A Blueprint to safeguard Europe's water resources

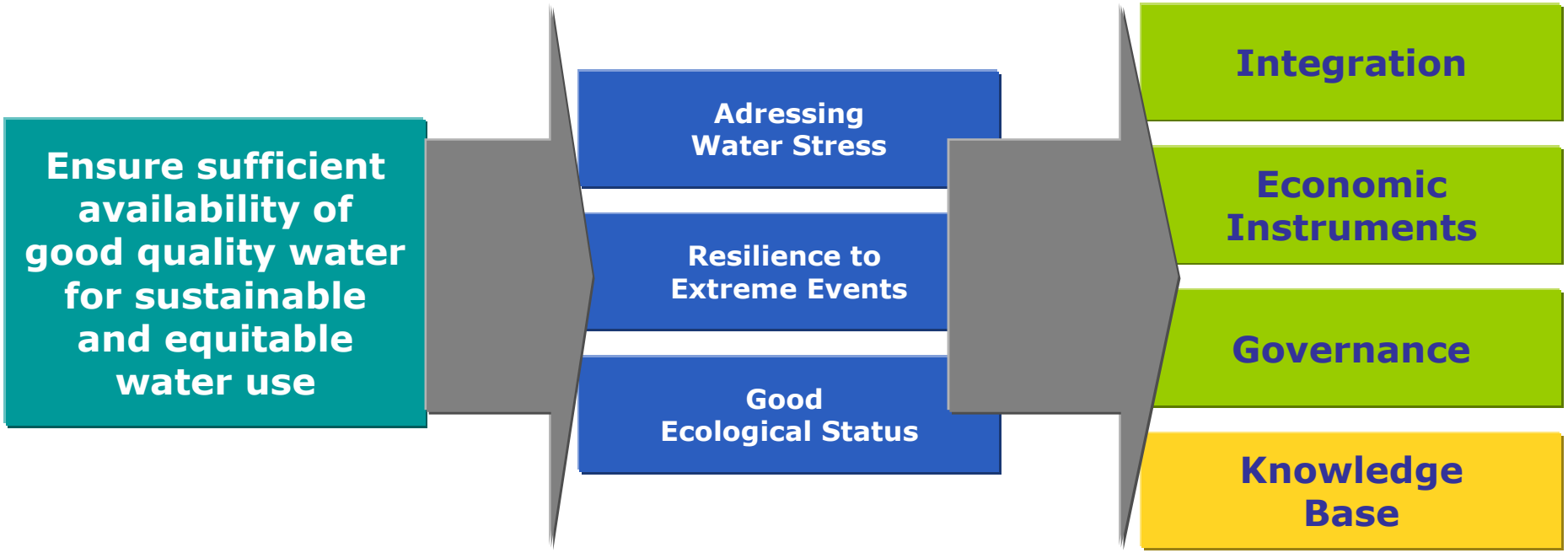
Follow-up: Knowledge Base

9 November 2012, Brussels

Jacques Delsalle, DG Environment

The Blueprint and related assessments have demonstrated that there are still important knowledge gaps and failures in the dissemination and proper integration into decision making.

Blueprint Objectives



Knowledge Base: operational objectives

- Improve EU-wide economic analysis for WFD Common Implementation Strategy
- Integrate quantitative issues into RBMP
- Support better integration water policy into sectoral policies
- Increase interoperability of the information / decrease administrative burden.
- Provide indicators and targets for Europe 2020 - Ressource Efficiency Roadmap

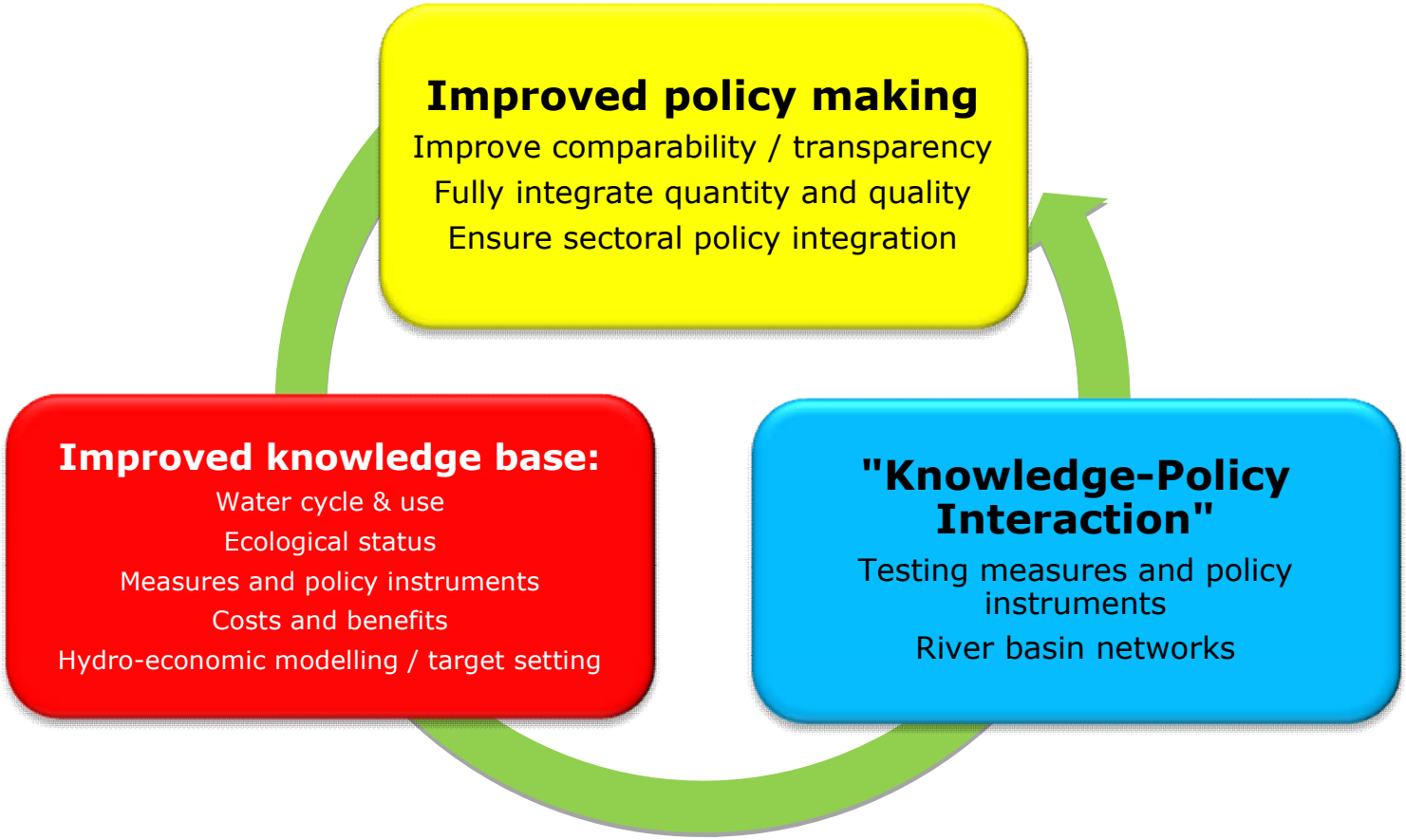
Blueprint follow-up

The implementation and monitoring of the Blueprint will use WFD-CIS as platform.

In the first phase (2013-2015), the objective will be:

- **to provide support for preparation of the next RBMPs by 2015**
- **to strengthen the knowledge base and tools that will support the assessment of these plans and the review of the WFD.**

Knowledge-Policy Interface



Blueprint follow-up: building blocks

Water balances

- **Reference situation water availability and demand**

Ecological status

- **Focus on ecological flows and vulnerability**

Measures and policy instruments

- **Shared database of measures and case studies:**
- **Costs, effectiveness, impacts, applicability**

Hydro-economic modelling

- **Valuation costs and benefits, including ecosystem services**
- **Baseline + scenarios: pressure on water ressources, changes in water availability**
- **Target setting / Integration into RBMP**

EU WATER BALANCES

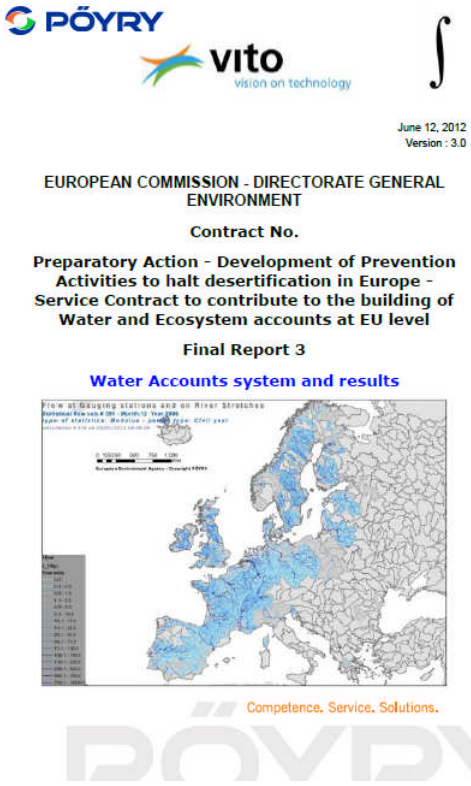
The EU water balances project

Contract for DG ENV with technical support from EEA in the context of the Blueprint

- **Based on UN SEEA-W methodology**
- **Shift from Year /country to Month /sub-basin…**

Objectives:

- **Analyse the regional inter-dependencies**
- **Support EU policies**
- **+ identify inconsistencies between datasets (across countries, sectors, reporting processes, etc.)!**



Ad-hoc meeting September 2012

Meeting conclusions:

- **No fundamental disagreement to the generic approach followed by the EEA and DG ENV.**
- **A more active involvement of MS in technical details was required.**
- **The problems identified by the participants relate to concrete datasets and could be solved by bilateral coordination with the member states & sectoral organisations**
- **There were concerns expressed on the potential publication of maps, in particular WEI / WEI+ maps**
- **A better coordination with the CIS work should be established**

VERY few CONCRETE contributions received at this stage…

Next steps

Compilation national/sectoral contributions received (or to be received)

Contribution pilot studies in river basins

Launching study for EU database water use in power plants in March 2013

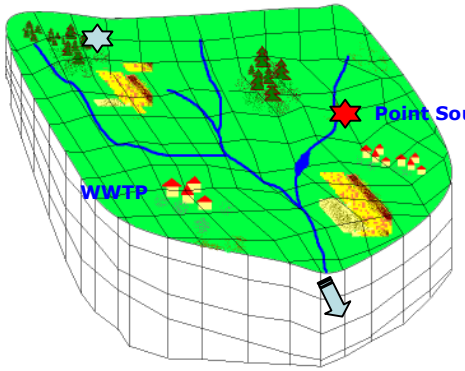
Launching service contract for Water Balances Phase II in April 2013

HYDRO-ECONOMIC MODELING

JRC modeling framework

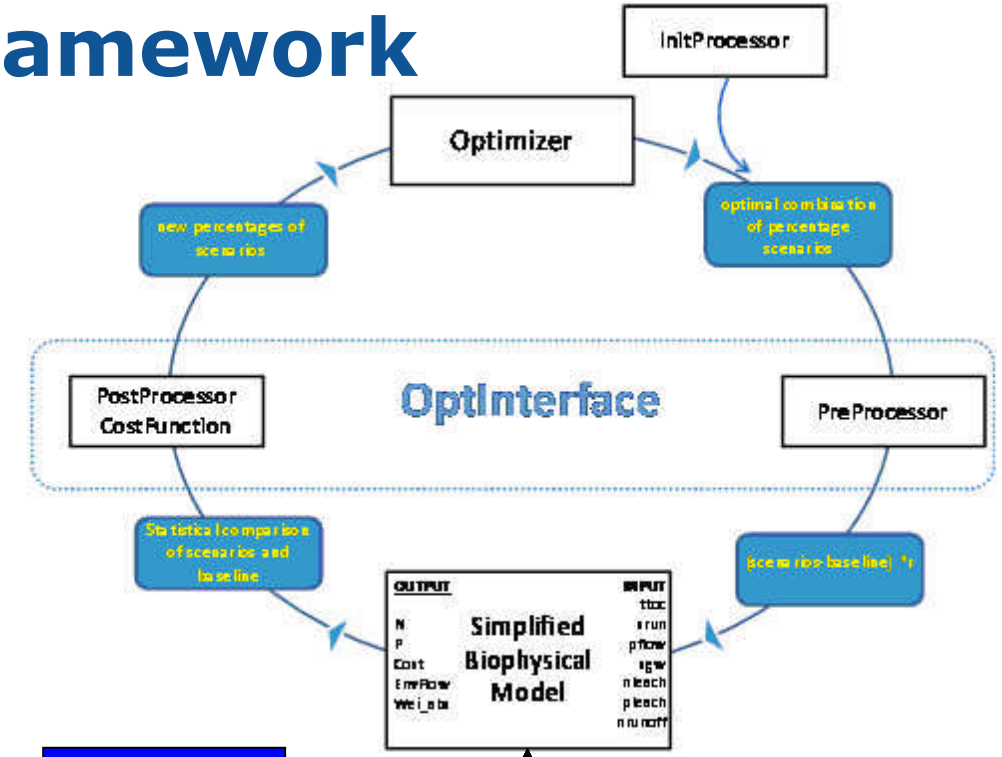
LISQUAL: distributed routing model for Q, N and P, with decay functions and point sources, water scarcity indicators, and including functions to estimate monetary loss due to water scarcity

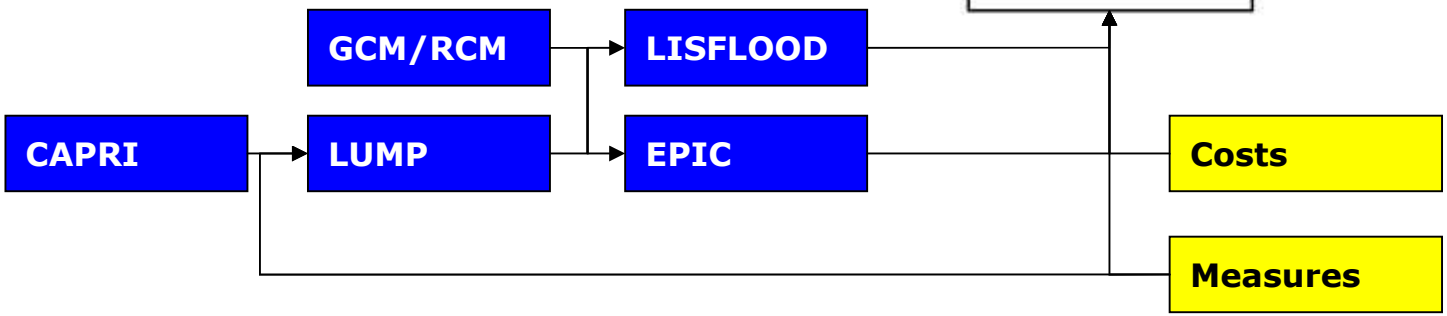
Q, N, P daily local fluxes from LISFLOOD & EPIC



Spatial resolution :
5 x 5 km for Europe

Calibration parameters are uniform over each sub-basin





Conclusions and further work

A multi-criteria tool has been built to optimize combinations of water efficiency measures at EU level

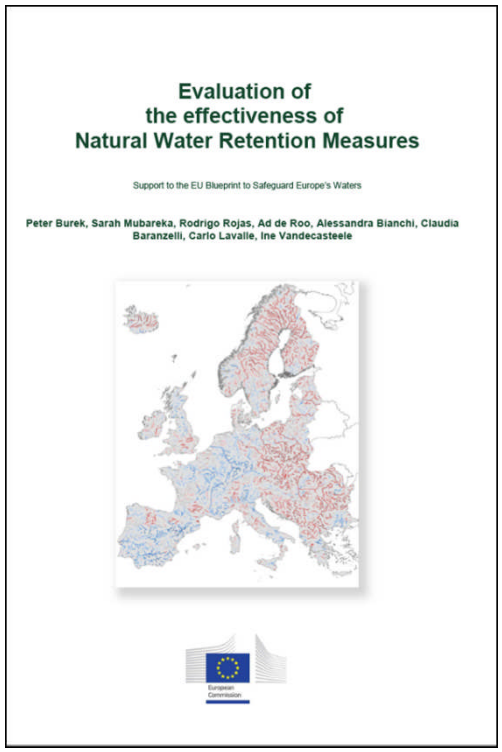
- **Can stimulate MS to perform similar studies at river basin level, including a wide range of measures**

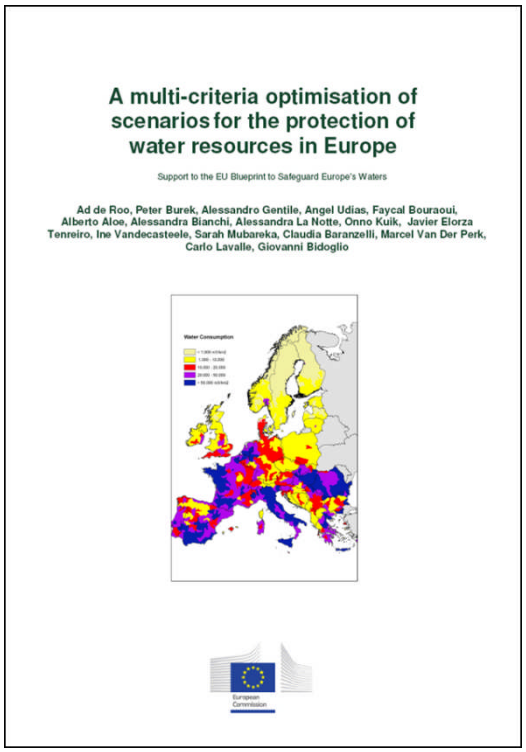
Modeling setup to be streamlined with EEA water accounting work, i.e. have a common database

Improvements needed:

- **Climate Change runs (on-going)**
- **Economic Loss functions**
- **Water transfers between river basins**
- **Improve underlying data: discharge (WMO), precipitation, wastewater fluxes, groundwater use etc..**
- **Costing other benefits, e.g. ecosystem services**
- **Costs of measures from national and regional projects**
- **Data on water price (industry, irrigation)**

JRC studies to be published next week





Main conclusions ad-hoc expert group

Is the model properly developed?

- **The model is on the forefront of the state of the art but uncertainties of outcomes still very high.**
- **Improvement needed (beyond JRC suggestions)**
  - validation of e-flows and cost and effectiveness of measures to be region-specific
  - essential to better consider trends/scenarios outside the water sector
  - Sophisticate the cost-benefit analysis of scenarios/measures and better explain the methodology for multi-criteria analysis of combinations of measures
  - Reflect any dynamic or feedback during the modelling period.

When would this EU-wide model be useful?

- **For ex-ante evaluations at EU level**
  - EU wide overview and differences between territories
  - Supporting impact assessment of sectoral policies
  - Effects of socio-economic & climate scenarios and broad categories of measures
- **Use for WFD implementation**
  - No when more accurate tools available at Member State level.
  - Possible use in a subsidiary way provided minimum required data are available
  - Support a bidirectional learning process

NEXT STEPS

Links with the WFD-CIS

Blueprint deliveries are « prototypes »

- **Limited dissemination**
- **Basis for discussion**

A role to play in CIS process

- **Support economic analysis, assessment programmes of measures from EU-wide perspective**

Need for a multi-scale assessment framework

Need for higher stakeholder involvement

- **Ad-hoc expert groups for Blueprint Modeling and Water Accounts**
  - Ensured visibility process
  - Filled knowledge gaps
  - Improved consistency with assessment tools at other scales

Need to further improve consistency between CIS, Eionet and internal EC processes

Next Steps

Internal work programme (ENV + ESTAT + JRC +R&I + EEA)
Awareness raising at MS and RB levels

- **Datasets and Tools inventory**

A support document to next CIS Work Programme:

- **Merge current ad-hoc groups and hold discussions early 2013.**

Roadmap for further improvement 2013-14

- **GMES input (EU-Hydro, CLC, etc.)**
- **Review reporting and statistical processes**
- **Filling specific gaps: economic module, geo-localised datasets for water use, impact assessment measures**
- **Interoperability with tools and datasets at national/river basin / sectoral levels**

Guidance on water balances, e-flows and target setting by 2014

Thank you for your attention!

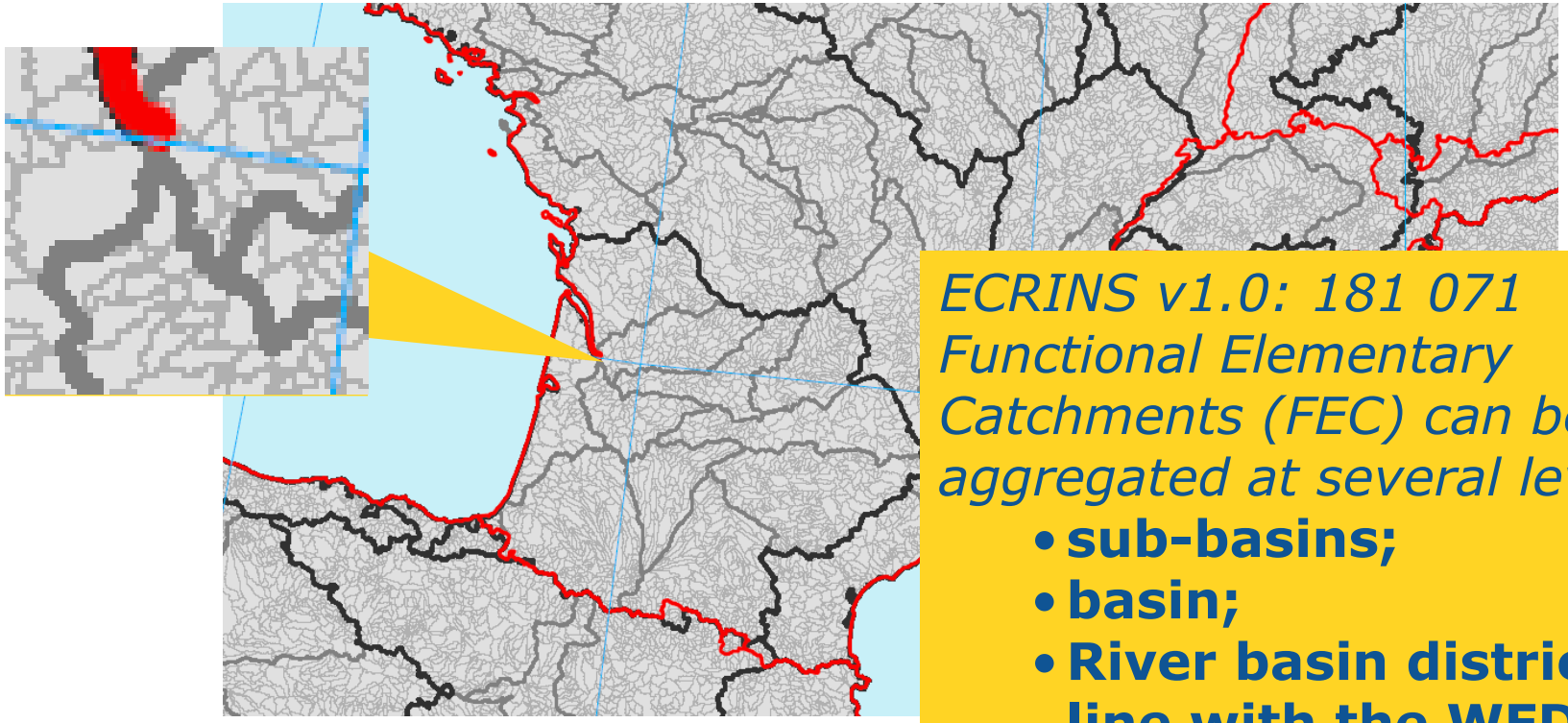
Data collection and calculation

Use was made from already reported water data and additional specific data collection of daily river discharge data

- **When no data were available within the EU institutions, other organizations were approached or specific data gathering processes were organised**

Calculation was based on an average 8 years input data

Functional Elementary Catchments



ECRINS v1.0: 181 071 Functional Elementary Catchments (FEC) can be aggregated at several levels:

- **sub-basins;**
- **basin;**
- **River basin district in line with the WFD;**
- **NUTS2**

Main data gaps

River discharge gaps is the major issue

- **Jeopardising the whole exercise in many basins, in East and South-East Europe**

Groundwater quantitative status

Divergent reporting quality across member states

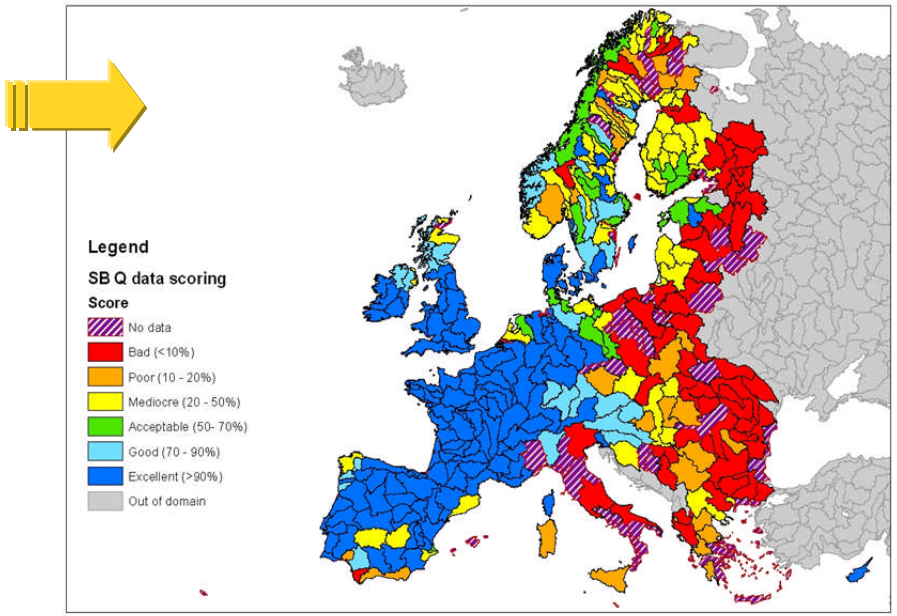
- **E.g. waste water treatment**

Lack of geo-localisation (national data) or geolocalised databases lacking data on water use

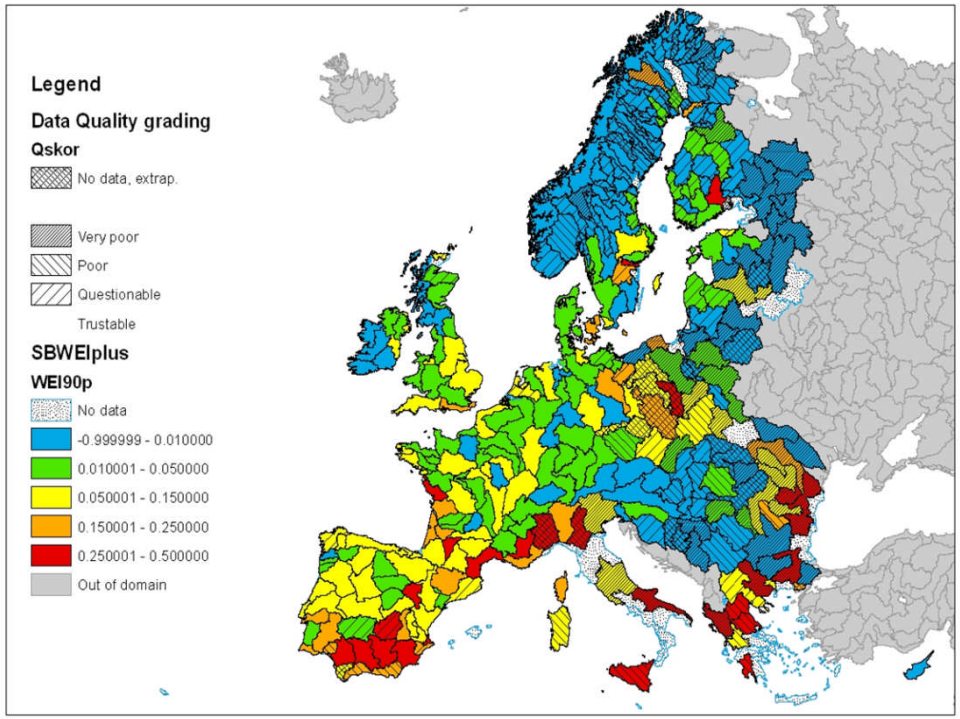
- **e.g. PLATTS or E-PRTR**

Uncertainty on % consumptive use

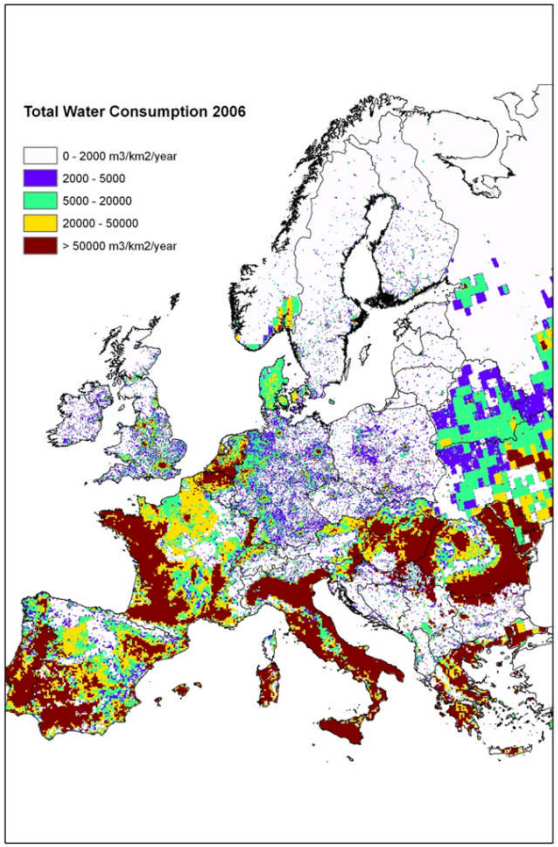
- **Irrigation, cooling, etc**

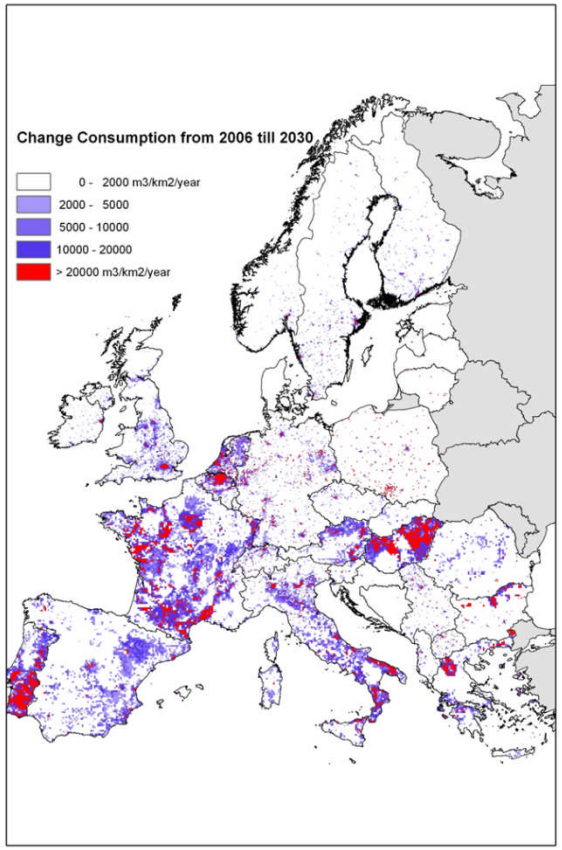


Example of results: WEI+ 90%



Baseline: e.g. water consumption 2006 and changes until 2030





Optimisation is aimed to minimize these indicators:

Flood risk (high river flows)

- **Change of flood return period (50yr return period discharge)**

Low river flows (proxy for e-flows)

- **The number of days are recorded when "e-flow" is not respected**
  - working definition: 10th and 25th percentile of daily discharges defined for every month (to be further refined)

Water Exploitation Index

- **WEIabs = abstractions / (external inflow + internal flow)**
- **WEI+ = (abstractions – returns) / (external inflow + internal flow)**
  - Lower indices indicate less water stress

Average loads and concentrations of Nitrogen & Phosphorous in rivers

Costs of scenarios

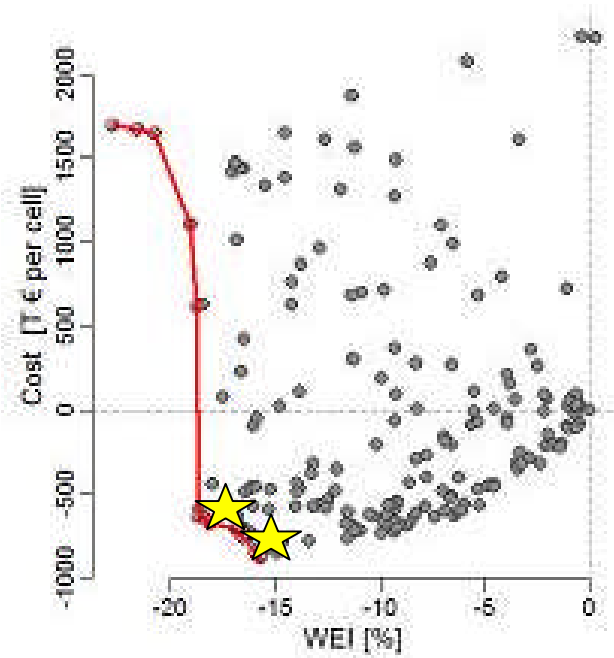
- **Investment & maintenance of measure**

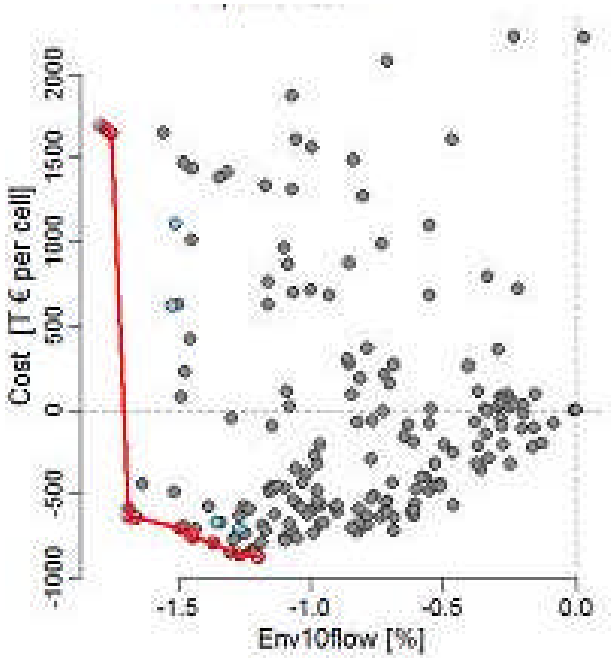
Economic loss

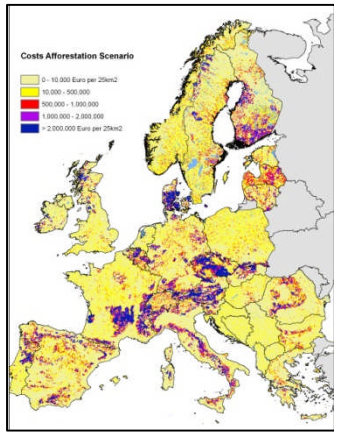
- **Expected Flood Damage (here for a 100-yr flood)**
- **Economic Loss as a consequence of water shortage**
  - Industry
  - Households
  - Agriculture
  - Energy production

Example optimisation

FLOOD	CROP	WATER SAVING
12afforestation	51Nfixing	71Desalination
21urban25 34crop	52OptFertilization 53Combined	91Irrigation 93Reuse
43meander	91Irrigation	94WaterSaving
31grassland	34crop 93Reuse	95Leakage 21urban25







Region 11 "Water saving" Scenario combination	Scenario combination 21_UG	71_DS	91_IE	93_WRI	94_WSH	95_LR	Objective functions Cost [T Euro per cell]	EnvFlow [per cell]	WEI [per cell]
C7	100	100	100	100	100	100	1696	-2	-23
C16	13	0	100	1	100	1	-877	-1	-16
C47	27	94	100	70	100	100	-635	-2	-19
C59	100	100	100	98	100	100	1643	-2	-21
C66	13	4	98	70	100	100	-639	-2	-18
C68	100	100	100	99	100	100	1673	-2	-22
C71	13	0	100	0	100	1	-879	-1	-16
C77	13	5	98	70	100	99	-706	-1	-17
C90	28	92	100	73	100	96	-762	-1	-17
C110	13	4	98	38	100	98	-743	-1	-16
C136	13	2	98	70	100	37	-865	-1	-16
C148	0	2	97	43	100	91	-790	-1	-16
C158	34	4	100	71	100	59	-847	-1	-16
C159	13	5	98	70	100	98	-740	-1	-16
C165	14	0	100	1	100	2	-871	-1	-16
C174	11	3	98	72	100	35	-865	-1	-16

Example optimisation: Danube

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C71	13	0	100	0	100	1	-879	-1	-16
C77	13	5	98	70	100	99	-706	-1	-17
C90	28	92	100	73	100	96	-762	-1	-17
C110	13	4	98	38	100	98	-743	-1	-16
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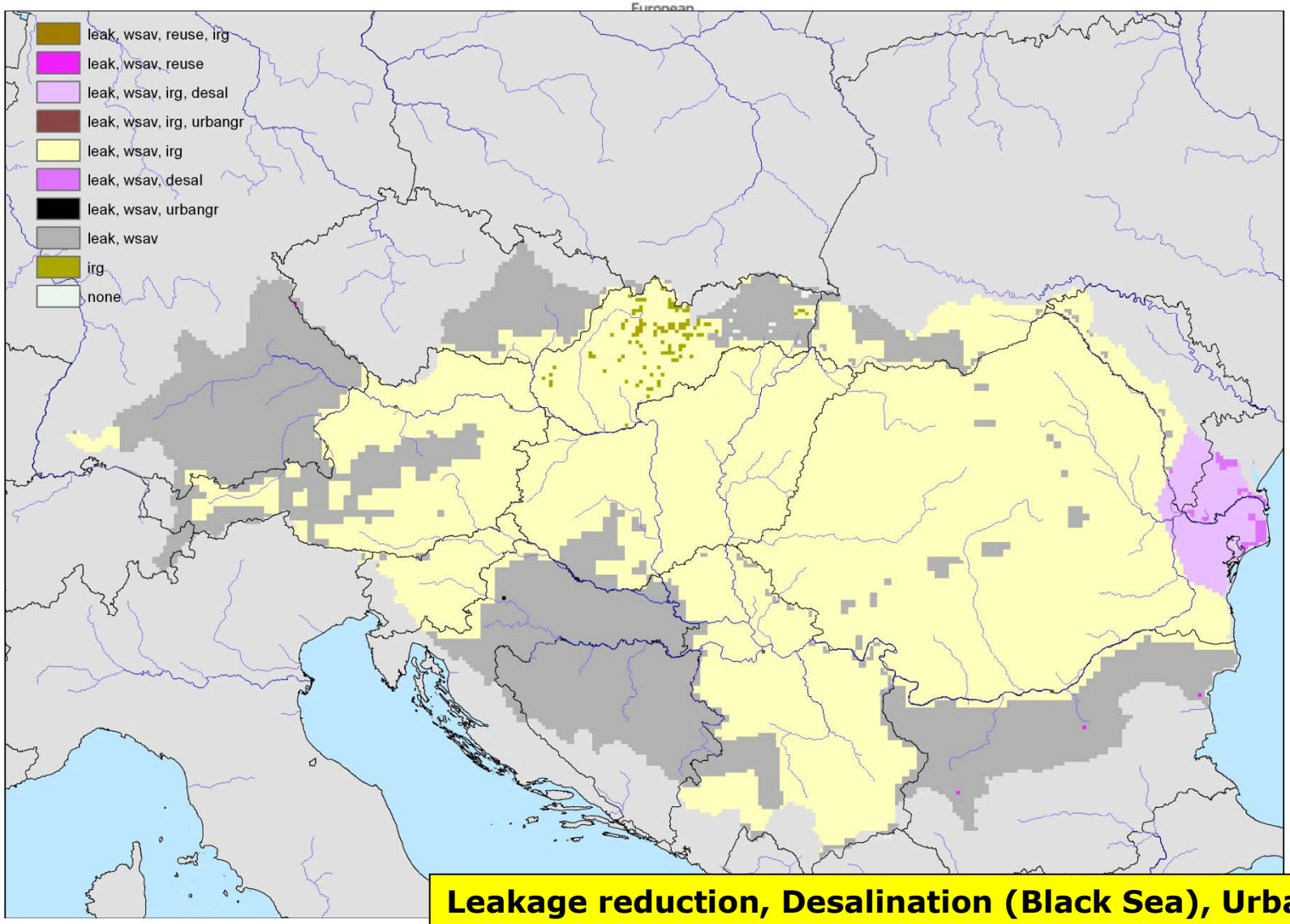
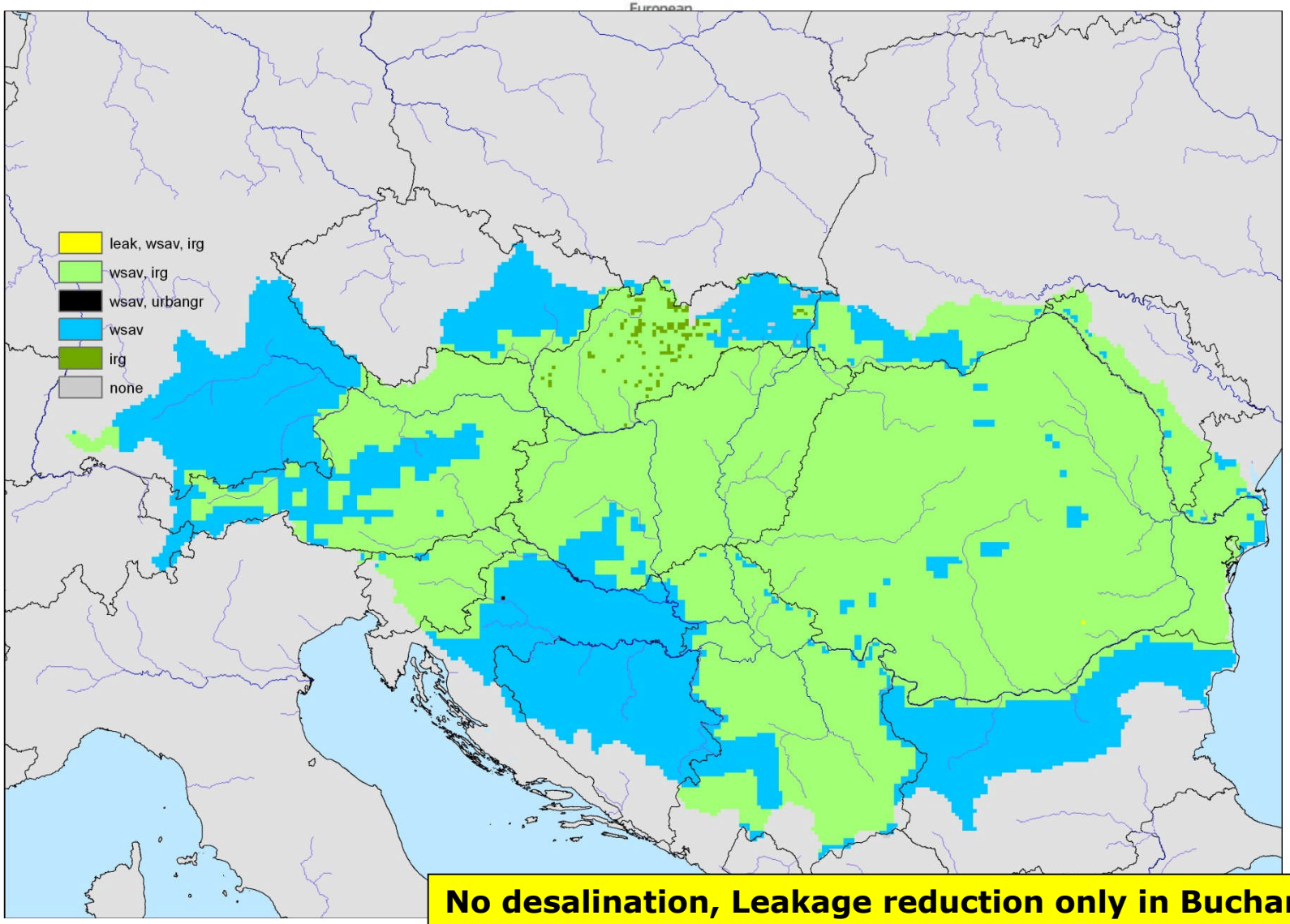
Danube: scenario-combination C47



Leakage reduction, Desalination (Black Sea), Urban Greening in Zagreb and Belgrade, Re-Use of Water in Industry in Bulgaria, irrigation water use efficiency, and

Danube: scenario-combination C71



No desalination, Leakage reduction only in Bucharest, Urban Greening only in Zagreb, no water-re-use in industry in Bulgaria

Conclusions on individual measures for Europe (1)

- '**Water saving in households**' improves the Water Exploitation Index, and reduces the amounts of abstracted and consumed water, especially in Great Britain (GB), Po (Milan area), Mediterranean Iberia, southern Italy and Odra/Vistula (Warsaw area)

- **Increasing 'irrigation efficiency'** from the current average of 74% (Eastern Europe) - 77% (Western Europe) to 93% improves the Water Exploitation Indices and the Environmental Flow Indices, especially in the Danube, Iberia/Mediterranean, southern Italy, Sicily, Sardinia, Greece/Evros, and the France/Atlantic macro-region.
  - additional benefit is also that the use of deep (geological) groundwater is reduced by around 20%
  - Due to the larger amount of water available when less irrigation water is consumed, economic losses are also reduced for industry, the public sector, and agriculture.

- '**Water re-use in industry**", which assumes that 50% of the water abstracted for industry is re-used, leads to improvements in the Water Exploitation Index of around 10% in several regions, with most effects being simulated in the industrial Elbe/Ems, GB, the Rhine/Meuse/Scheldt region, southern Italy, Sardinia, Sicily, the Po and the Odra/Vistula region.

- A **50% reduction of the current leaking in the public water supply**, improves the Water Exploitation Index in all regions, most dramatically in GB (24%), Ireland (38%), Po (6.2%), Adige/Balkan (5.8%), and Greece/Evros (4.1%), with local effects even higher. It also improves the Environmental Flow Indicators by several days per year, especially in the region of GB (8.6%), Ireland (5.8%), Sardinia (3.7%) and Sicily (2.2%).
  - It is an expensive measure though

- Establishing **urban greening measures** (green roofs, parks, more infiltration) reduces flood peaks (Q50) slightly, for example by 0.7% in the region of GB. This scenario consequently also reduces the potential flood damage by 27% in the region of GB in general, and by even more locally in England.
  - Further positive effects are simulated in the regions of the Rhine/Meuse/Scheldt (0.2% Q50 decrease, 12% flood damage decrease), Elbe/Ems (0.3% Q50 decrease, 6.5% flood damage decrease), Po (0.2% Q50 decrease, 4.5% flood damage decrease) & Mediterranean Iberia (0.2% Q50 decrease, 6.0% flood damage decrease). On the other hand, reduced runoff from cities results in less availability of water for extraction, and thus leads to a slight deterioration of the WEI in those areas.

Conclusions on individual measures for Europe (2)

- The **"N-fixing** Scenario**"** and the "**Optimum Fertilization** Scenario" both reduce Nitrate and Phosphate concentrations in all regions that have significant agriculture, most dramatically in the Elbe/Ems region (68% and 26%), France/Atlantic (61% and 25%), Denmark/northern Germany (61% and 45%), the Rhine/Meuse/Scheldt (63% and 39%), and GB (75% and 26%).

- '**Re-Meandering** Scenario", which increases the meandering of the current rivers by increasing the length and storage capacity of the river bed – reduces flood peaks in all European regions, and is estimated to significantly reduce the flood damage potential especially in the Elbe/Ems (11%), Danube (10%), Odra/Vistula (9.8%), Po (6.8%), Rhine/Meuse/Scheldt (5.3%) and France/Atlantic regions (5.8%). At the same time, environmental flow conditions improve in some areas, for example in GB (0.1%) and Ireland (0.3%)

- **Improved crop practices** (reversed/reduced organic matter decline and increased mulching and tillage), results in reductions of potential flood damages in all EU regions, including areas with high absolute flood damages in regions such as the Odra/Vistula (6.2% reduction), the Rhine/Meuse (7.8% reduction), Great Britain (15.9% reduction) and the Danube (8.2% reduction).

- Installing **desalination plants** along the coastlines would improve the Water Exploitation Index in several European macro-regions, and decrease the number of days during which Environmental Flow cannot be respected, especially in Spain and Italy.