Hydrological conditions of European wetlands – overview of current situation and future perspectives

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Outline

- Intro
- SCENES project & wetlands there
- Method
    - set of wetlands
    - modelling
    - thresholds
    - analysed scenarios
- Results
- Conclusions

Intro – conclusions and remarks from 2009 presentation

- Regardless - source or user - hierarchy matters and estimation of consequences of the water deficit;
- Wetlands in WFD are recognized but not defined;
- Who cares of wetlands (on decision making level)?
- Evapotranspiration is a key question in the water management issues in the terms of credibility of calculation as well as comparability to the „standard" methods used in agricultural;

- Waiting for the operational ecological models….

Intro – a scenario overview

Boundaries
- Spatial
- Thematic
- Temporal

Key Dimensions
- Variables

Current Situation
- Historic context
- Institutional description
- Quantitative accounts

Driving Forces
- Trends
- Processes

Critical Uncertainties
- Resolution alters course of events

Plot
- Captures dynamics
- Communicates effectively

What is NOT a scenario?

Scenarios are not **forecasts**, **projections**, or **predictions**.

K. Kok

Intro – 6 FP Scenes project

To develop and analyse a set of **scenarios** of Europe's freshwater futures up to 2050

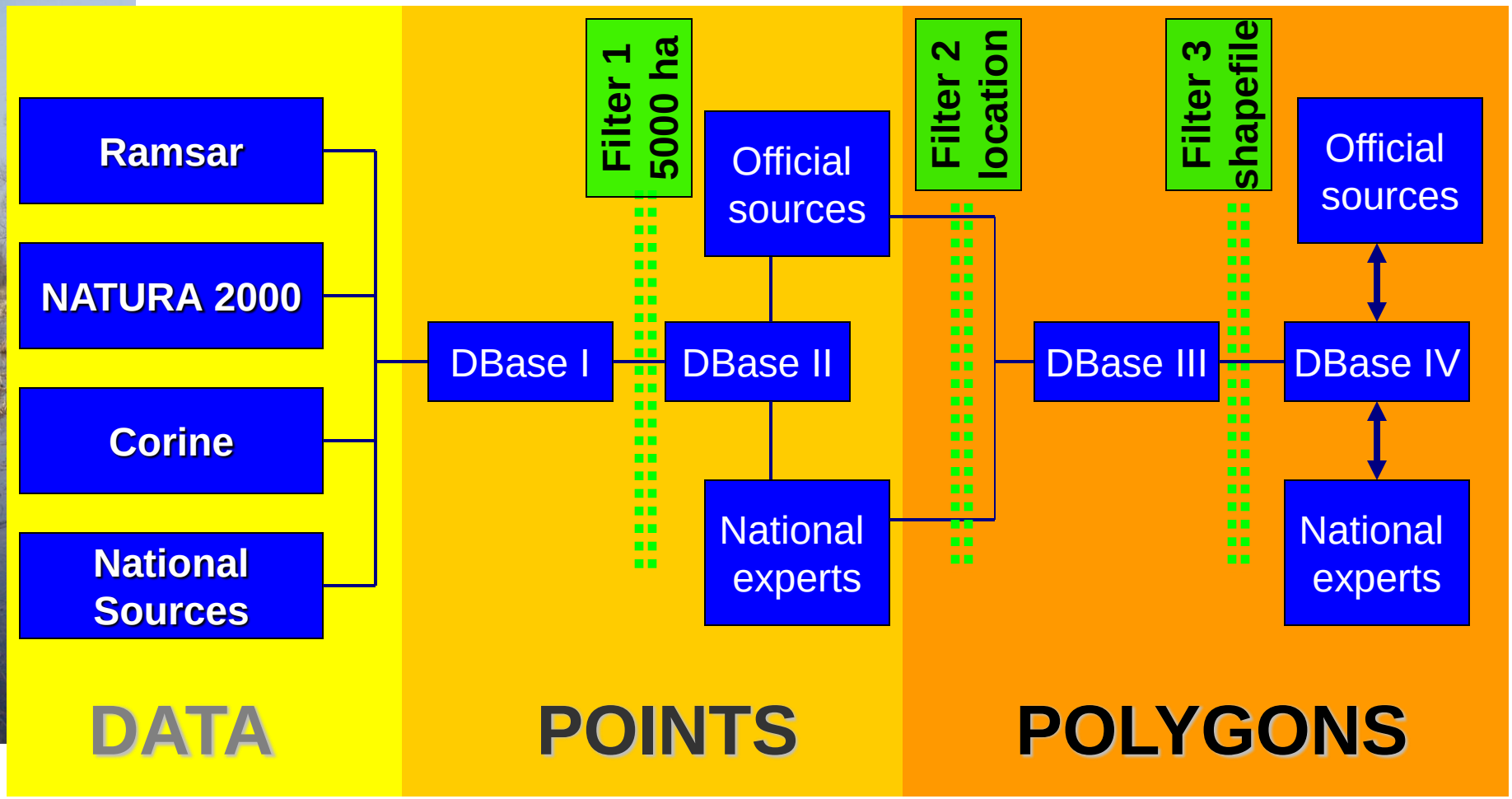
The scenarios will:

- provide reference point for strategic planning
- alert policymakers and stakeholders
- allow river basin managers to test water plans

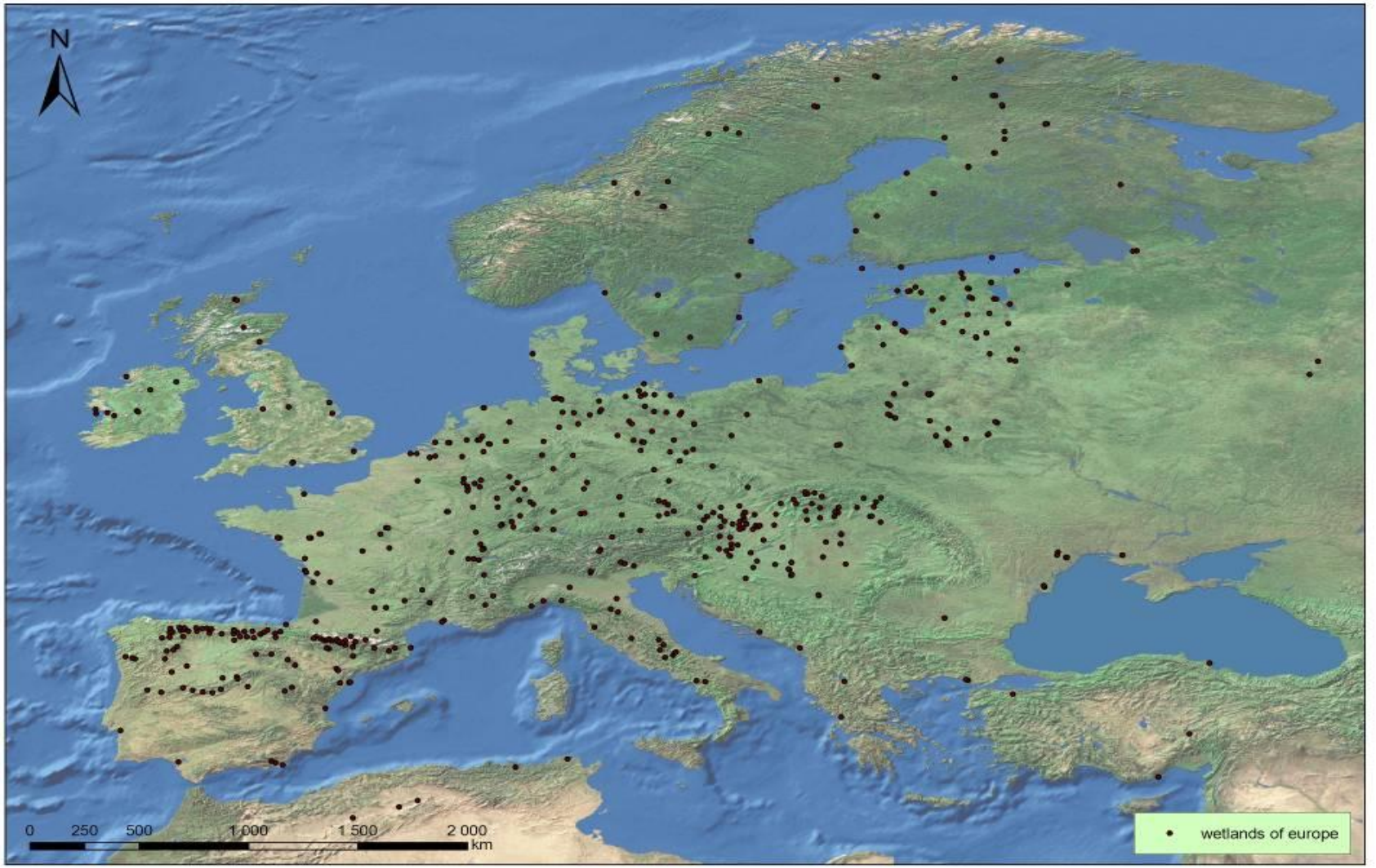
Intro – Scenes quantify analysis

- Analysing the socio-economic and environmental and ecological impact of changes in water resources for different water system services and water sectors
  - agriculture (irrigation), biodiversity, drinking water supply and sanitation, recreation and tourism, industry, hydropower, cooling water
  - clustered in 4 groups
    - ✓water for food
    - ✓water for nature
    - ✓water for people
    - ✓water for industry
- Quantification by using indicators

Methods – data set



Example: dbase II, wetlands >5000 ha, 470 centroids



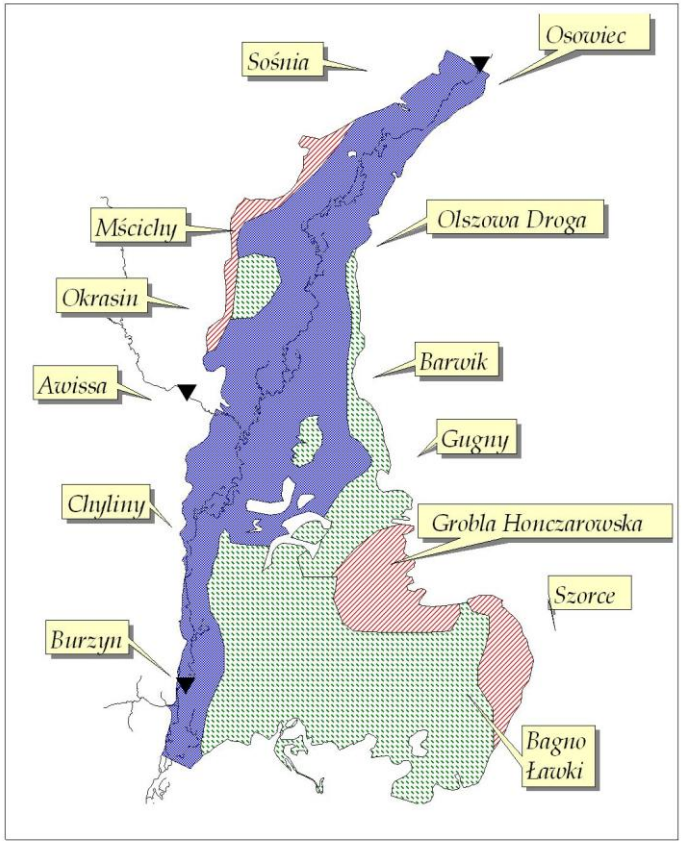
Example: dbase IV, wetlands >5000 ha, 103 shape files

BOG – 24
FEN – 22
MARSH – 34
SWAMP – 15
Estuary - 8

0 250 500 1 000 1 500 2 000 km

Legend
Final set of wetlands

Example: Biebrza, different hydrological types in one wetland



Methods – treshold values

- Three expert values:

no change – 0- 15 % (model confidence)

moderate - 16 – 30 % (some changies may occure)

significant – > 30% (damage treshold)

- Should be tuned to wetlands type

Methods – treshold values 2

Change of the hydrological characteristics comparing to the baseline:

- Riparian – change in water discharge over bank flow magnitude and timing,
- Bogs - change in (Prec - PET),
- Fens - change in ((Prec + Re) – PET),
- Estuaries – change in freshwater inflow to estuary.

Methods – treshold values 3

Change of the hydrological characteristics comparing to the baseline:

- Riparian – 20 % or 1 month, lack of flood: 70% reduction or 2 months shift in the peak flow
- Bogs - 20%, PET > Prec
- Fens - 20% , PET > Prec + Re
- Estuaries – 15%, 25% decrese of inflow of freshwater

Methods – WaterGAP 2 model overview

•Land Cover
•Climate

Water Availability

Water Availability
- Runoff
- Groundwater recharge

River Basin Water Stress

•Population
•Income
•Technology
•Climate

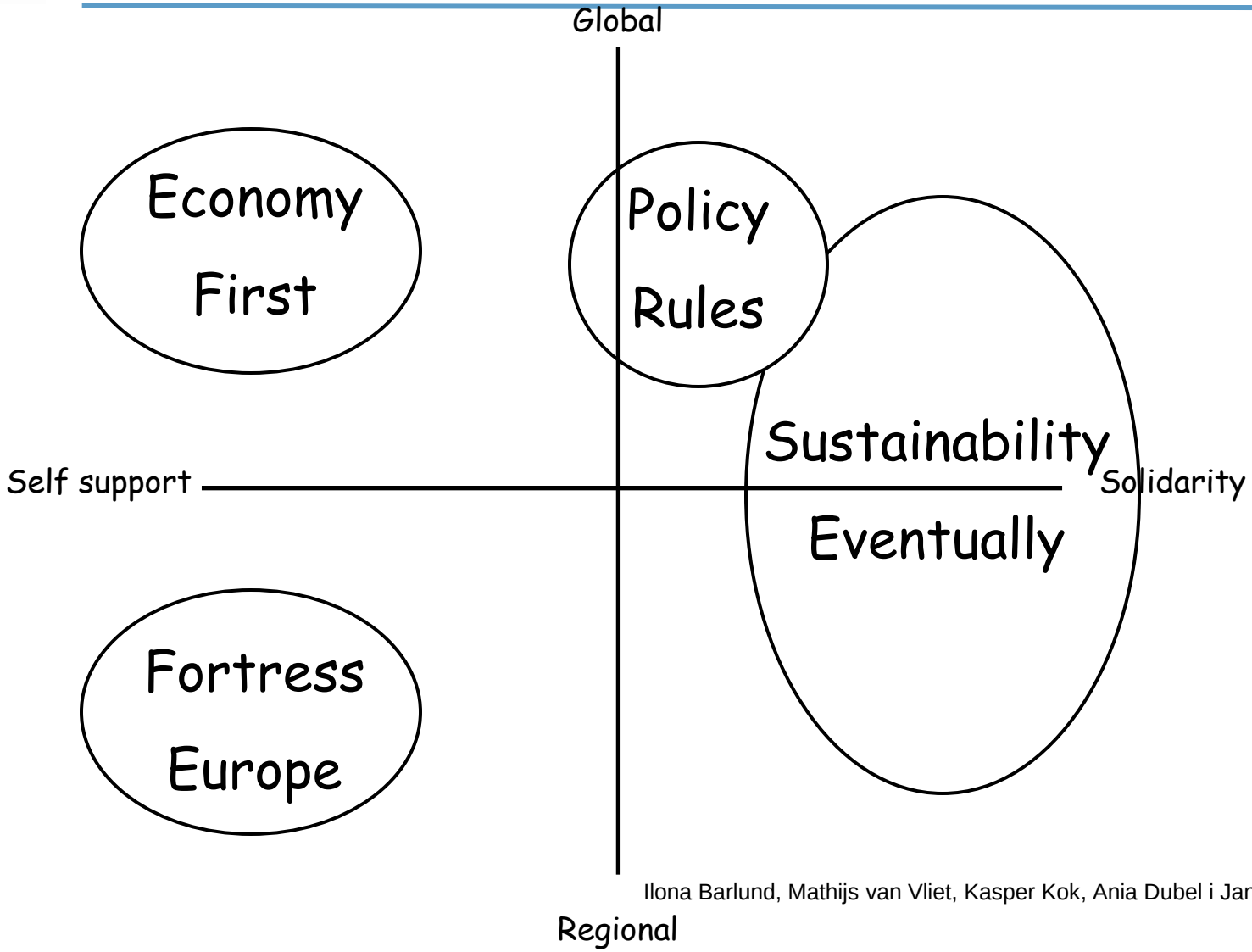
Water Use

Water Withdrawals

Wastewater Loadings

J. Alcamo

Methods – socio-economic scenarios

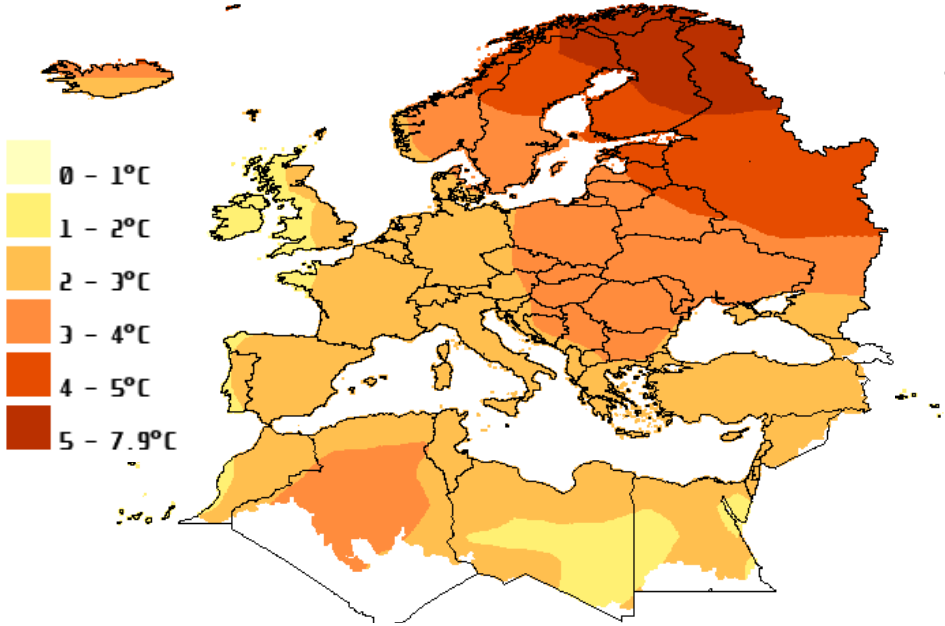


Ilona Barlund, Mathijs van Vliet, Kasper Kok, Ania Dubel i Jan Sendzimir.

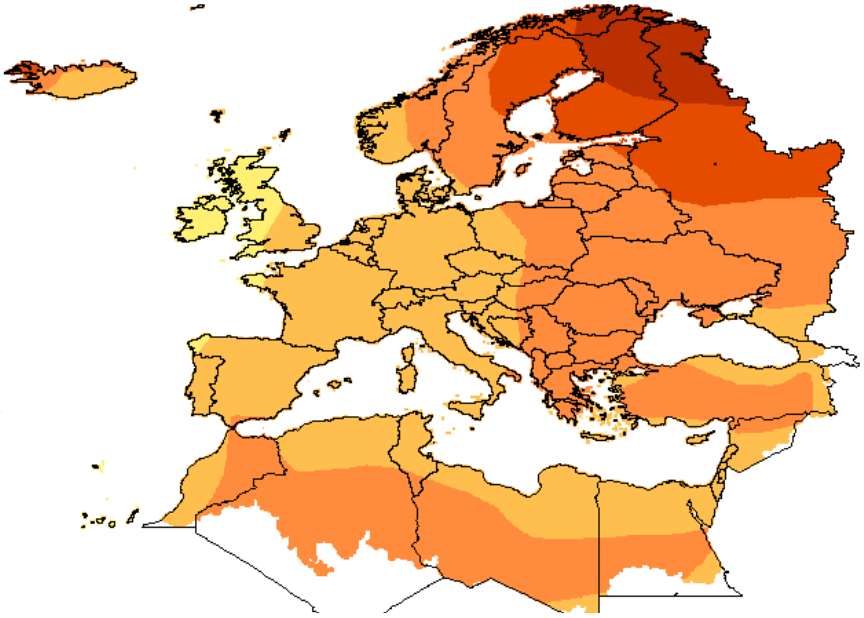
Methods – GCM & CC emission scenario

- In SCENES project two combination for Climate Change has been chosen and described by Global Circulation Models using A2 emission scenario:
- 1) The IPSL-CM4 model from the Institute Pierre Simon Laplace, France representing an A2 scenario (IPCM4-A2).
  2) The MICRO3.2 model from the Center for Climate System Research, University of Tokyo, Japan representing an A2 scenario (MIMR-A2).
- A2 emission scenario has been chosen by Pan-European Panel of experts;
- CC approach: difference between the GCM results for 2015-2045 (2025) and for (2040-69) and the reference climate 1961-90
- Variables: air temperature & precipitation

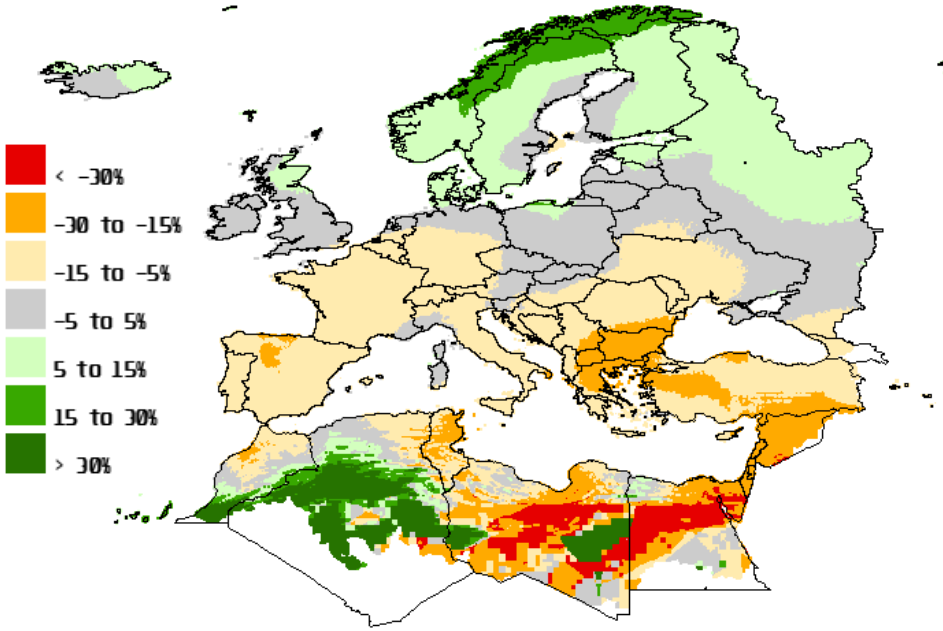
Temp. IPCM4-A2



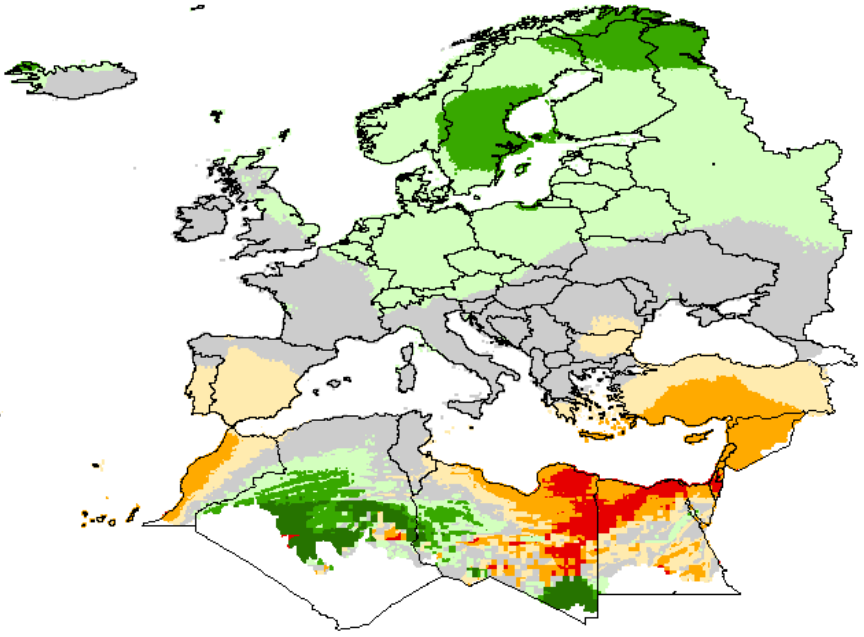
Temp. MIMR-A2



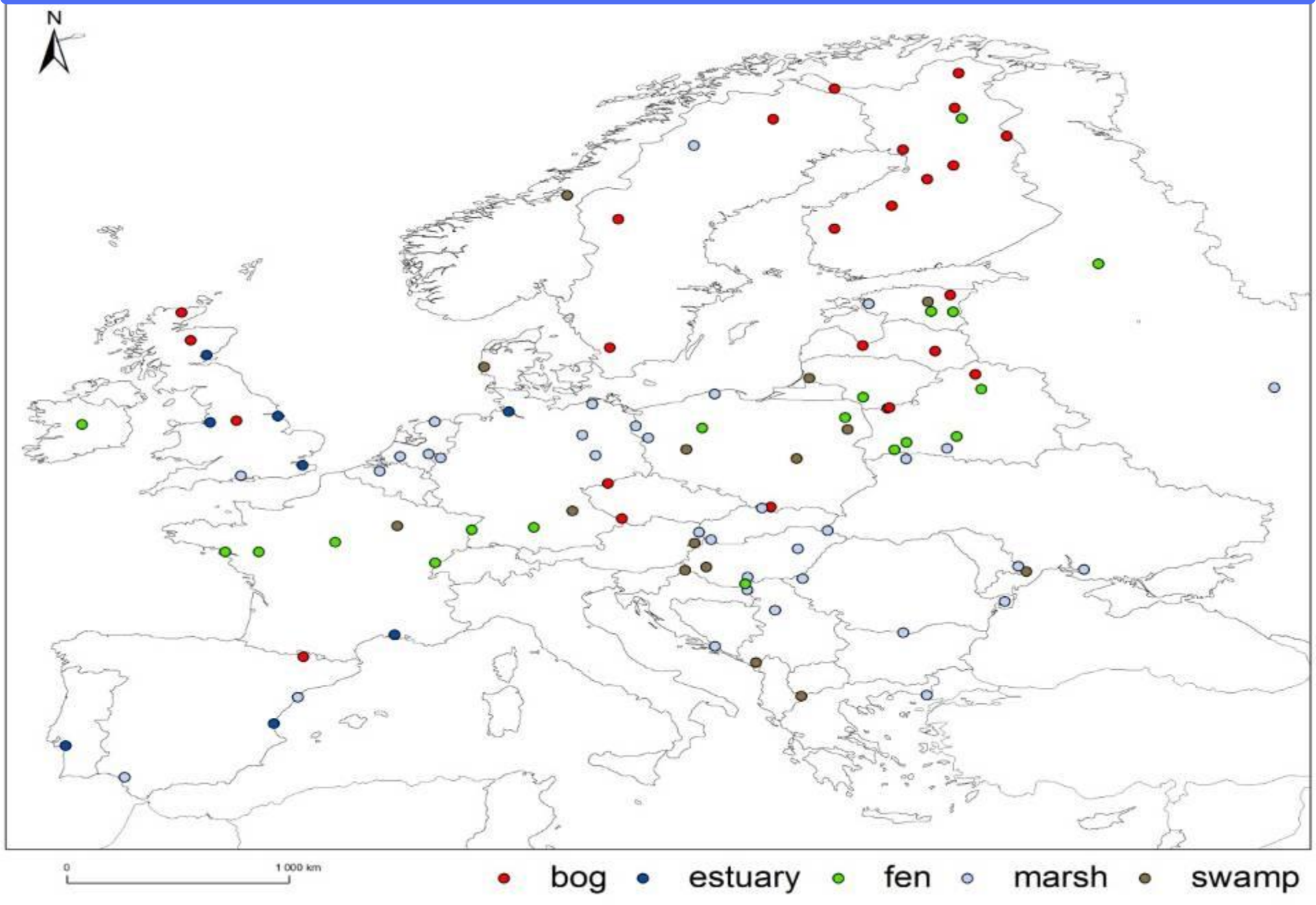
Prec. IPCM4-A2



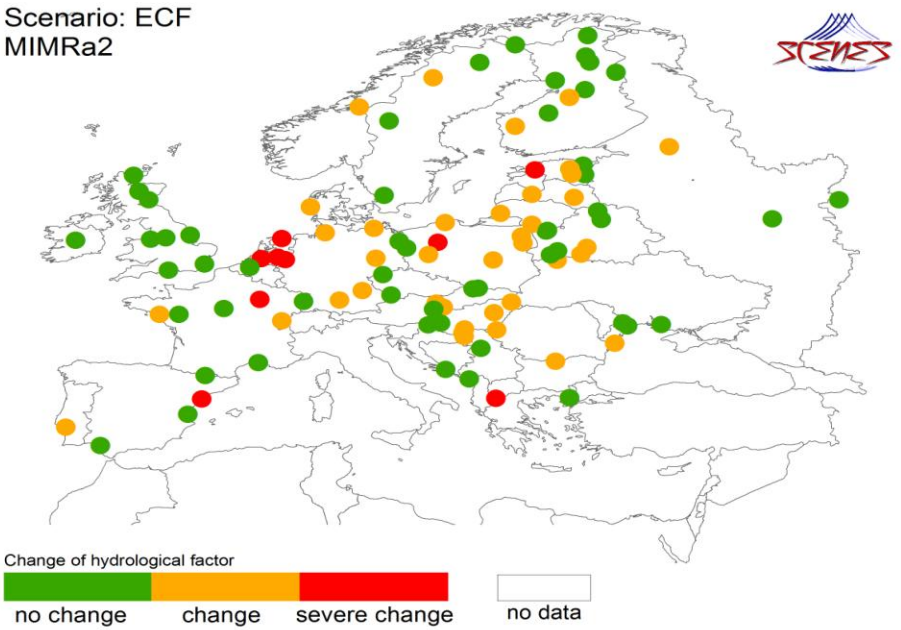
Prec. MIMR-A2

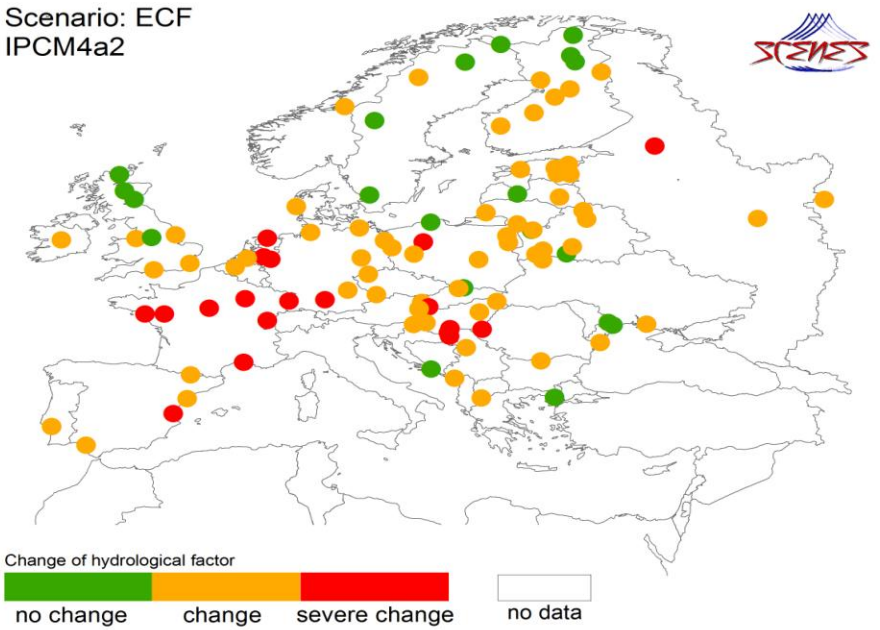


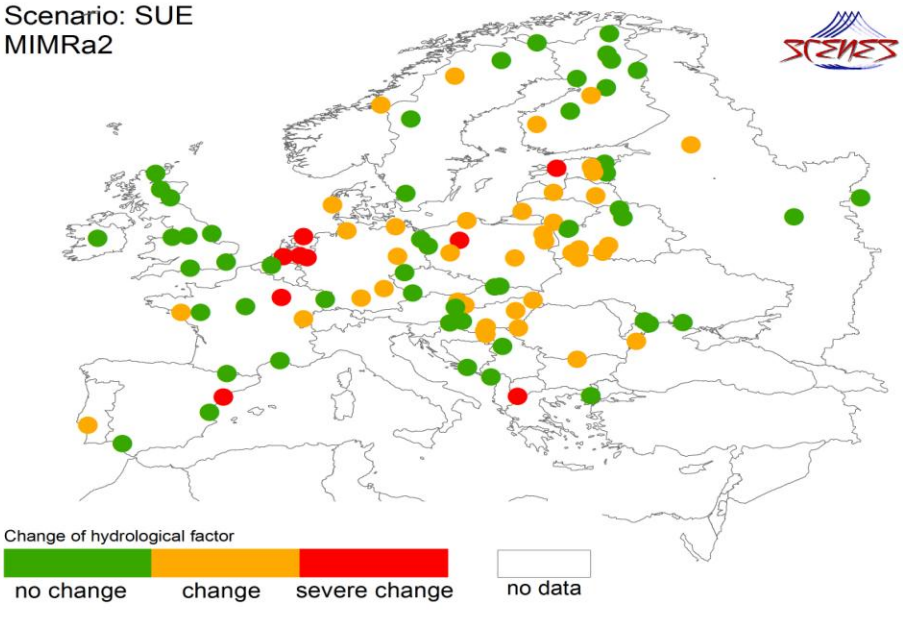
Results – 103 set of wetlands

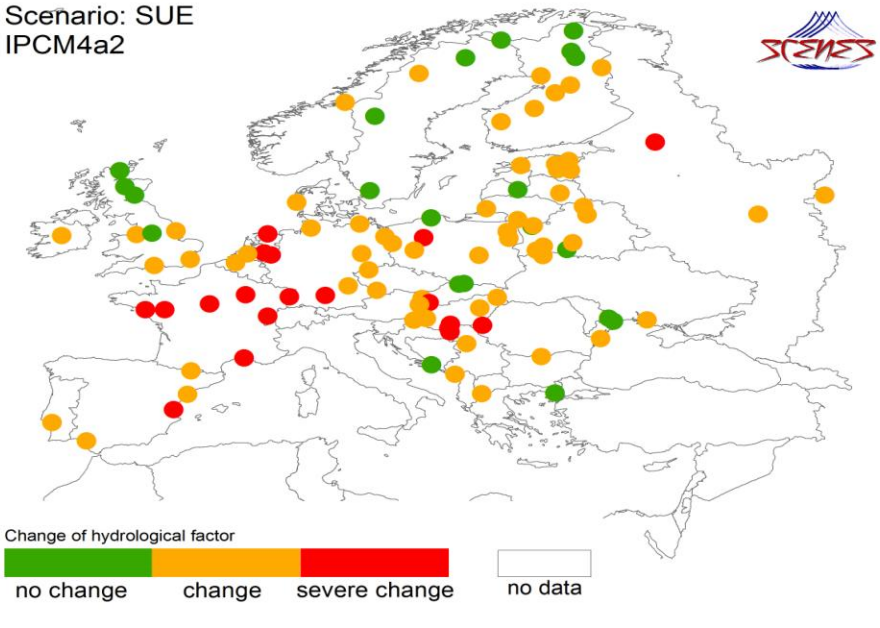


Results – year 2025 compared to present

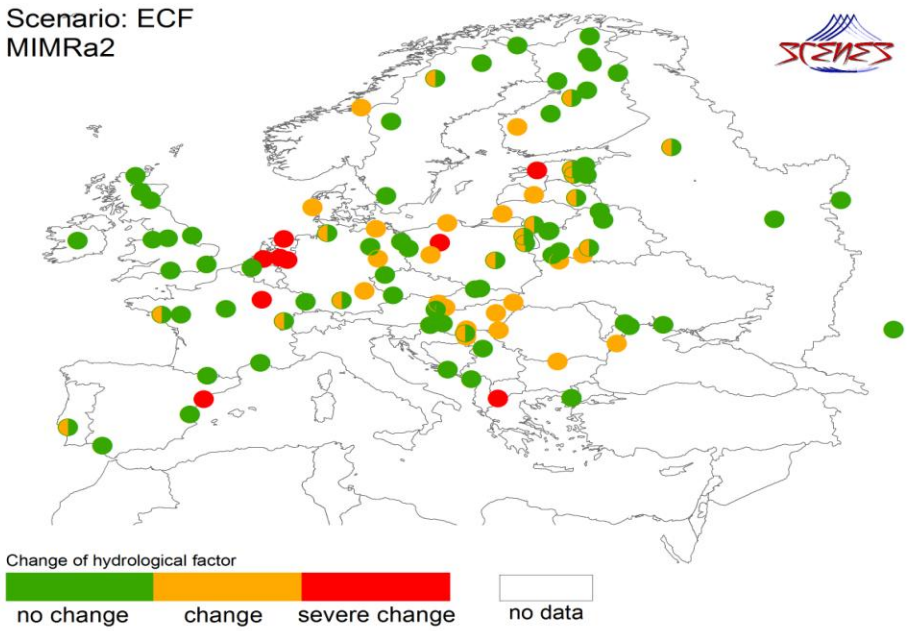


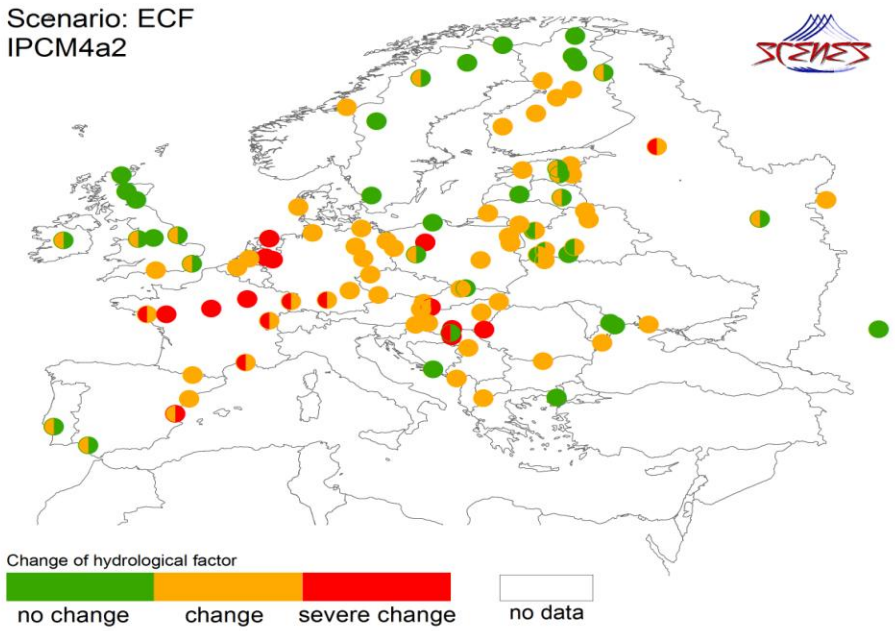


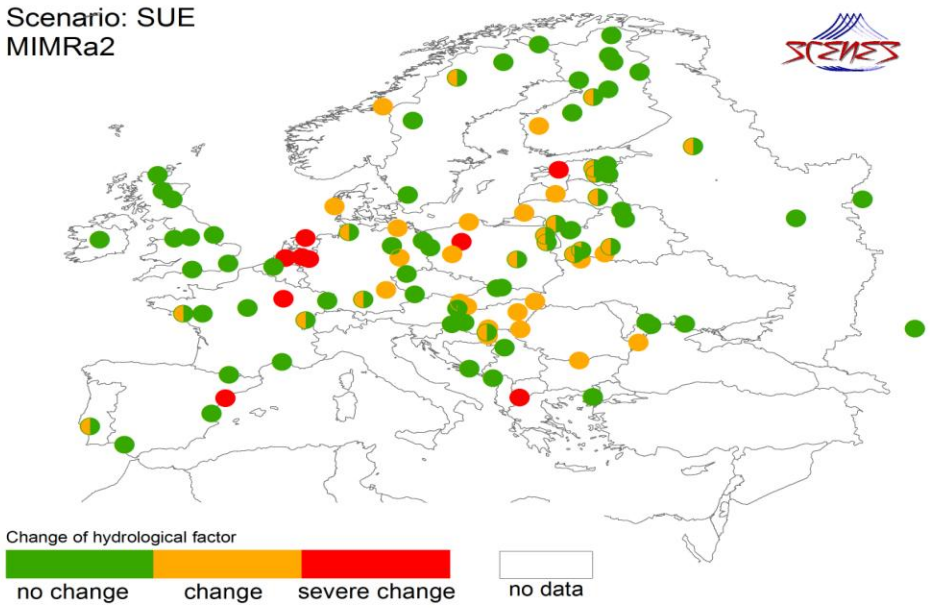


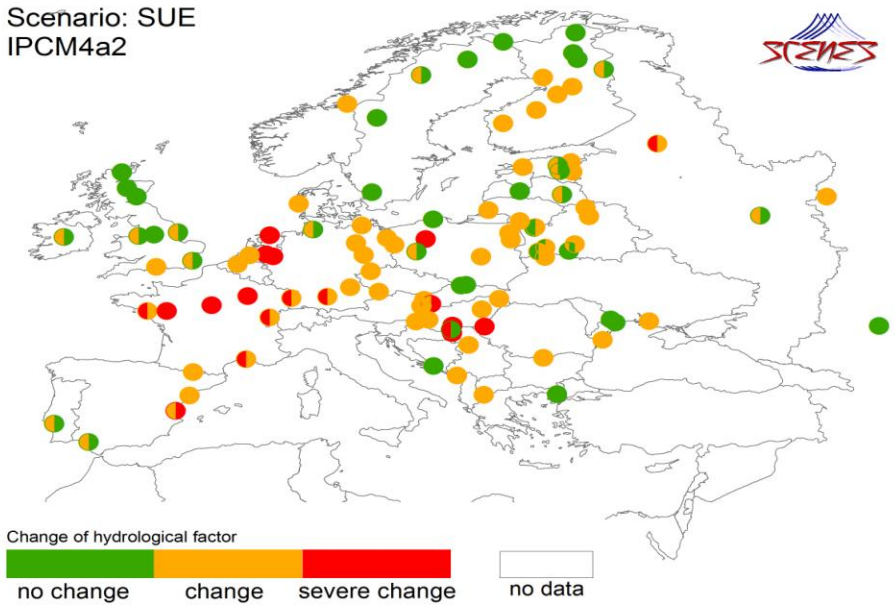


Results – year 2025 compared to present; divided types

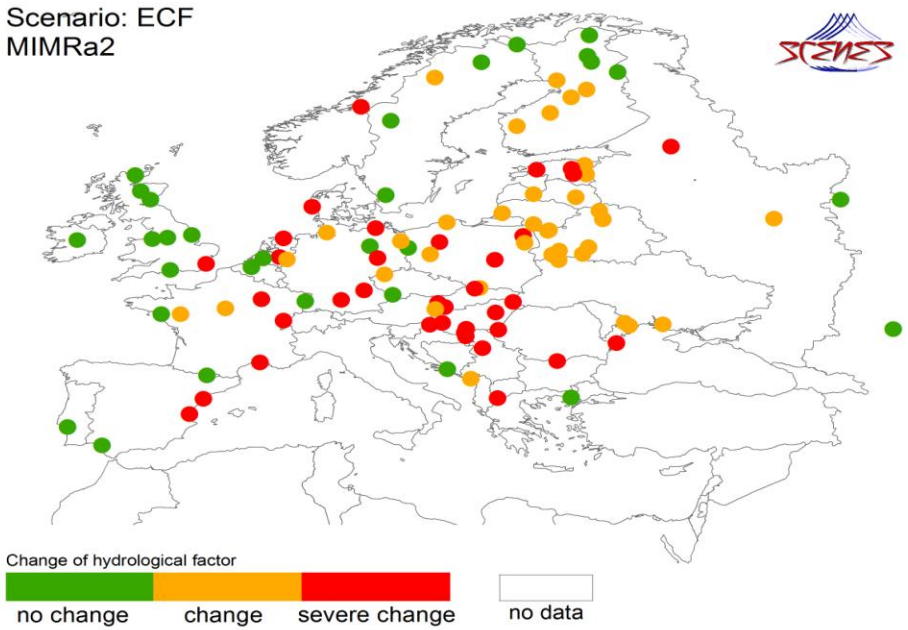


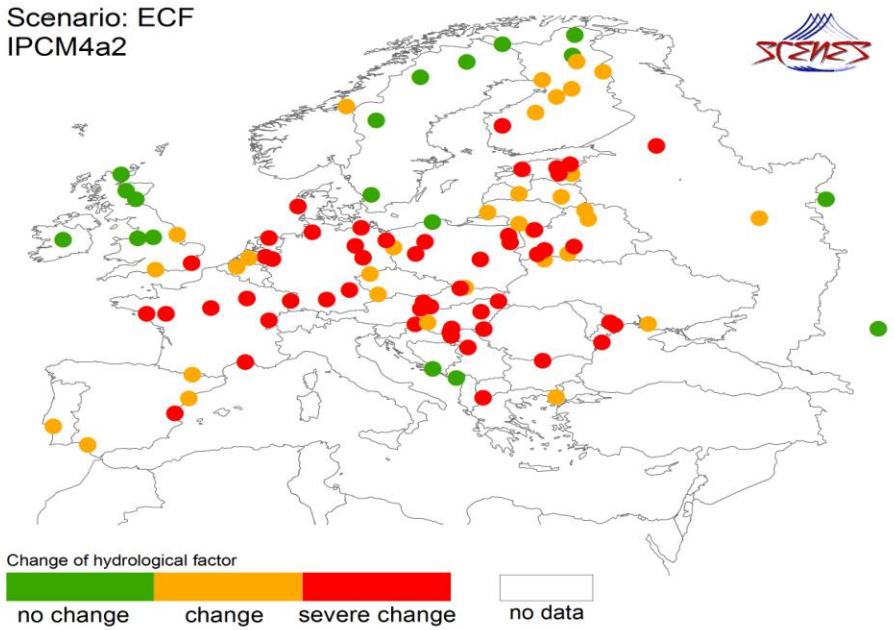


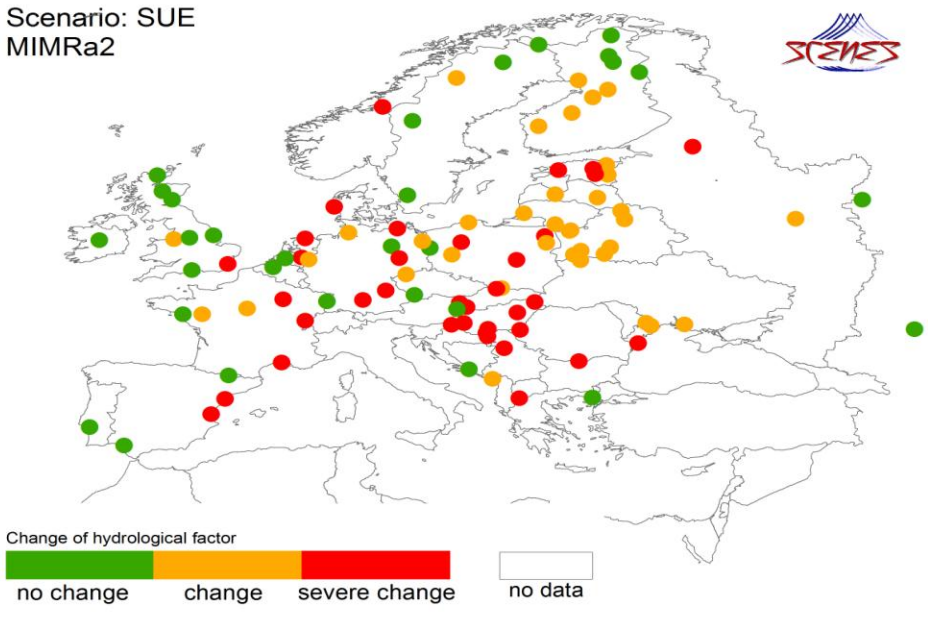


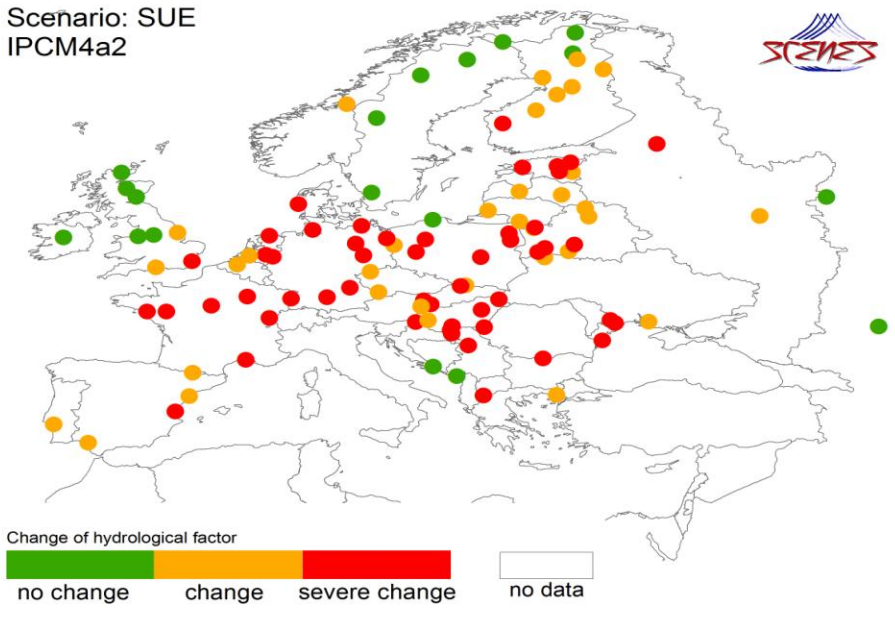


Results – year 2050 compared to present

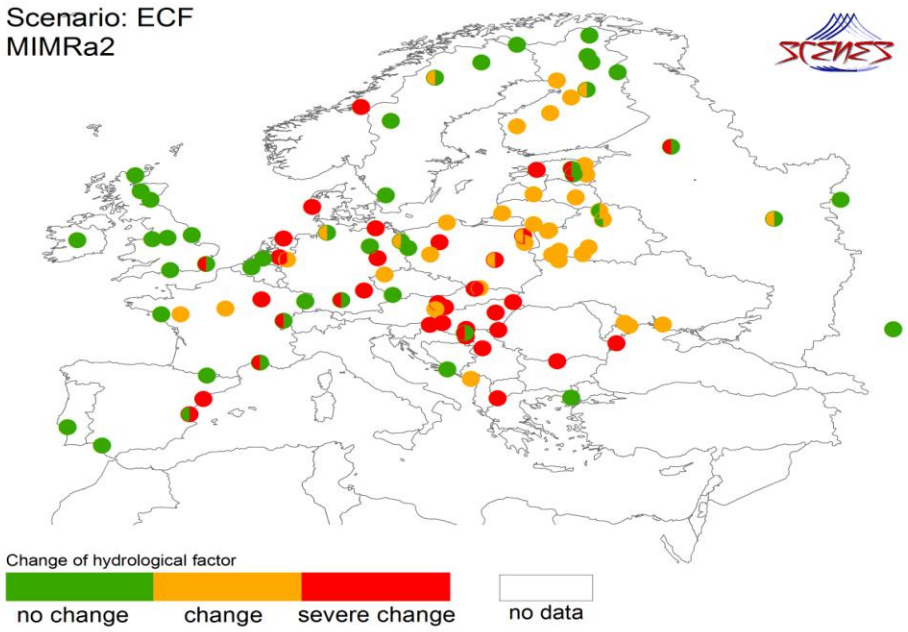


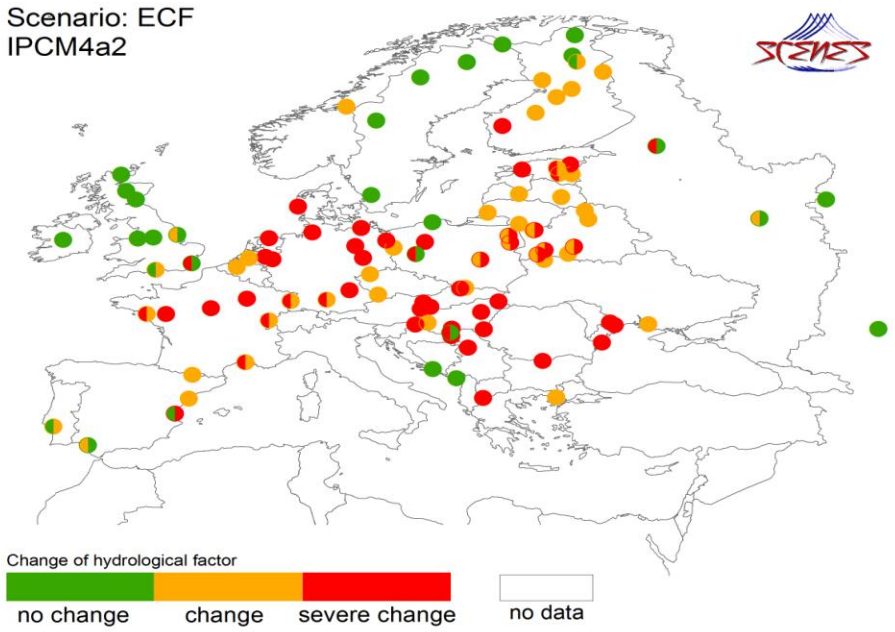


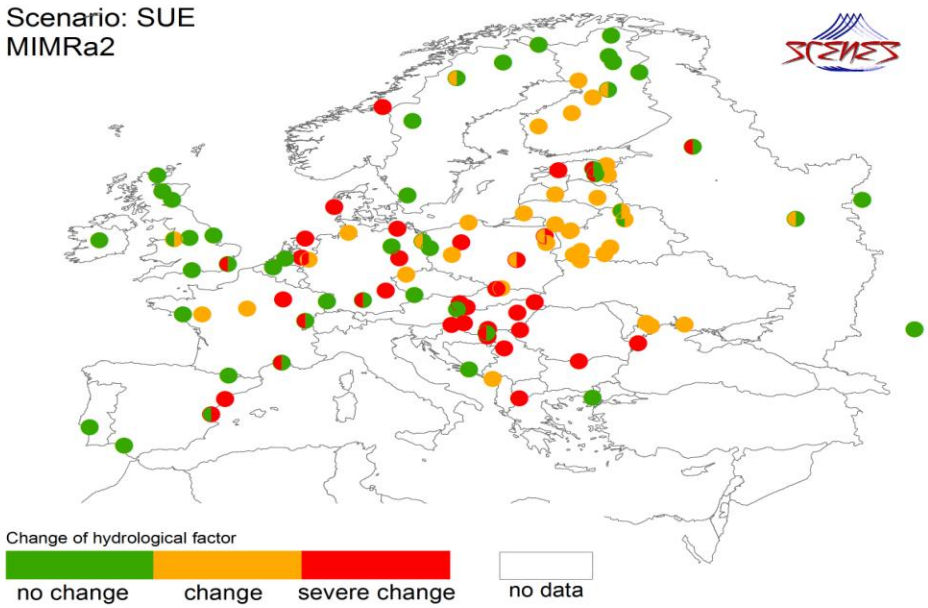


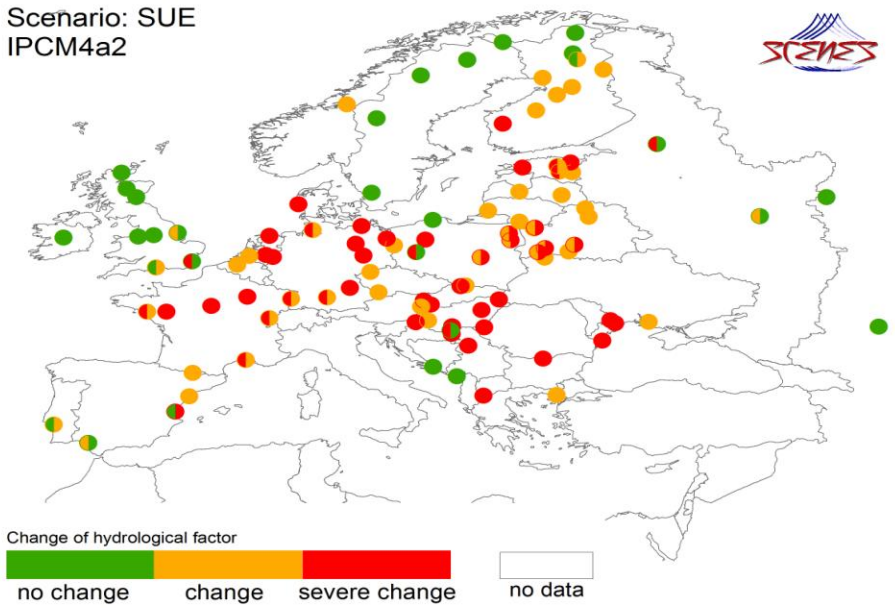


Results – 2050 compared to present ; divided types









Results – summary

WORST	2025				2050			
	MIMRa2		IPCM4a2		MIMRa2		IPCM4a2	
	SUE	ECF	SUE	ECF	SUE	ECF	SUE	ECF
No change	54	56	22	21	30	30	18	18
Change	40	38	62	63	37	37	34	33
Severe change	9	9	19	19	36	36	51	52

Conclusions

- Lack of European wetlands inventory and assessment of current status;
- Very strong Climate signal;
- Pattern of changes follows then pattern of GCM results;
- Riparian wetlands more vulnerable due to shift in flooding and water use (in some regions) then fens and bogs (located in less affected regions of Europe);
- „Big wetland” are often a composite of more then one type so the response to pressure can differ in particular part of wetland;

Conclusions - Questions

- Definitions, classifications, data bases, etc;
- Scale issue and local models;
- Assessment of the small wetlands on continental scale;
- Climate Change;

- Research results vs. „key messages”;

- Desk job important but …

Enjoy the fieldwork as well

Ławki marsh, Biebrza Lower Basin, 18 June 2006, 4 a.m.