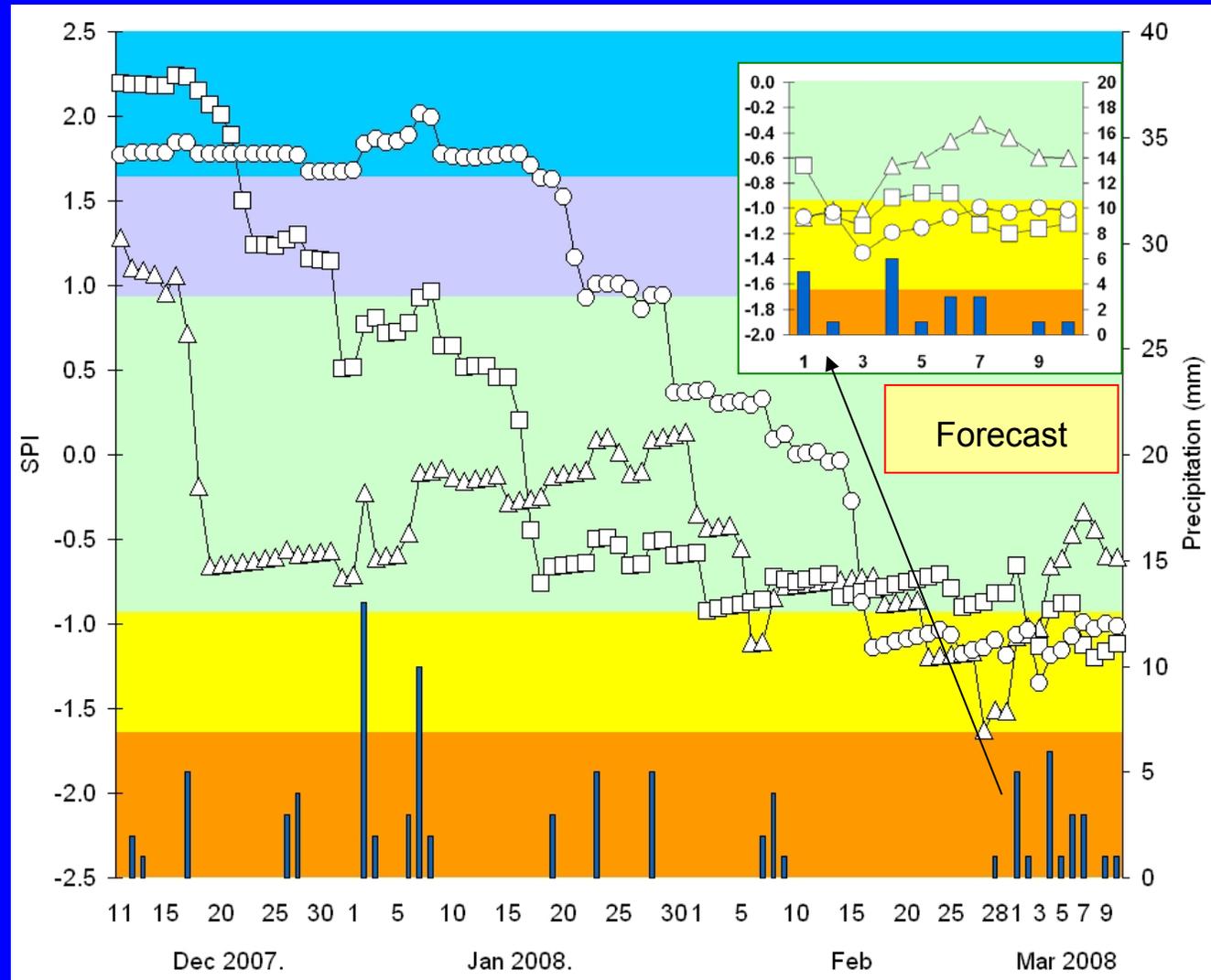


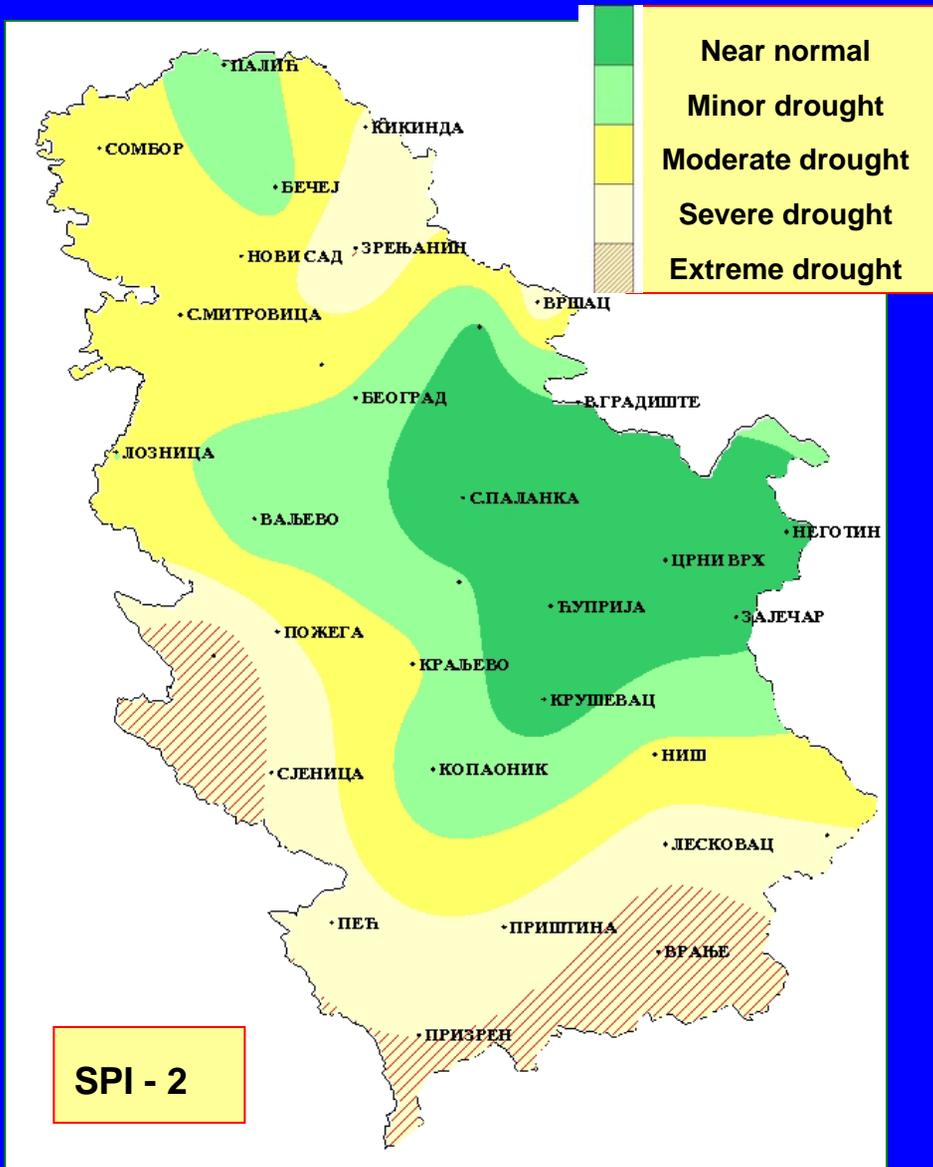
FORECAST OF THE STANDARDIZED PRECIPITATION INDEX

Preparations have started in RHMS for the introduction of operative SPI forecasting on the basis of forecasted precipitation (ECMWF medium range forecast and monthly precipitation anomaly forecast - seasonal forecast)



Belgrade,
February 29th
2008: monitoring
and forecast of SPI
on the various
time scales

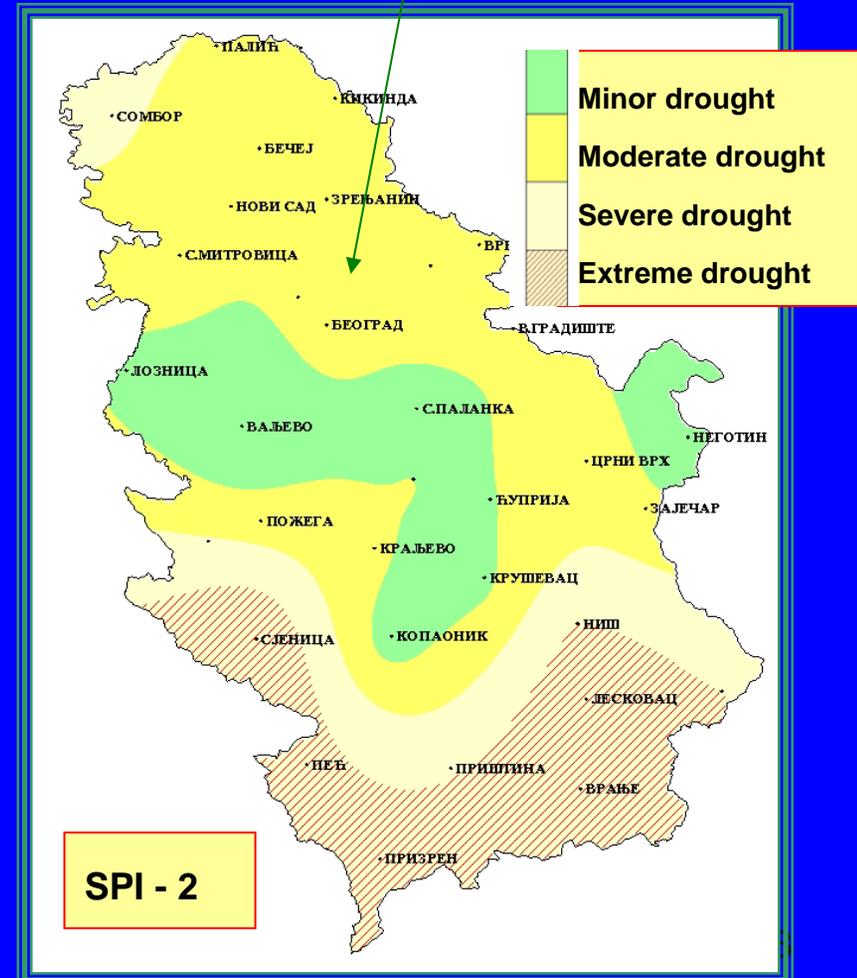




Moisture conditions on February 29th 2008 on the basis of SPI - 2 values

Due to the forecasted monthly precipitation anomalies, deterioration of moisture conditions in Serbia can be expected till March

31th, ...



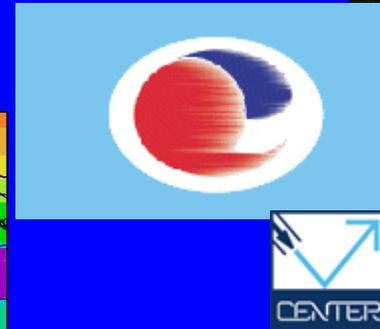
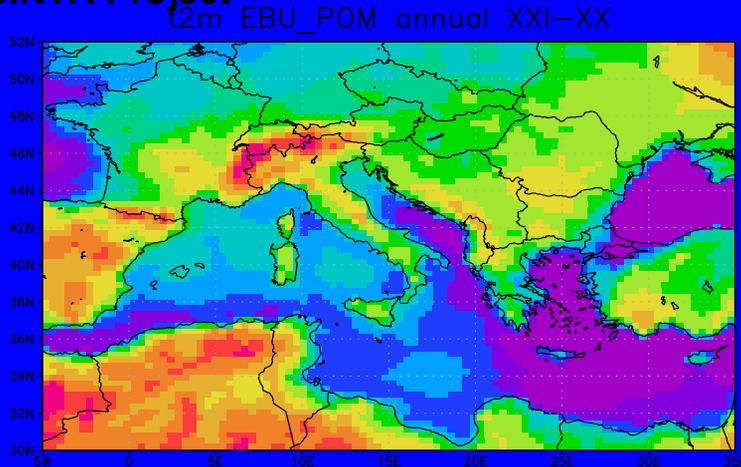
Sub-regional virtual climate change centre in Belgrade which will facilitate and coordinate implementation of the SEE/CCFAP.

The Republic Hydrometeorological Service of Serbia, as a government authority hosting the centre, contributes in-kind to the virtual centre with its available human resources, expertise in regional climate modeling (ClimEta, PRECIS) communication, computational and technical infrastructure resources, including offices with the necessary office equipment.



Existing collaboration:

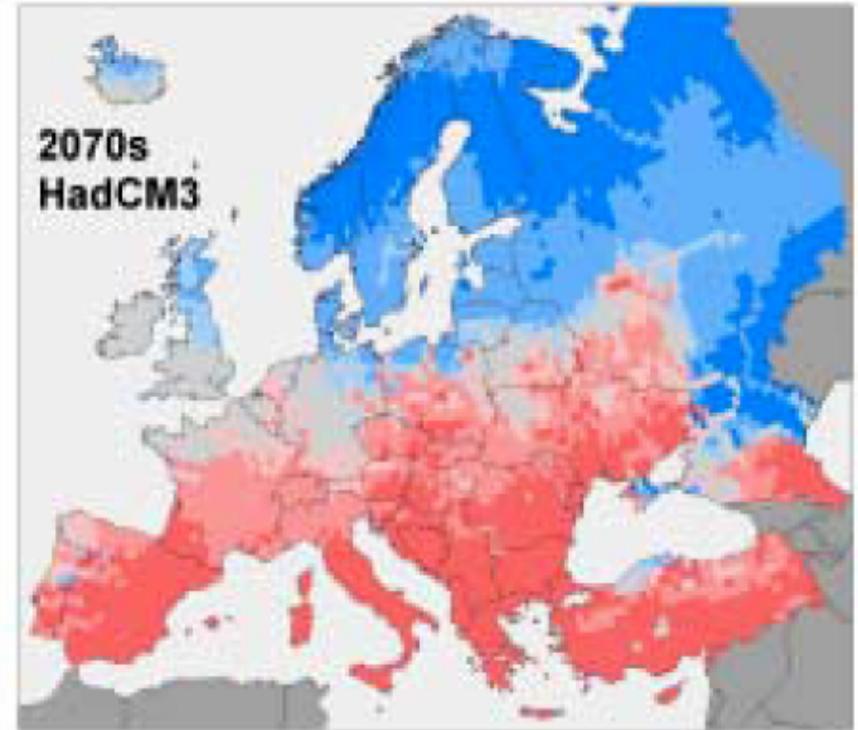
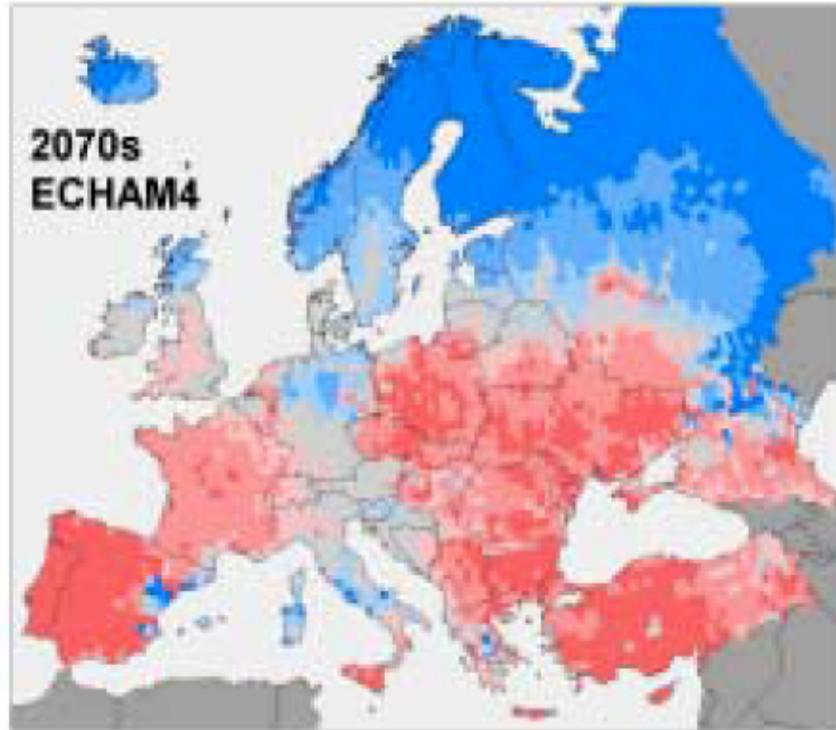
Italian Ministry of Environment, Land and Sea – Republic Hydrometeorological Service of Serbia and University of Belgrade - SINTA Project



Japan-Serbian Center for simulation Sciences – Earth Simulator – NEC super computers



Climate Change Impact on Hydro energy potential (e.g.)

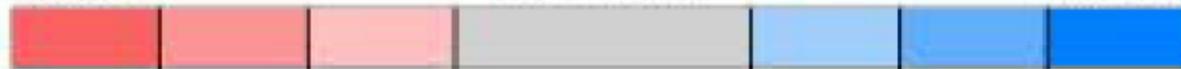


Change in discharge volume in %

decreases

small changes

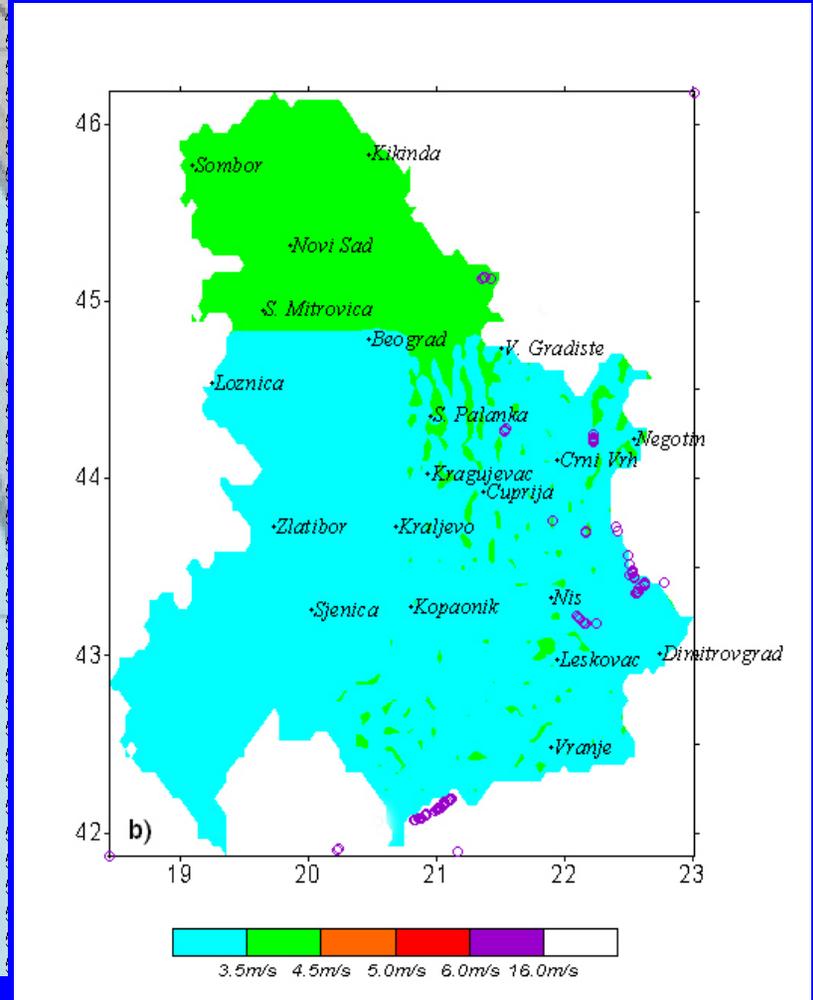
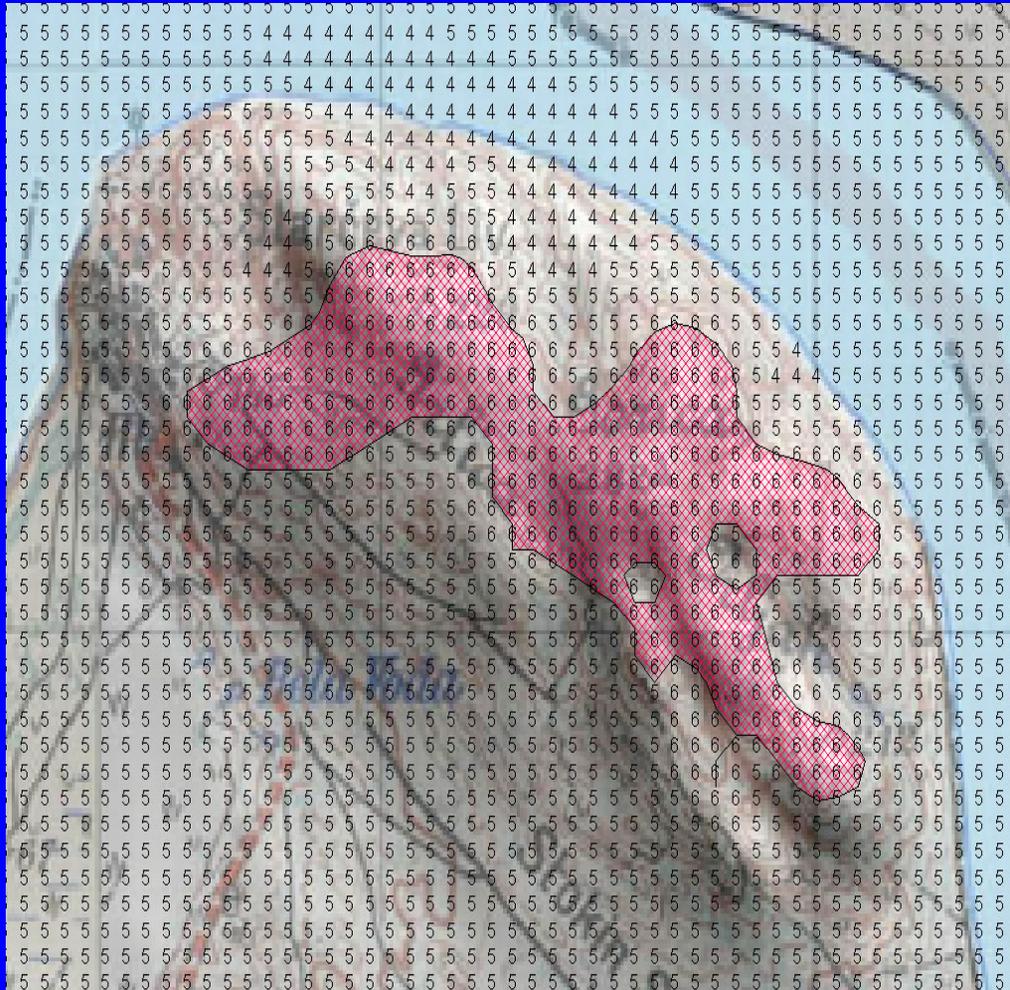
increases



... -25 -10 -5 +5 +10 +25 ...

(c) Center for Environmental
Systems Research,
University of Kassel,
June 2001 - WaterGAP 2.1C

Wind energy potential in Serbia (e.g)



KEY ISSUES IN POST-2012 PERIOD

ADAPTATION – Need for coordinated Sub-regional approach

- There is need to support both facilitation and implementation of adaptation activities in terms of integrating across scales, from local to national and sub-regional.
- This will require improvements in knowledge and expertise, institutional strength, good governance, transparency and stakeholders involvement, supportive government of interested countries, and financial resources for effective and efficient adaptation activities.
- To facilitate this activities Belgrade Initiative propose to develop SEE/CCFAP based on UNFCCC Nairobi Five-year programme of work on impacts, vulnerability and adaptation to climate change.
- **Adaptation to the unavoidable impacts of climate change needs to be addressed as a priority within the negotiations on a post-2012 agreement, especially to enhance the support for adaptation action and capacity building in Non-Annex I (developing) countries that are most vulnerable to the impacts of climate change.**

Thank you for your attention...

**See you in Tirana ... probably in Szentendre
thereafter – REC's Zero-emission building.**

Are we traveling too much?

office@hidmet.sr.gov.yu

milan.dacic@hidmet.sr.gov.yu

danica.spasova@hidmet.sr.gov.yu