Future water scenarios for the Great Plain of Hungary and their connection with water resources risk management

GOCE 036822 -SCENES Project
Water Scenarios for Europe and for Neighbouring States

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In memoriam Zsuzsanna Flachner

What have been our goals in the project?

- Provide the project with a case study for participatory scenario development on the Tisza Pilot Area
- Where we prepare a storilyne for scenarios
- Arrange scenario building workshops to test the applicability of the participatory process
- Carry out regional enrichment of the robust strategies arose from scenarios
- Carry out indicator testing using local knowledge and modelling results

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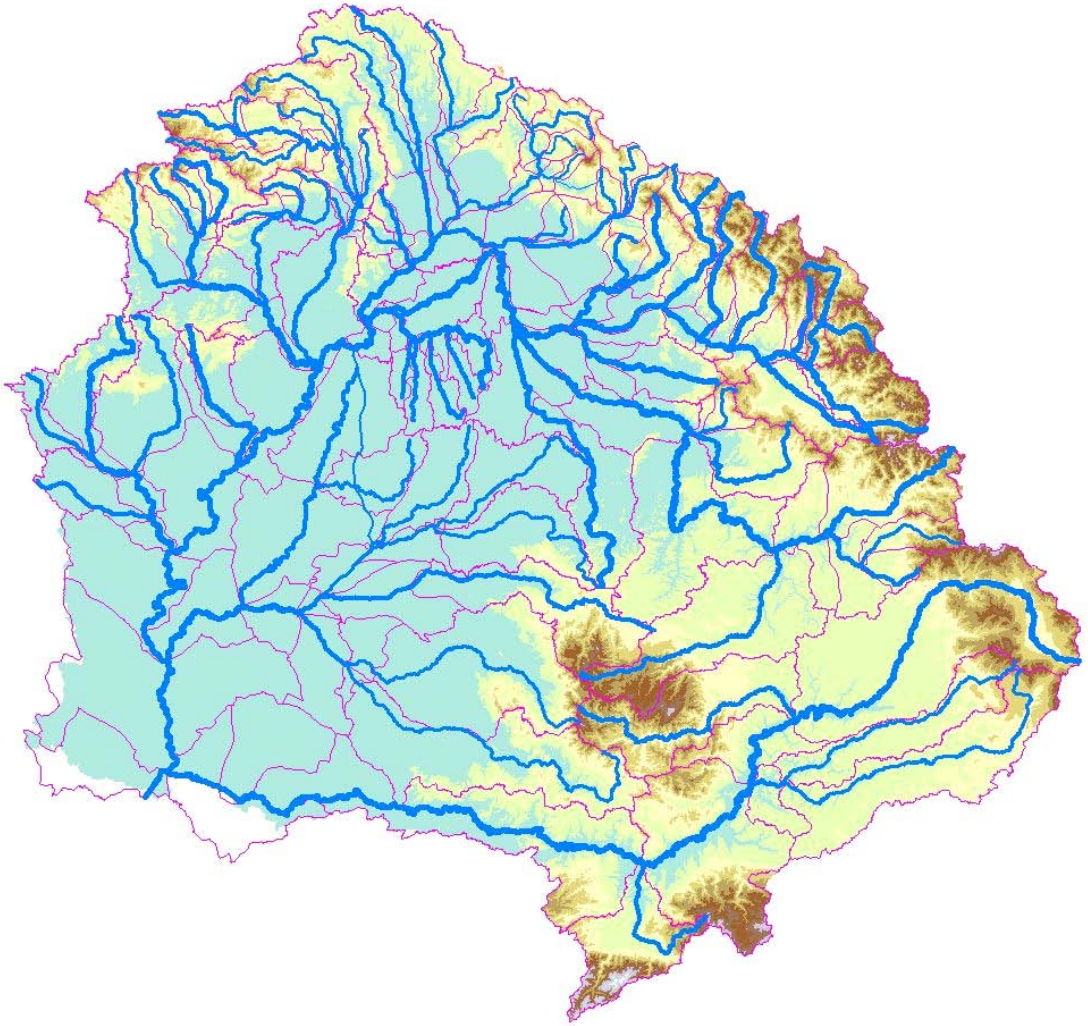

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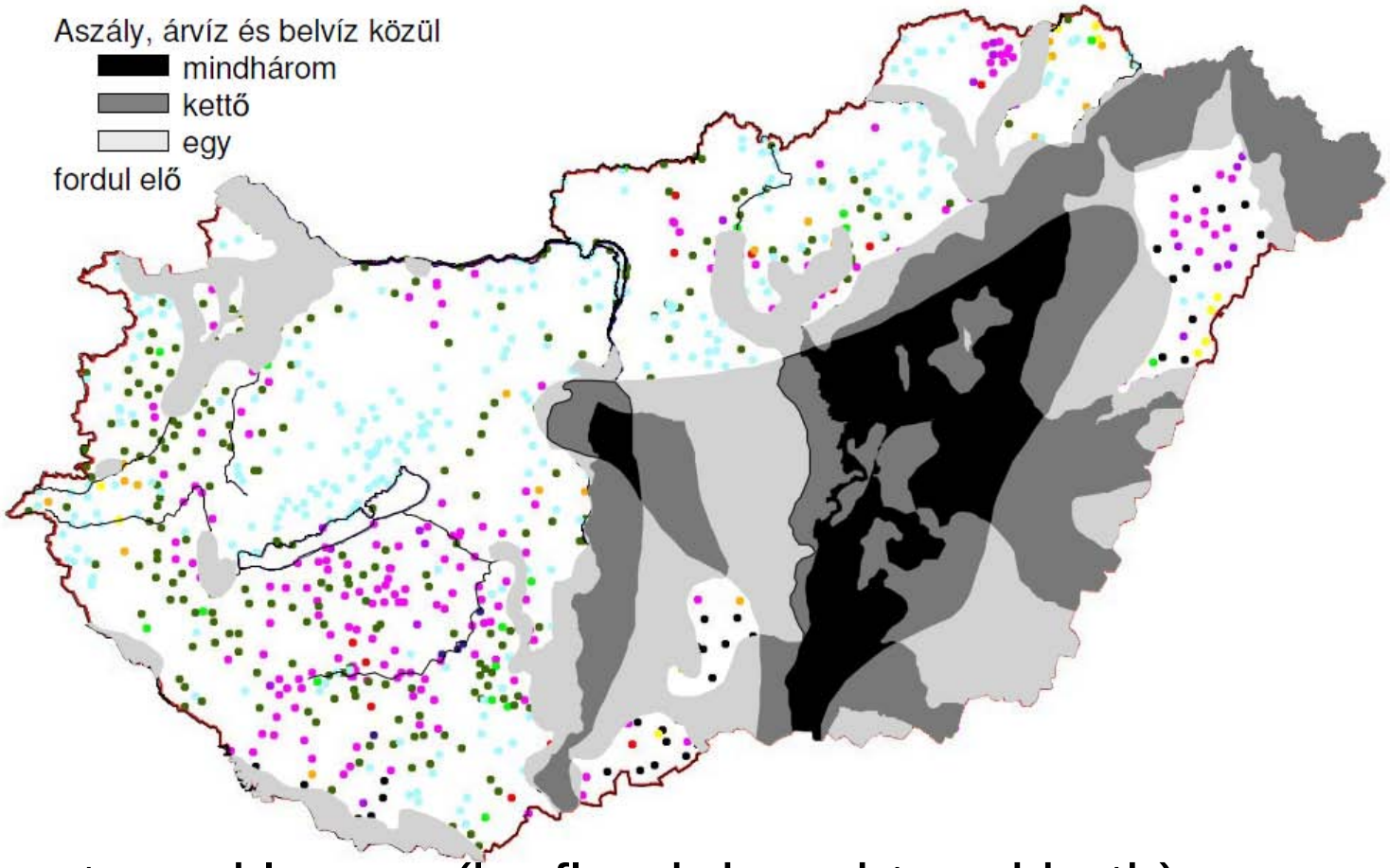

Threats and losses (by flood drought and both)

Most relevant problems and processes in the Hungarian part of Tisza Pilot Area

Social:

- Ageing
- Migration from the region
- Increasing minority issues (gypsies)
- High unemployment rate (avg. 30%. but up to 70%)
- Low education and awareness, loss of traditional knowledge
- High values, cultural values (built environment, traditions, local knowledge) under threat

Most relevant problems and processes in the Hungarian part of Tisza Pilot Area

Economic:

- Poverty, segregation
- Land fragmentation, unclear ownership due to incompleted land consolidation, need for land use change
- Lack of financial capital, high cost of loans, lack of subsidies
- Lack of high quality, optimal scale machinery and technologies (unproductive agriculture)
- Lack of management capacity and co-operation
- Lack of proper institutions
- Lack of money for the VTT

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Preparation	Workshops	Dissemination

Before SCENES

Tisza flood prevention program
(National Research Found)
BUTE, 2003-2007

Tisza River project (FP5)
VITUKI, 2002-2005

River basin management planning (WFD)
Tisza River basin 2006 - 2009

Wageningen training
(GEO4, FCM)

Training for the Hungarian facilitators
Budapest, Jan 2008

Discussion Day for experts, researchers, stakeholders
Budapest, Apr 2008

Parlament Day for experts, researchers, stakeholders, students, local governments
May 2008

1st workhop
Szolnok, May 2009
Szeged, June 2008
Vásárosnamény, June 2008
Tokaj, June 2008

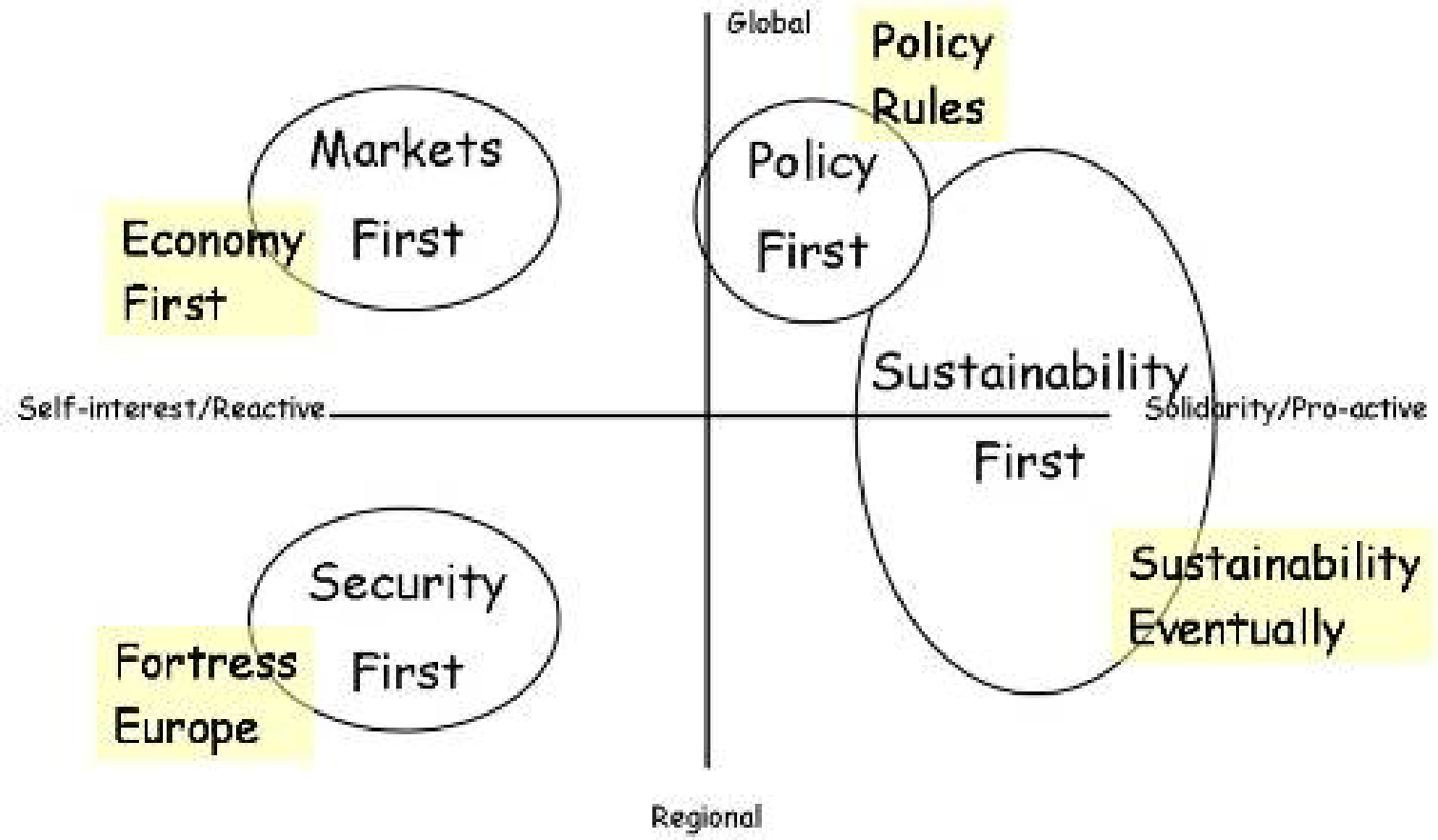
Discussion Day for Advisory Board
Budapest, Aug 2008

Parlament Day for experts, researchers, stakeholders, students, local governments
Oct 2008

What have we achieved?

Preparation	Workshops	Dissemination
Krakow training (CLD)		
Training for the Hungarian facilitators Budapest, Jan 2009		
	2nd workshop Kerekegyháza, Jan 2009	
	Future generation vision Secondary school competition Tisza catchment, Nov 2008 - March 2009	
		Parlament Day for experts, researchers, stakeholders, students, local governments March 2009
Training for the Hungarian facilitators (CMAP) Budapest, Oct 2009		
Training for the Hungarian facilitators (Backcasting) Budapest, Nov 2009		
	3rd workshop Nagykörű, Nov 2009	
		Dissemination Conference May 2010 (planned)

Scenarios


Global
Policy Rules
Markets
Economy First
Policy First
Sustainability First
Self-interest/Reactive
Solidarity/Pro-active
Security
Fortress Europe
Sustainability Eventually
Regional

Scenarios

Economy first: quick globalization, technological development, unequal economic growth, multinational companies dictate and take no responsibility for the environment.

Policy rules: strong EU level coordination of policies, but becomes ineffective. Ecosystem services deteriorate. Water quality and quantity problems, increasing pressures on water resources, after 2030 climate change hits, and public participation is getting stronger. Paradigm shift happens but is a bit late.

Scenarios

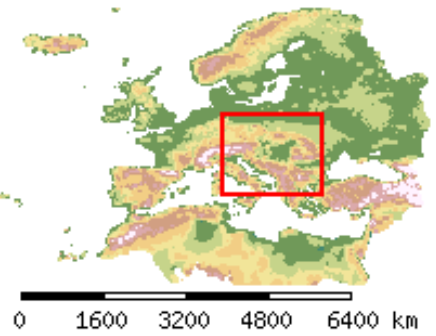
Fortress Europe: High number of crises(energy, climatic, financial). Increasing instability of the society, increased terrorist activity. Europe closes the borders and aims self-sufficiency. WFD becomes Water Security Framework Directive.

Sustainability eventually: paradigm shift towards sustainable thinking. Local initiatives are leading, bottom-up approach in governance. Environmental issues are dealt by ecoregions. Widespread water policies are implemented

Drivers

Overview

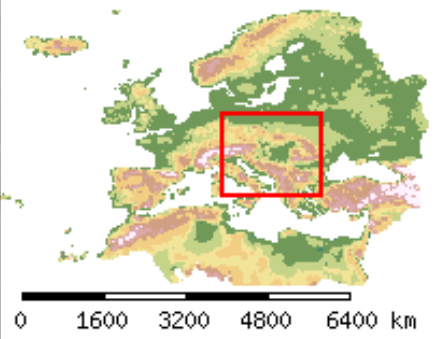
Interactive Map



Change in mean annual precipitation (IPCM4, A2 scenario, 2025s)

- < -30%
- -30 to -15%
- -15 to -5%
- -5 to 5%
- 5 to 15%
- 15 to 30%
- > 30%

Change in mean annual average precipitation by 2025-SRESA2

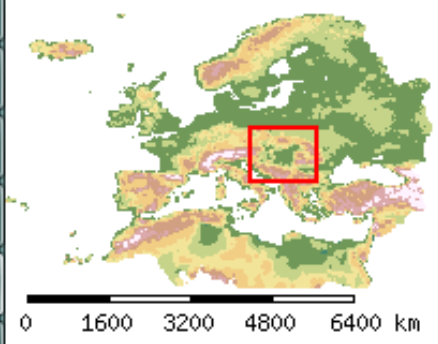


Change in mean precipitation in summer (IPCM4, A2 scenario, 2025s)

- < -30%
- -30 to -15%
- -15 to -5%
- -5 to 5%
- 5 to 15%
- 15 to 30%
- > 30%

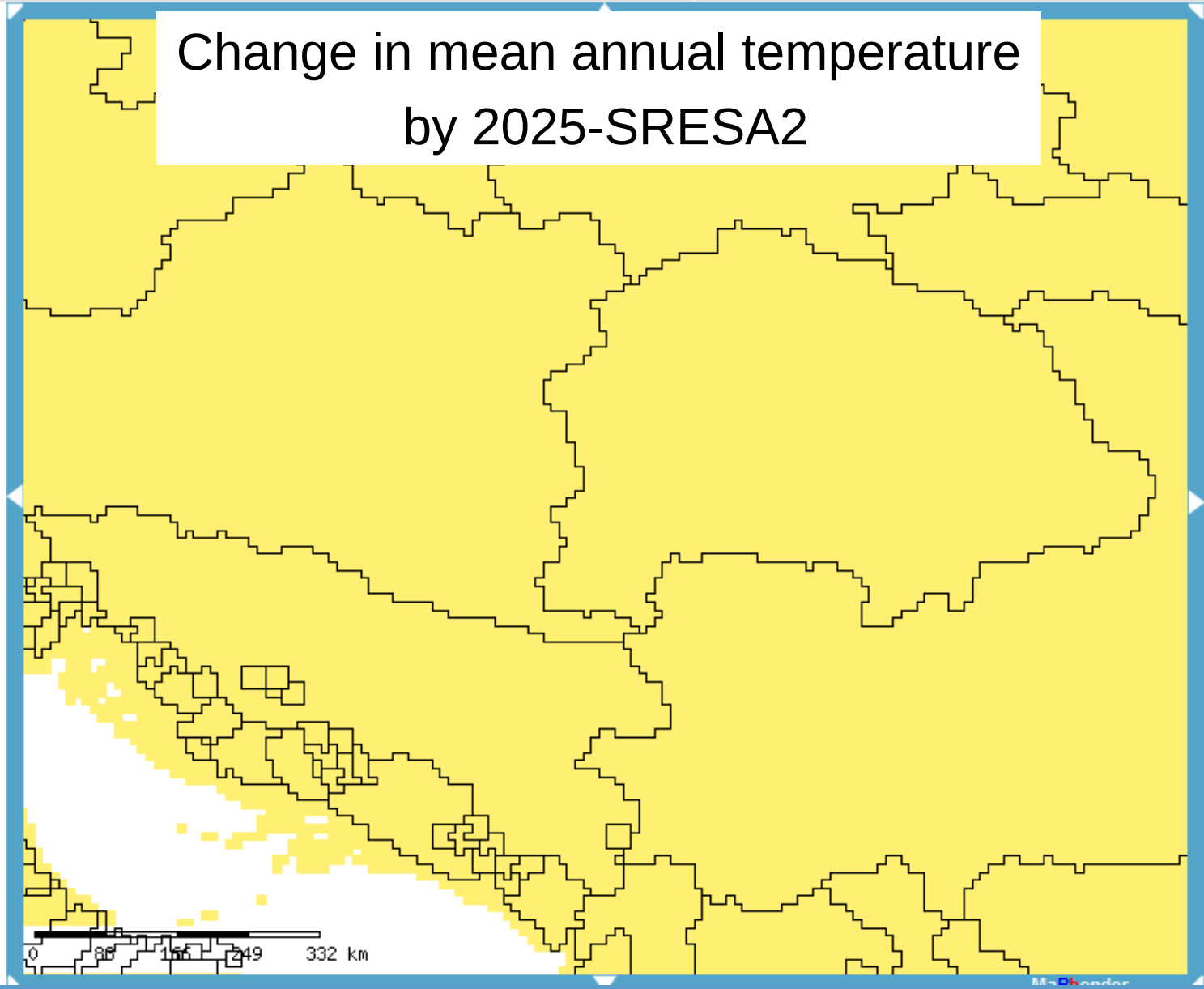
Change in mean summer precipitation by 2025-SRESA2

Change in mean annual temperature by 2025-SRESA2



Absolute change in mean annual temperature (IPCM4, A2 scenario, 2025s)

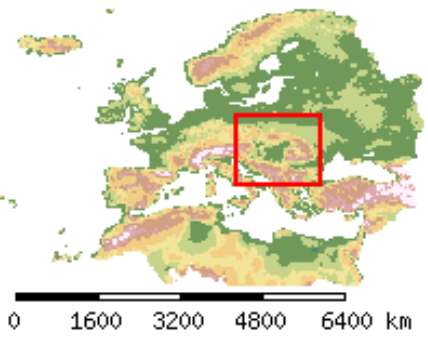
- 0 – 1°C
- 1 – 2°C
- 2 – 3°C
- 3 – 4°C
- 4 – 4.9°C



State variables

Overview

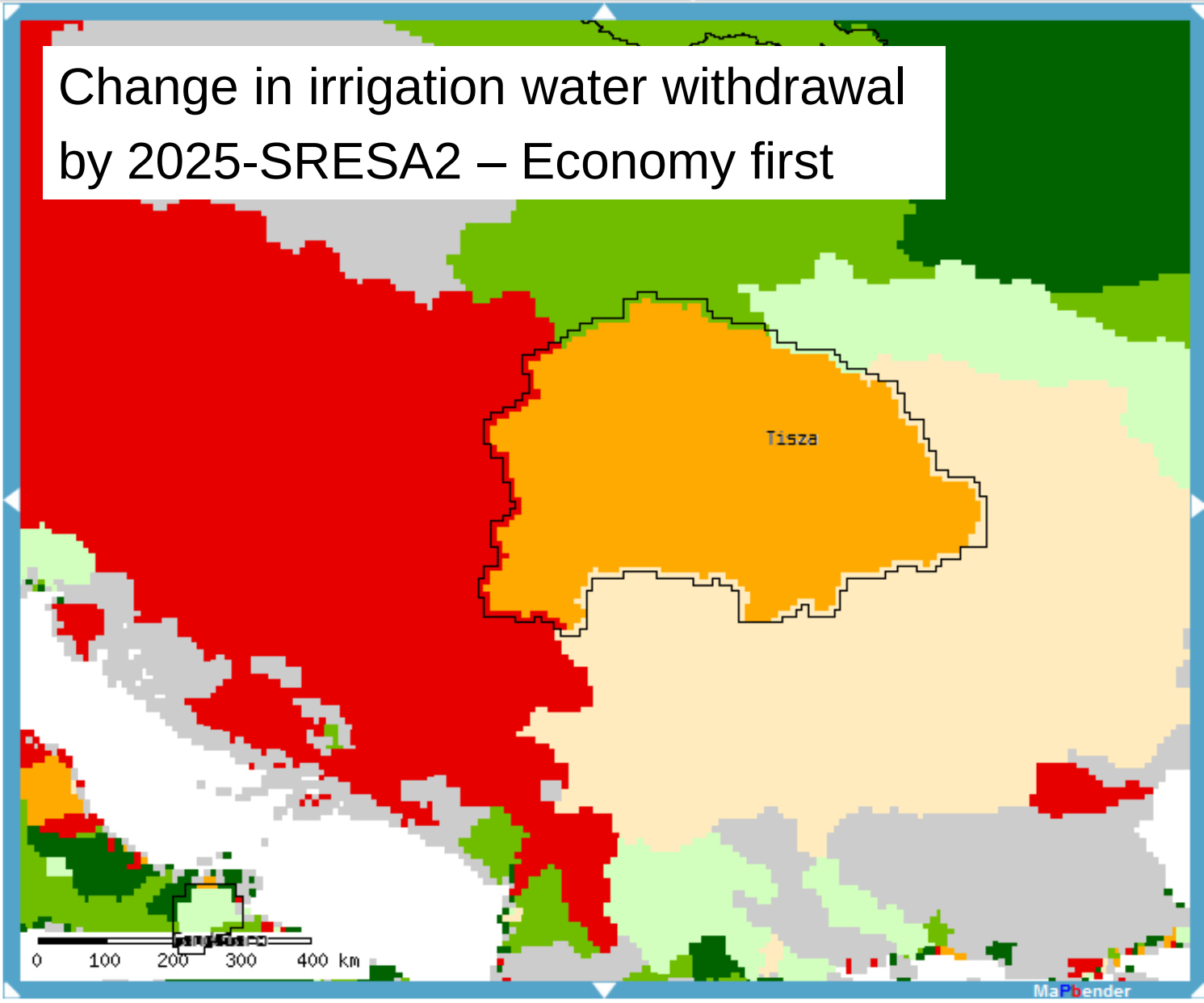
Interactive Map



Change in irrigation water withdrawals (2025, Economy First, IPCM4 A2)

- < -50%
- -50 to -25%
- -25 to -5%
- -5 to 5%
- 5 to 25%
- 25 to 50%
- > 50%

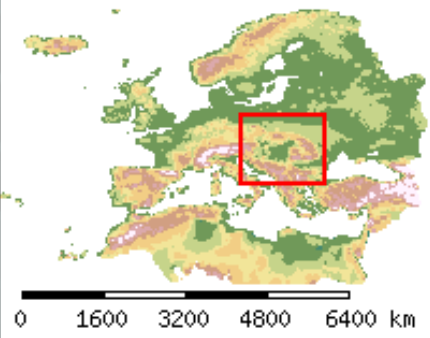
Change in irrigation water withdrawal by 2025-SRESA2 – Economy first



State variables

Overview

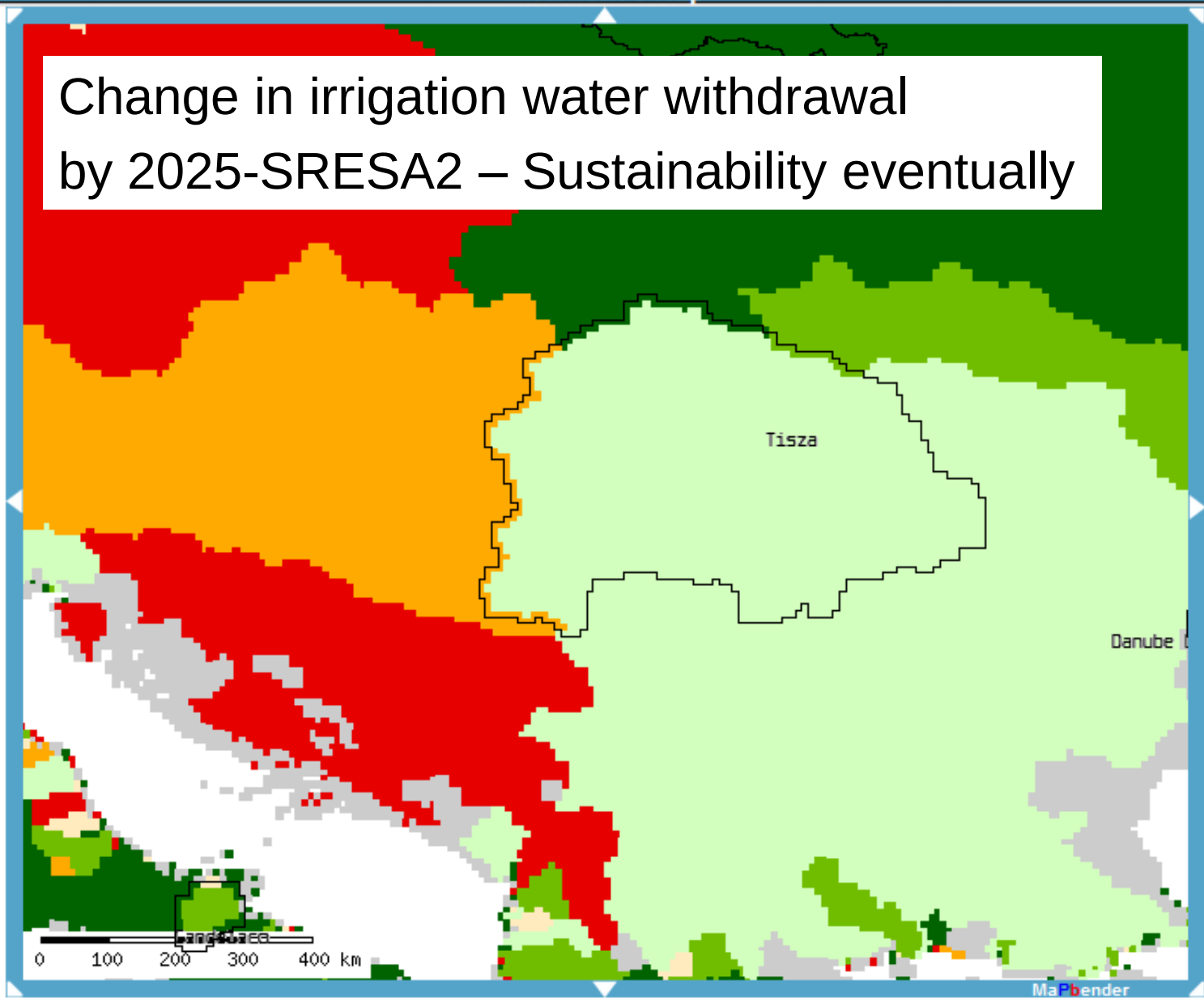
Interactive Map

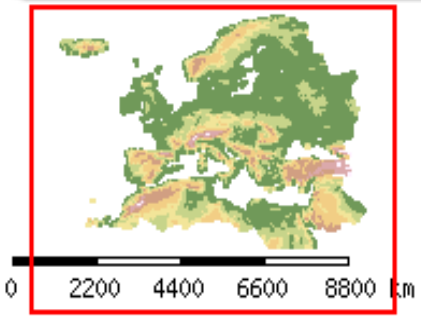


Change in irrigation water withdrawals (2025, Sustainability Eventually, IPCM4 A2)

- < -50%
- -50 to -25%
- -25 to -5%
- -5 to 5%
- 5 to 25%
- 25 to 50%
- > 50%

Change in irrigation water withdrawal by 2025-SRESA2 – Sustainability eventually





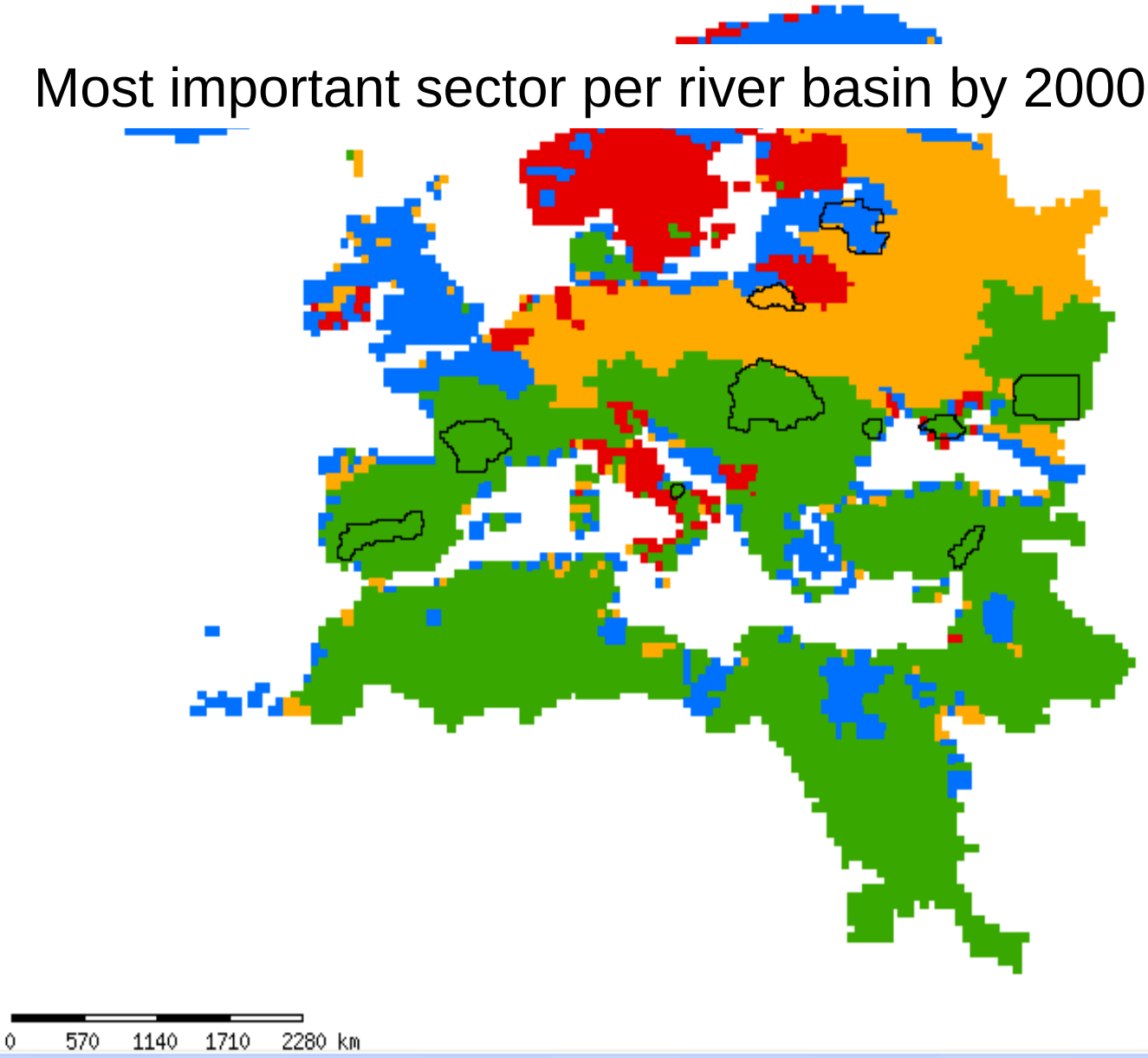
Most important sector per river basin (2000, WaterGAP2.1e)

- Agriculture
- Households
- Electricity
- Manufacturing

Additional layers

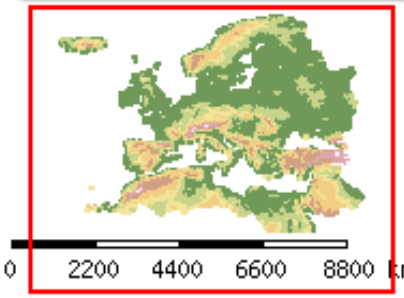
- Pilot areas

Most important sector per river basin by 2000



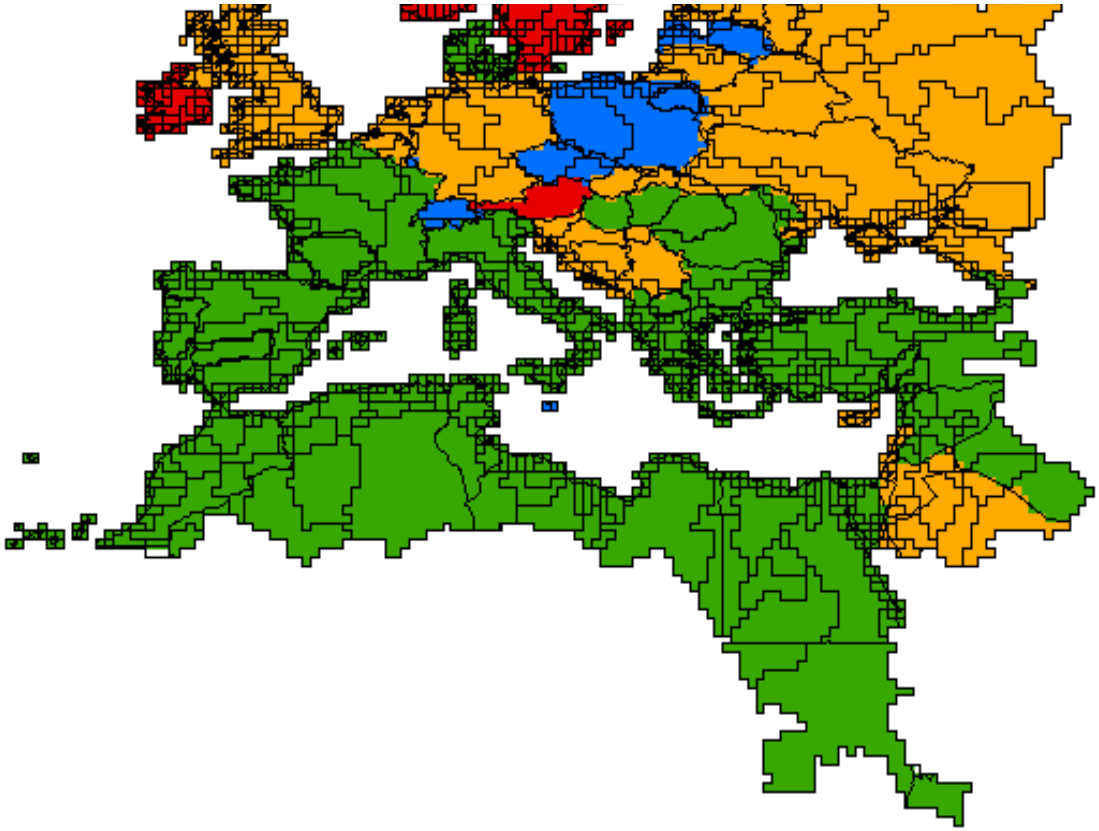
Overview

Interactive Map



Most important sector per river basin by 2030

Security first scenario



Most important sector per country (Security First, 2030, WaterGAP 2.1e)

- Agriculture
- Households
- Electricity
- Manufacturing

Additional layers

- Pilot areas

Done

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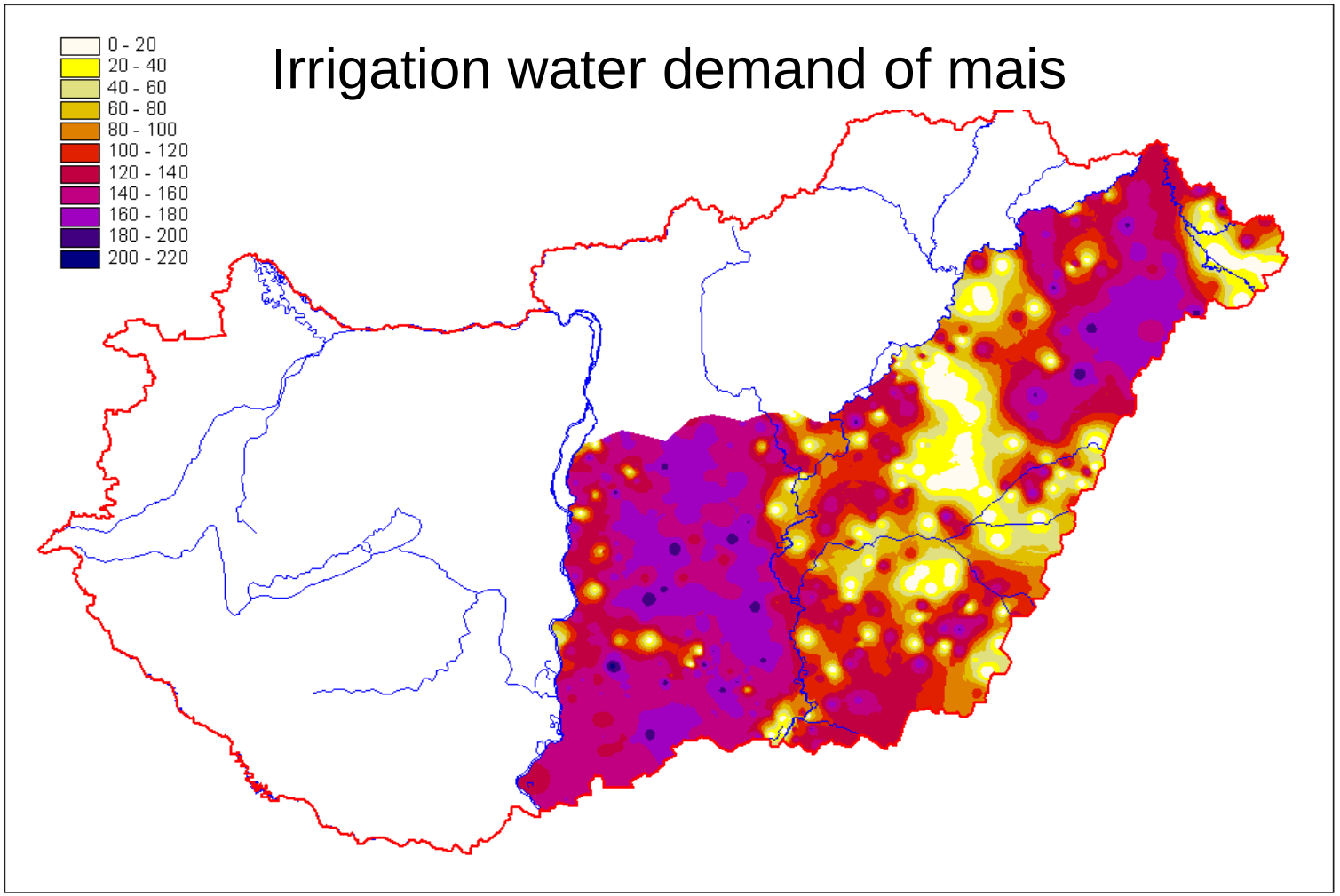
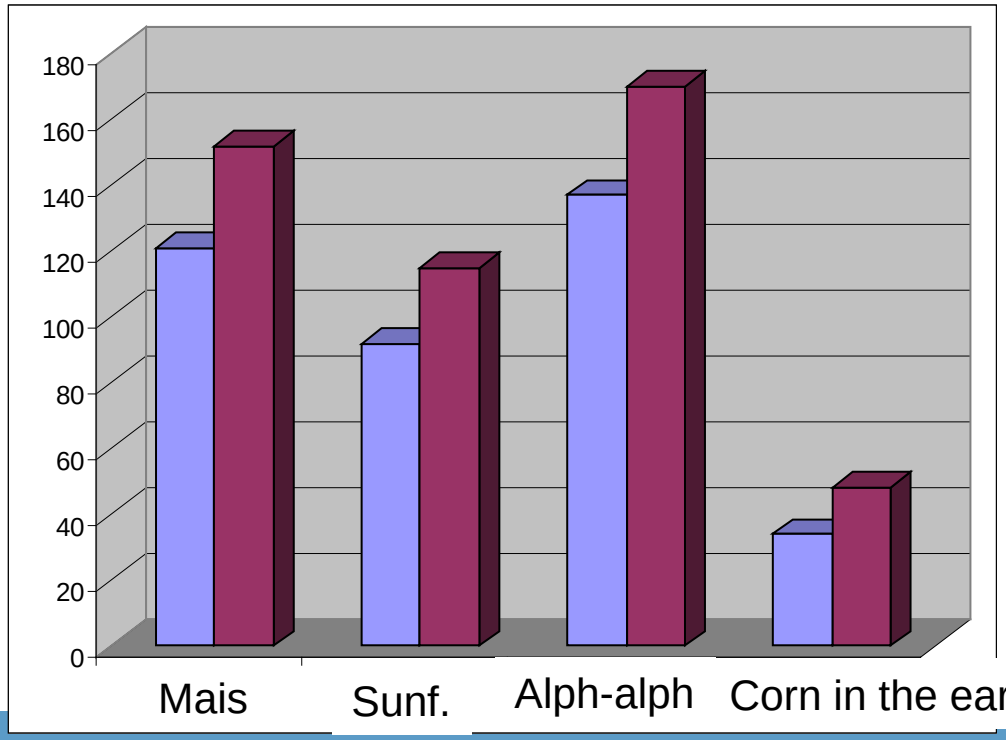


Agricultural water shortage (mm) areal and annual mean (present and future scenarios A2)

Crop	SPDE (mm) past	SPDE(mm) climate change.	Relative weight of precip. decrease (%)	Relative weight of temp. increase (%)
Mais	121	152	35	65
sunflower	92	115	37	63
alpha alpha	137	170	32	68
corn in the ear	34	48	28	72



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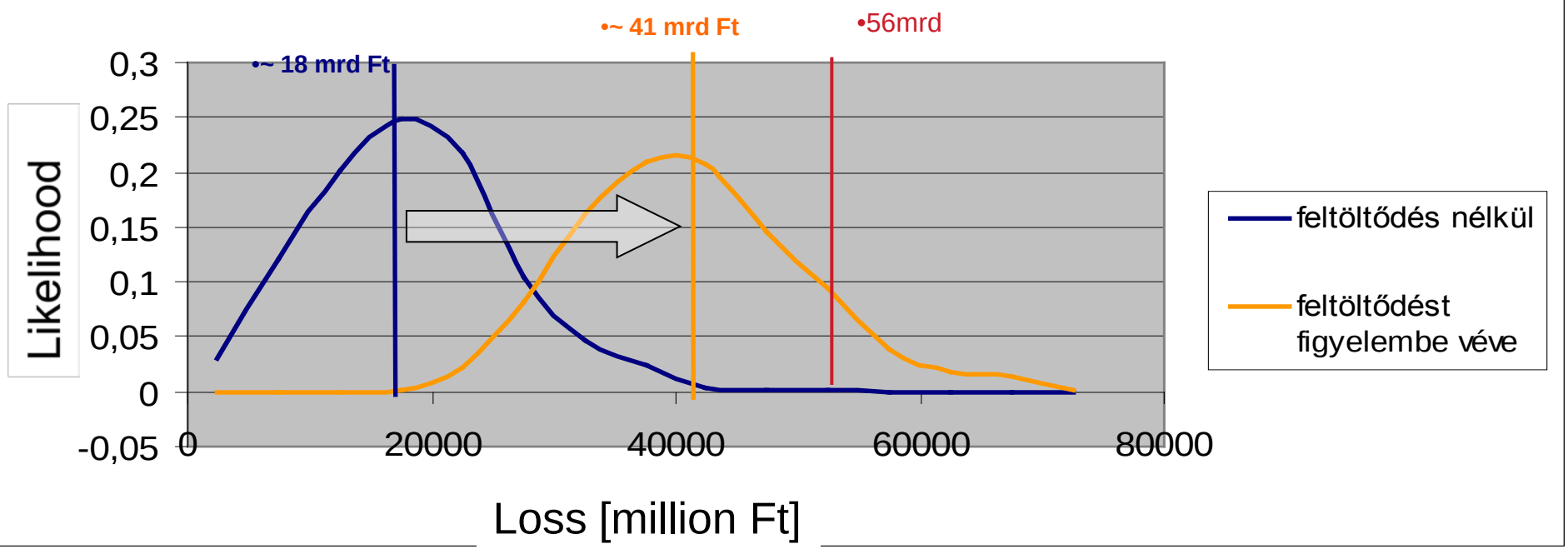
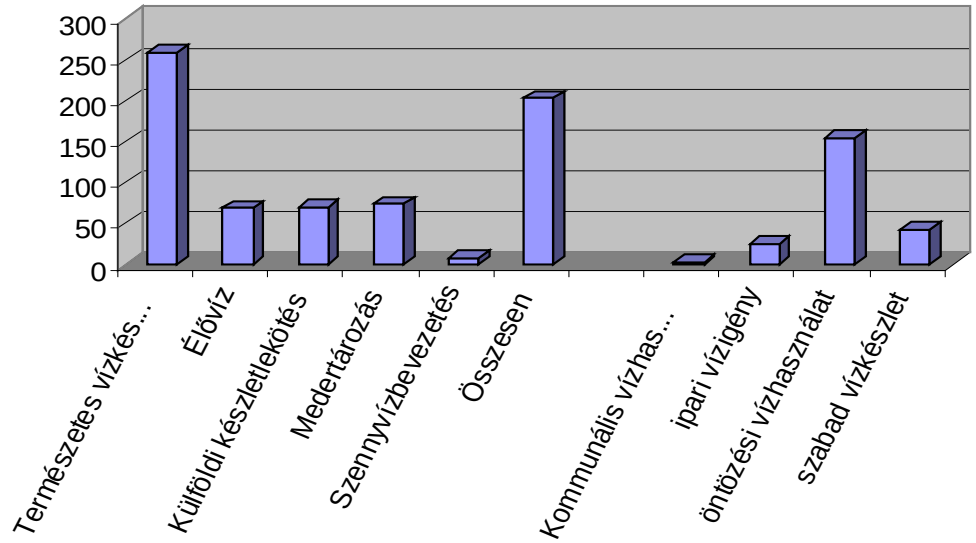
Flood risk change caused by sedimentation and climate change

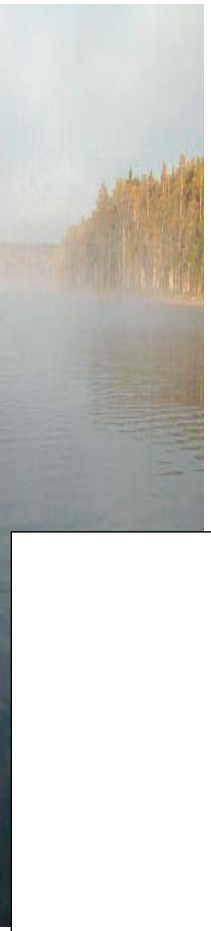


Natural Water Resource (m3/s)	**260**
„Living Water”	**69**
Water demand for downstream countries	**70.4**
Riverbed storage	**74.3**
Waste water inflow	**7.6**
Total	**202.5**

Tisza valley: 1992



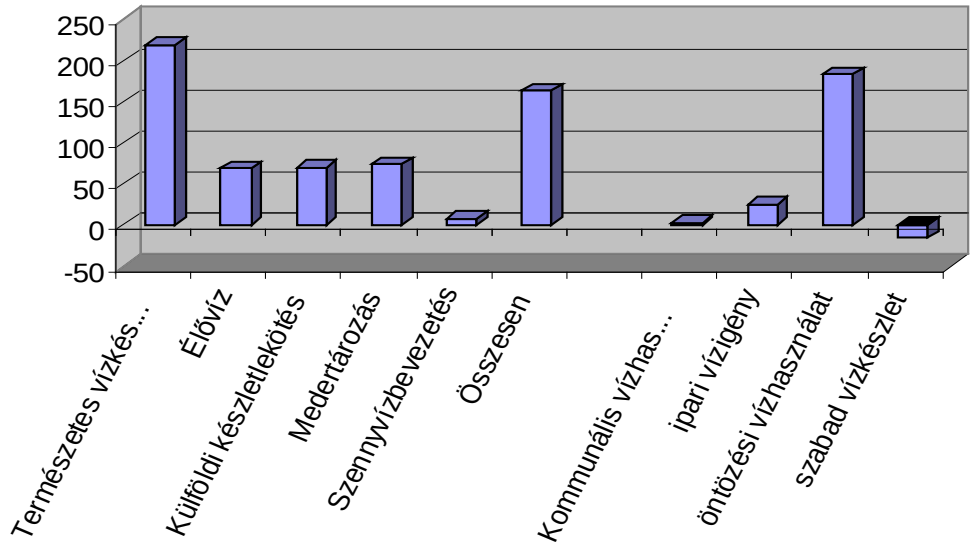
Slide by L. Koncsos



Natural Water Resource (m3/s)	**220**
„Living Water”	**69**
Water demand for downstream countries	**70.4**
Riverbed storage	**74.3**
Waste water inflow	**7.6**
Total	**162,5**

Tisza valley: 2030

„0”-strategy



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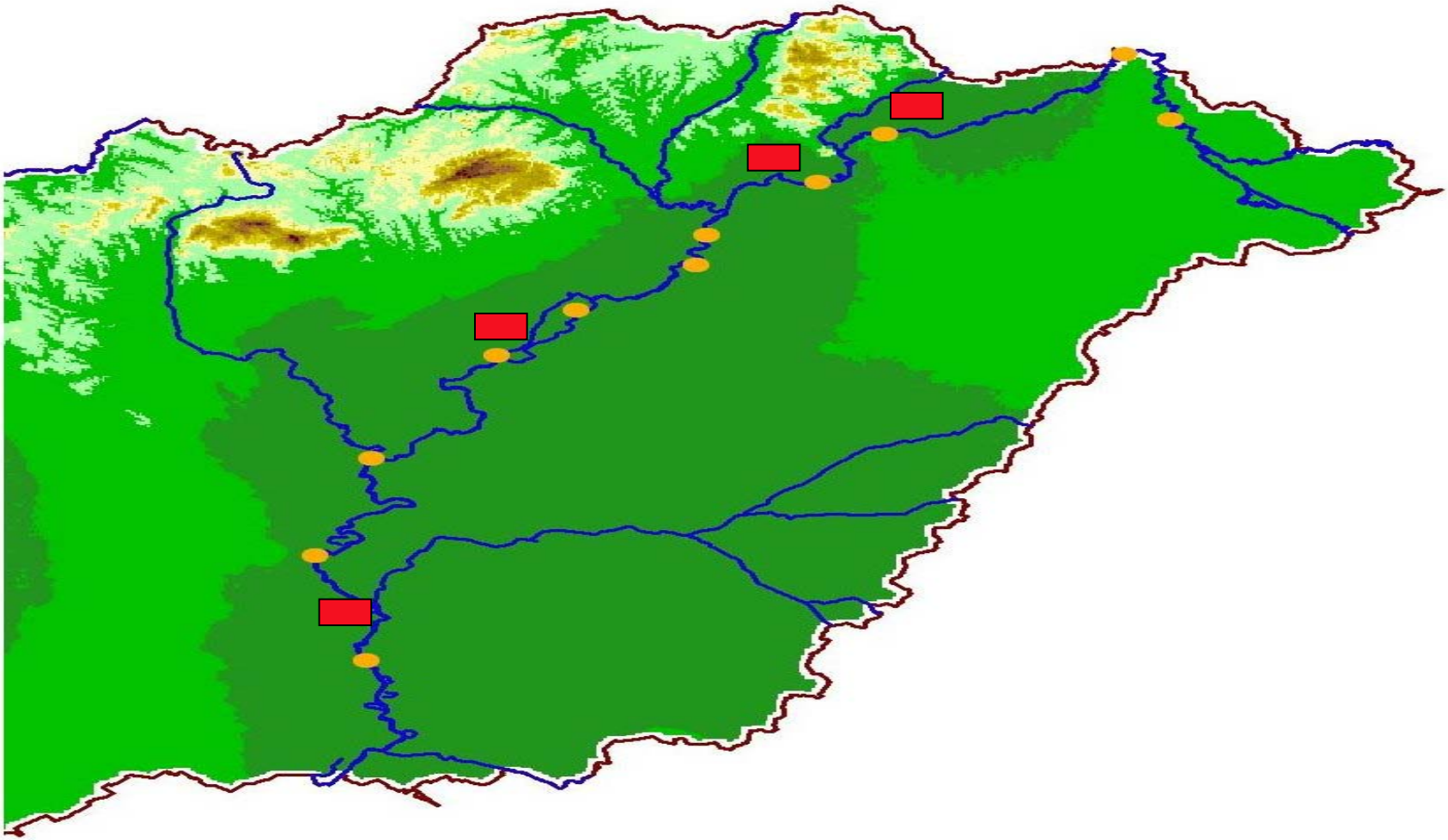
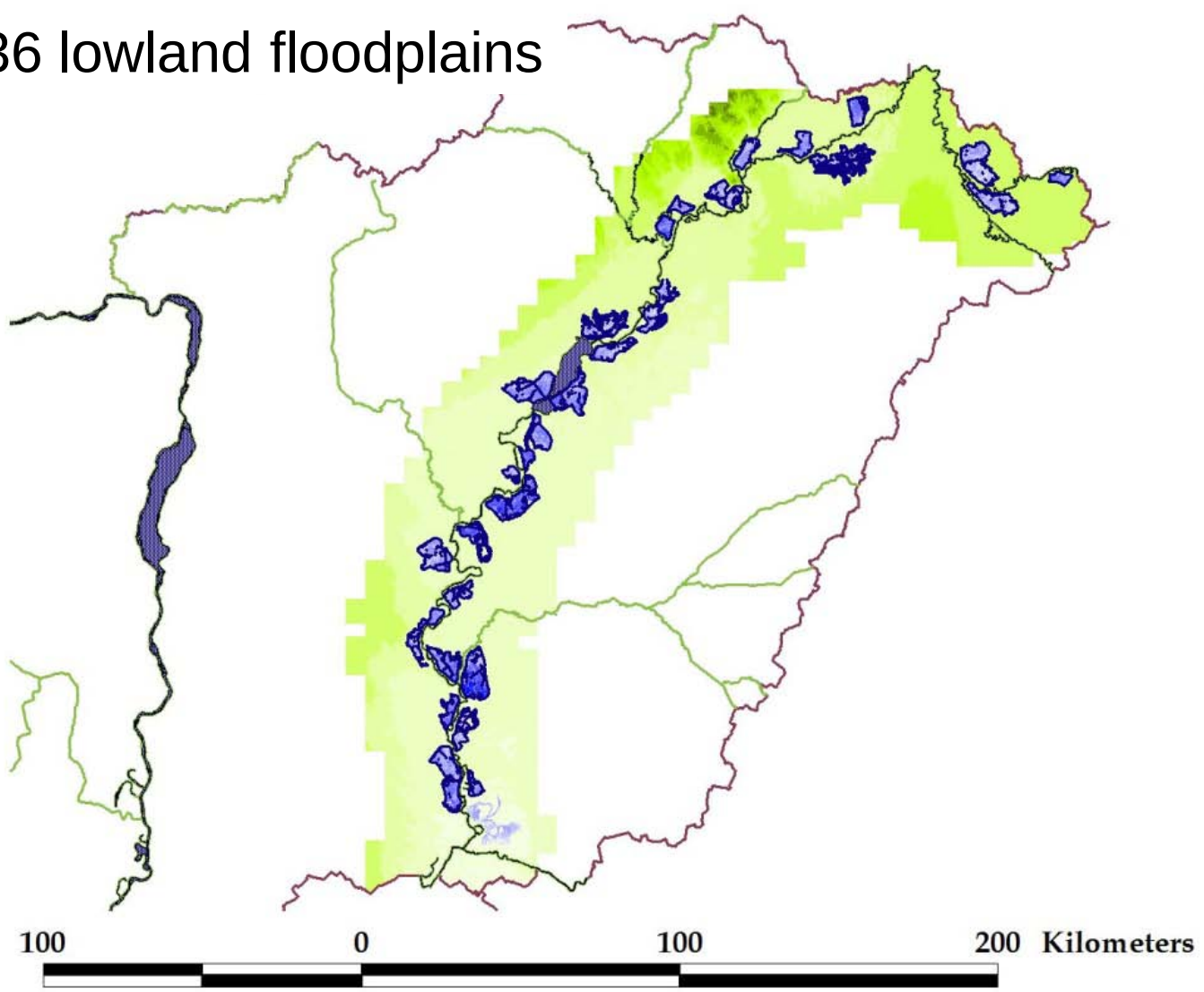
Natural Water Resource



Slide by L. Koncsos

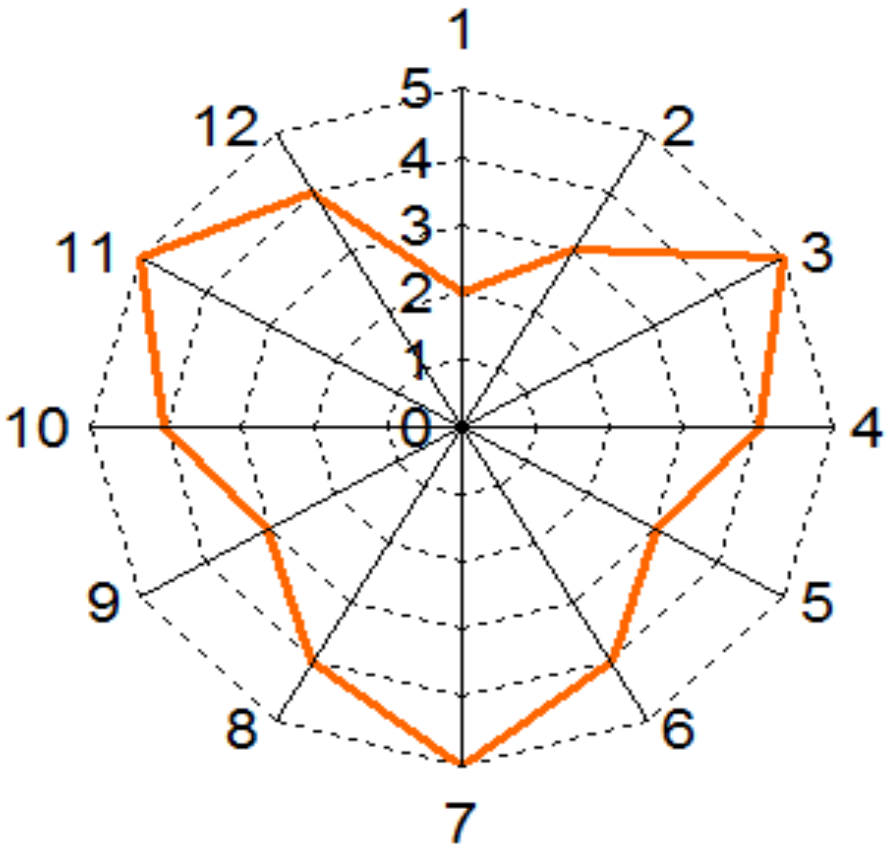
36 lowland floodplains



The main outcomes of the 1st - 2nd workshops, which were assessed and brought to the 3rd workshop were:

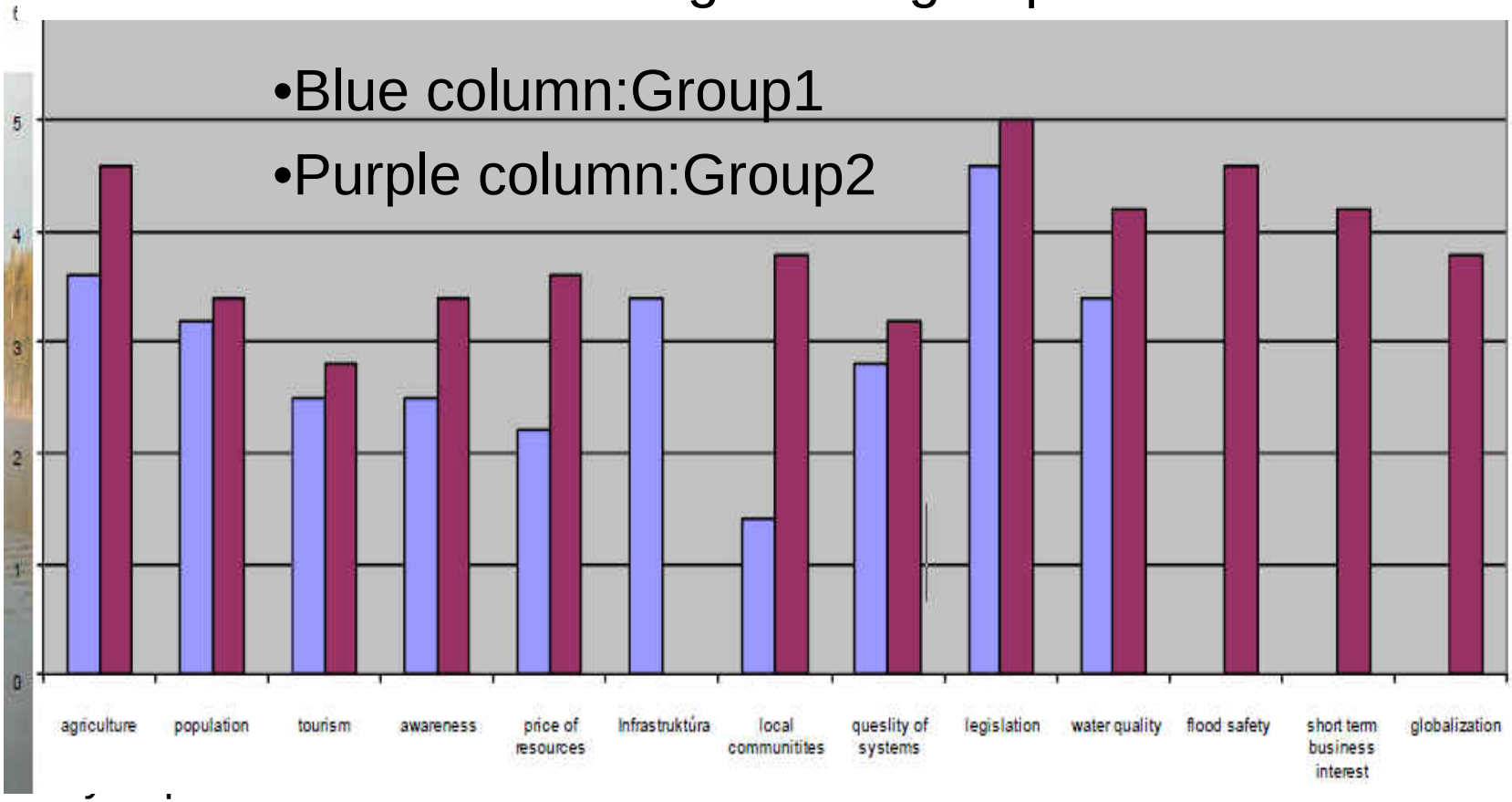
- Spidergrams of the main drivers
- Rich pictures
- Main drivers assessment for different scenarios
- FCMs for 4 scenarios, modeling results
- CLD for the Tisza (so-development with WP2, IIASA support)
- Comparison of modeling results of WATERGAP with national models and data sets
- Driver matrix for ideal future and 2 scenario (based on the drivers pyramid, see Figure 3.).

First phase-3 workshops:conceptual model and fuzzy cognitive map developments



1	Self-care, self-organizing of local communities
2	Local knowledge
3	Population
4	Public administration
5	Climate change
6	Propety, land-ownership structure
7	Agriculture
8	Infrastructure
9	Natural values
10	Quality of water
11	Quantity of water
12	Economical regulation

relative weights of the main drivers concerning the current situation according to two groups in Szolnok



The third workshop aimed the backcasting of actions for the four given scenarios and for two predefined aims:

- The water balance of the Hungarian section of the Tisza is not negative
- The pollution reaching the Hungarian Tisza section is minimal

ROBUST POLICIES

- Integrated water management, integrated projects and investments would be necessary (Integrated implementation of CAP, NATURA 2000, WFD) (The available budgets for investments will differ along the scenarios)
- Strong central control will be necessary as the water issue is a global issue and it will have to be managed more centrally (resource under global threat)
- The waste water treatment have to be complete for the whole country
  - (Centralized large plants in an economy first type scenario vs. small local, eco-solutions in a sustainable environment)
- International treaties will have to be available for water management at basins level and they also have to be strongly controlled, as integrated systems can only work for the whole basin (Tisza, Danube, ect.)
- Changing people mindset and political approaches are key issues: in a sustainable scenario it comes early with the recognition by the society, while in other cases, the changes come as the consequence of some external driving force (e.g.: energy or water crises, economic collaps)

Stakeholders feedbacks

- Most of them were very much interested in the issue to develop long term scenarios.
- They were please to have real debate and discussion on the TRB issues, and not only be target of a one way communication, as it has happened many times during the WFD process.
- Local decision makers were pleased to learn from international examples
- Farmers were representing short term needs in relation to CAP reform and land utilization, and were interested in alternative water saving options.
- People linked to nature conservation represented the multi-functional landscape management objectives
- At the Tisza RB the SHs were very mixed much time was used for general elaborative discussion to harmonize the communication.

Conclusions of the process

- Participatory scenario process is a very important way to achieve long term natural resource management in Europe
- Helps to highlight the most important cross sectoral and cross scale issues for water management,
- People taking part need guidance and some knowledge about experts opinions

Main aims:

- Harmonization of knowledge on sustainable resource management
- Harmonization of vocabularies of different SHs to improve the efficiency of their cooperation
- To learn from scenarios and to be able to create adaptive management cycles
- To improve the knowledge base for long term decisions.

Thank you for your attention!