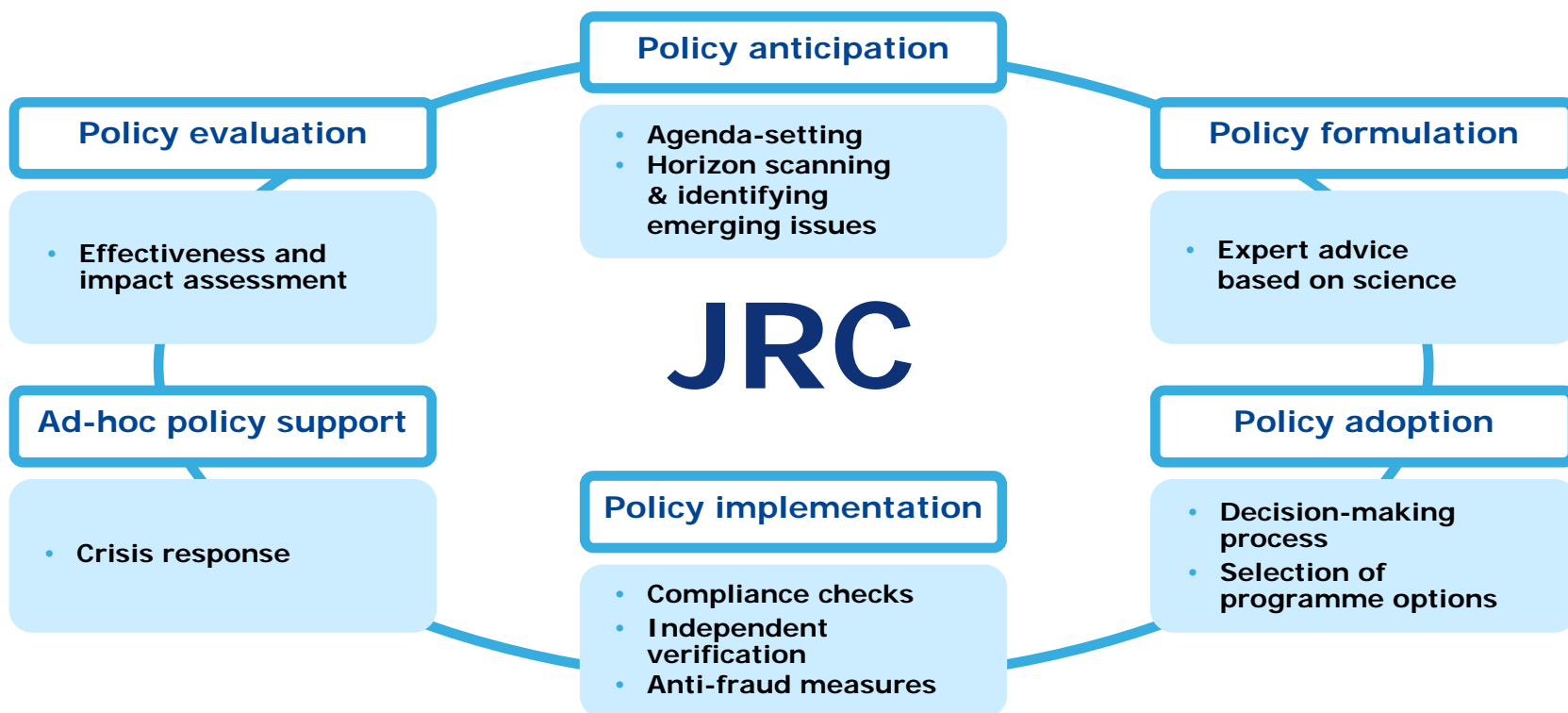




# A JRC project contributing to the assessment of the Water–Agriculture–Energy– Ecosystems Nexus

Giovanni Bidoglio  
Joint Research Centre  
European Commission

# Why the JRC? A networked organisation providing the European Commission's in-house scientific input to EU policy making





# 2012 Blueprint: The water milestone in the 2020 Roadmap to a Resource Efficient Europe



Efficient  
water use

Integration

**Water efficiency targets** should be developed by the river basin authorities ... **address all the main water using sectors** (industry, energy production, agriculture, households, etc.) and be closely linked to the objective of good status

Ecological  
Status

Knowledge base



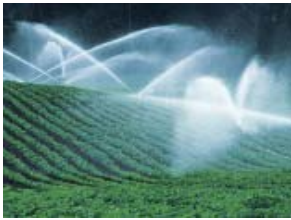
# Water in Agenda for Change: New perspectives in water and EU development policies

- Regional development: ...The EU should support regional and continental integration through policies in areas such as...cross border cooperation on **water, energy and security**
- Agriculture and Energy: ... The EU should tackle inequalities ...to give poor people better access to **land, food, water and energy without harming the environment**



# JRC contribution to build the evidence base of the Water-Agriculture-Energy-Ecosystems Nexus

## Agriculture



## Energy



## Environment



## Industry



## Tourism



## Drinking water

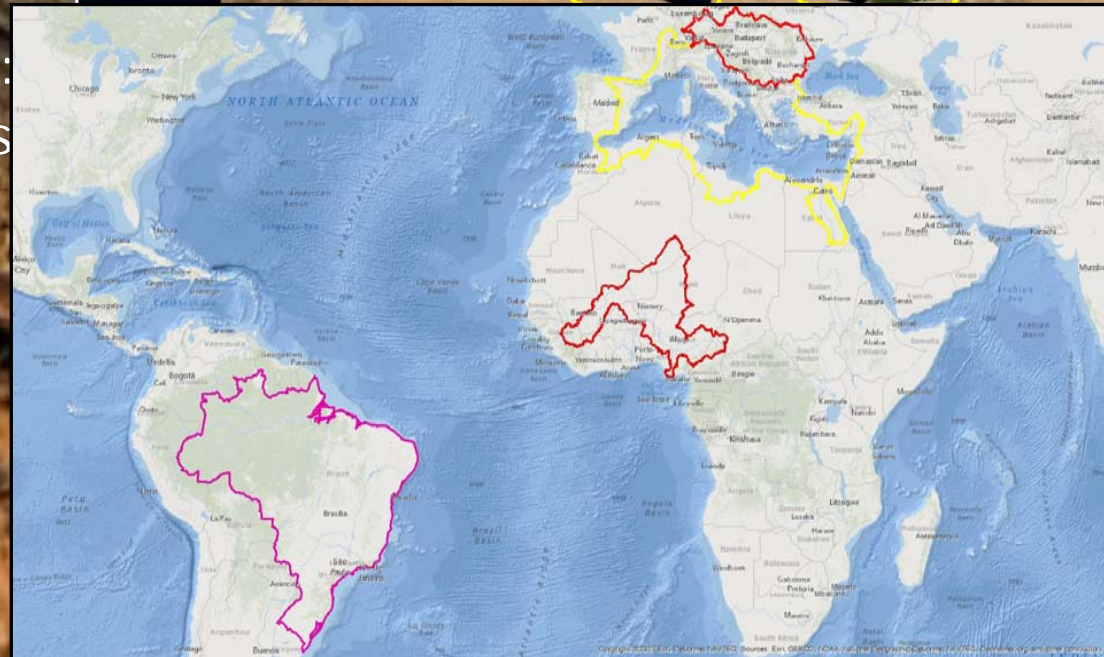


- Evaluate **availability and demand** of water in terms of competing objectives of the different sectors
- Look at the implications for **water resources allocation** and water security
- **Agriculture and energy** as the priority sectors in which water saving and efficiency should be improved in order to avoid scarcity



# Sizing future water gaps

- Deliver **integrated impact assessments** of the water nexus in the face of increasing trends of global population, urbanisation, pollution, over-exploitation, climate change
- Focus on Europe and Africa: **Danube-Niger** river basins and the **Mediterranean region** as pilot areas
- Twinning of experiences in the context of the **Transatlantic** cooperation

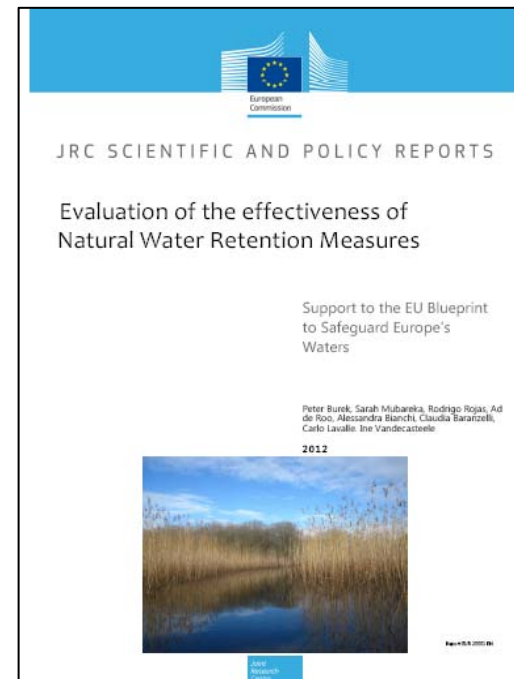
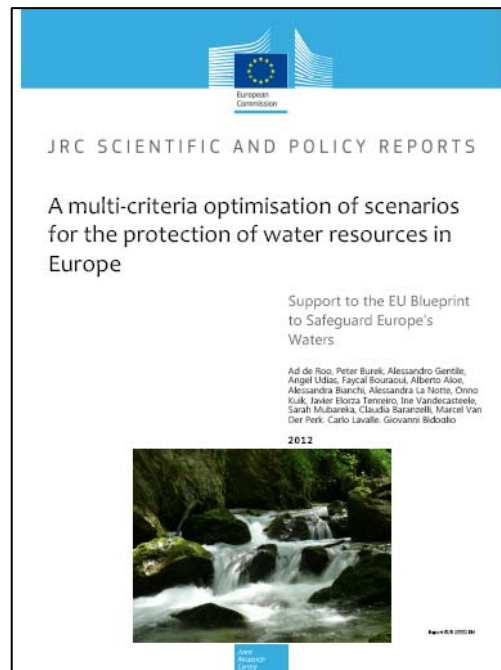




# The Danube test case

*First stakeholder meeting held on 21-22 March 2013*

A pilot study area to support the implementation of the **Danube Strategy** and test actions identified in the 2012 Impact Assessment of the **EU Blueprint to Safeguard Europe's Water Resources**



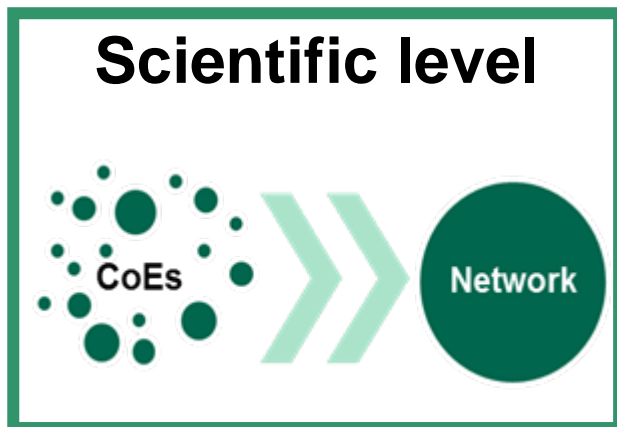


# Going beyond Europe: Regional networks of Centres of Excellence in water sciences

**ACE-Water** in the frame of the AU-NEPAD initiative on Networks of Centres of Excellence in Sciences and Technology

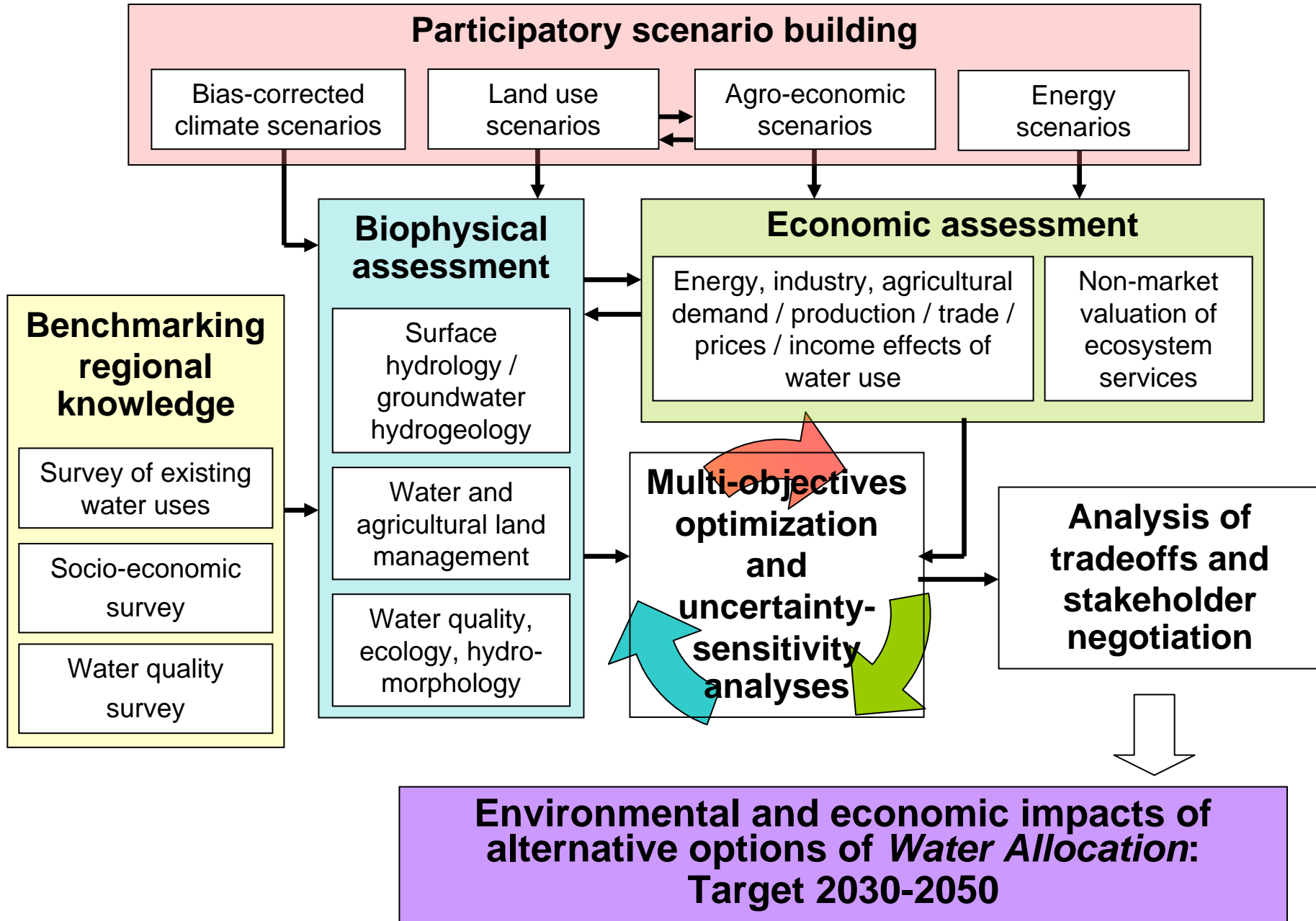


**RALCEA** - Red Latinoamericana de Centros de Conocimiento en gestión de Recursos Hídricos





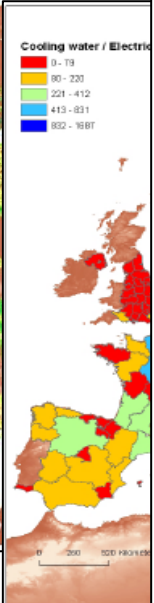
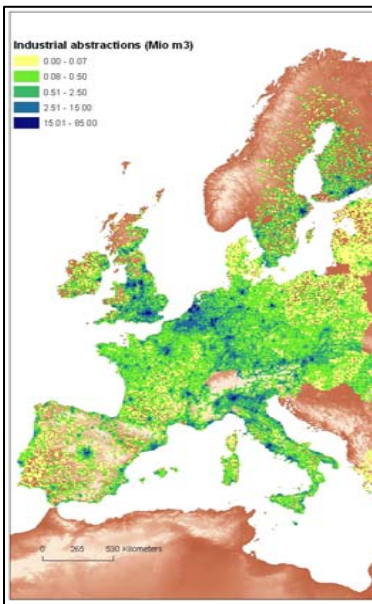
# A proposal of methodological framework



# Water abstraction and consumption baseline

## Water abstraction for industry

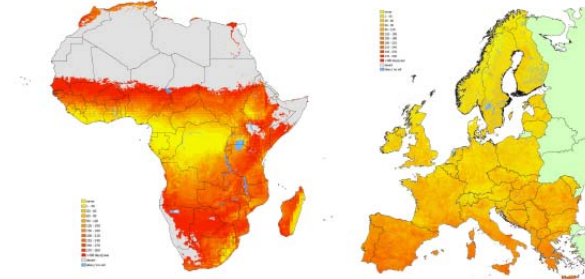
## Water consumption



## Current water resources in Europe and Africa

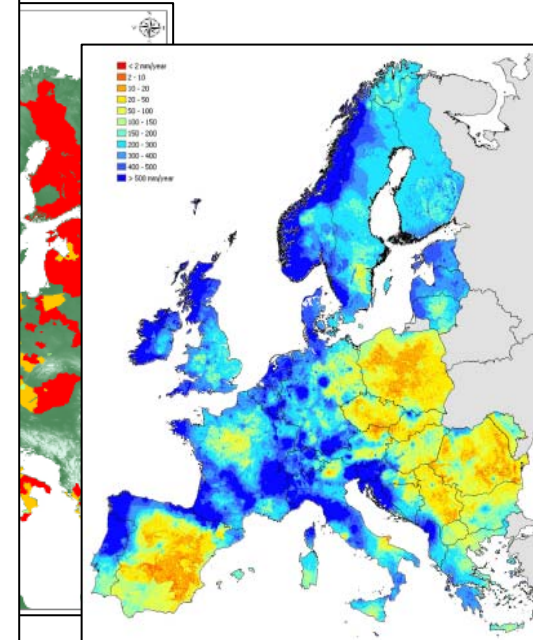
Matching water supply and water demand

Ad de Roo, Faycal Bouraoui, Peter Burek, Berny Bisselink, Ine Vandecasteele, Sarah Mubareka, Peter Salamon, Marco Pastori, Mauricio Zambrano, Vera Thiemiig, Alessandra Bianchi, Carlo Lavalle

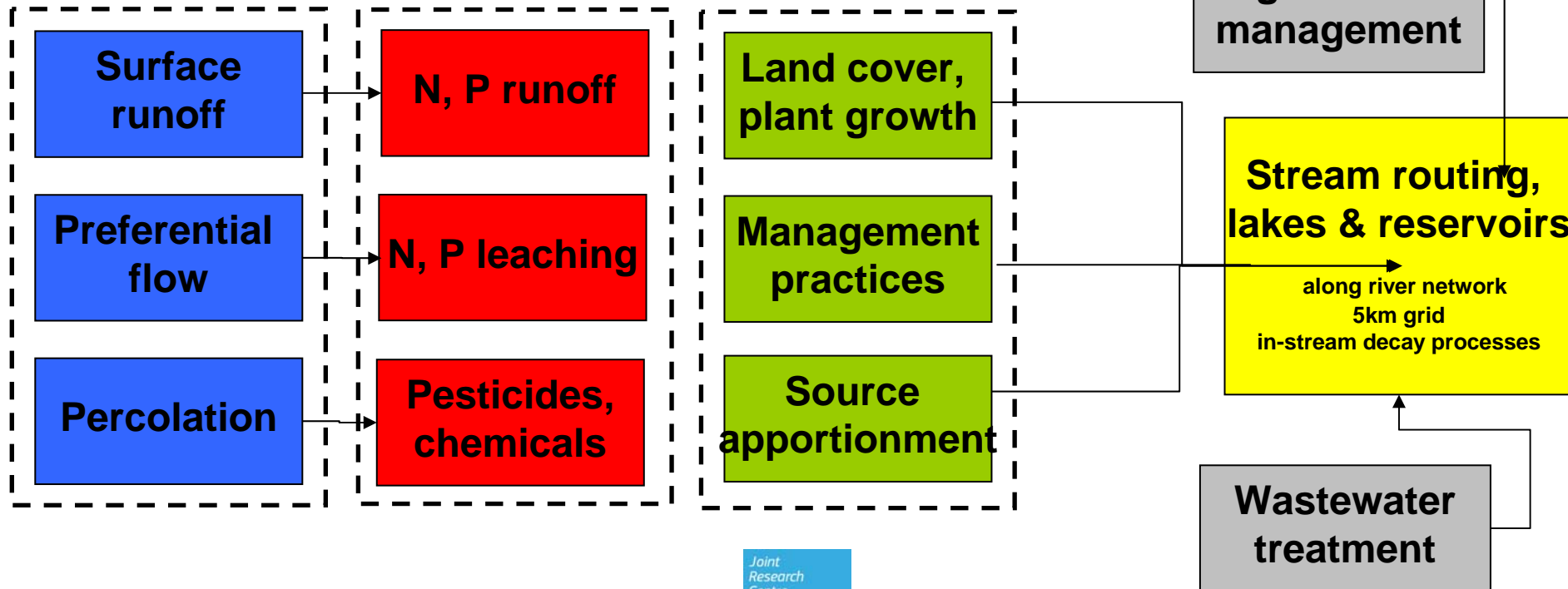


or  
n

## Water availability



- A suite of biophysical models integrating quantity, quality, ecology and hydro-morphology in coordination with tools at national and river basin level





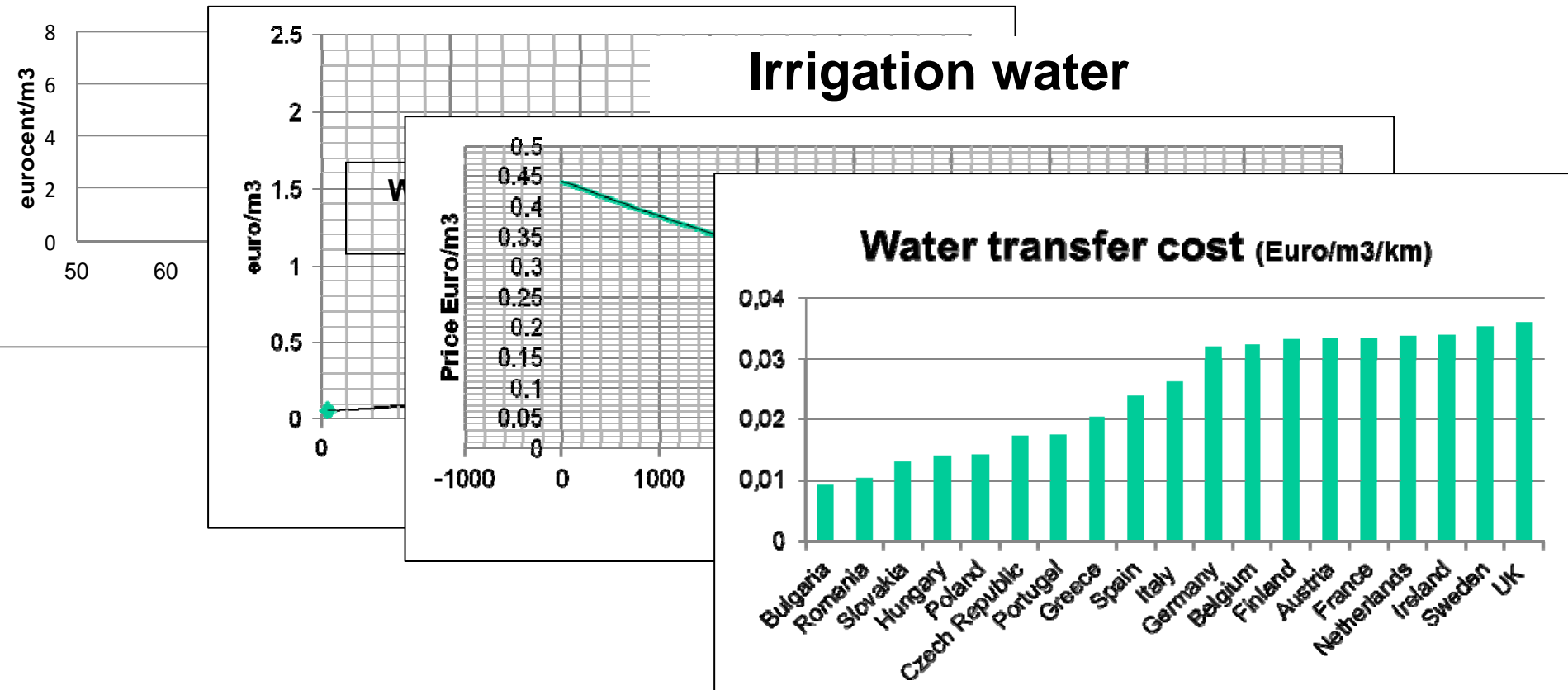
# Cost functions

## Residential water

Residential

Wastewater treatment

Irrigation water



# Measures affecting water availability and demand

## Clean water

- New wastewater treatment plants
- P-free detergents
- Optimum fertiliser and manure application
- N-fixing winter crops
- Change of diet
- Infrastructure for removal of emerging pollutants

## Water efficiency in agriculture

- Irrigation management
- Change crop practices
- Convert land to grassland
- Grassed waterways
- Aquifer recharge and water table management

## Water retention measures

- Riparian wetlands along rivers
- Introduce flood retention polders
- Afforestation in mountainous and riparian areas
- Greening urban environments
- Remeandering
- Constructing dams and reservoirs

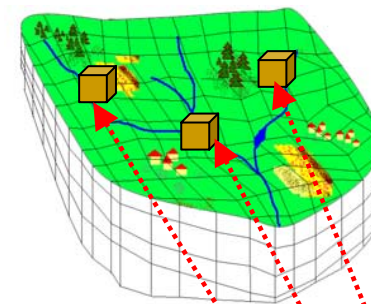
## Water supply and recycling

- Water efficiency in power generation
- Improvement in industrial processes
- Leakage reduction and water-efficient buildings
- Desalination
- Water reuse and recycling
- Large-scale water-transfer infrastructures

## What effects for which measures?

- Optimising targets for efficient water use in terms of impacts of selected **combinations of measures**
- Optimisation including **evaluation of costs** of the measures run for a package of mixed scenarios

- **A** - Afforestation
- **CP** -Crop practices
- **IE** - Irrigation efficiency
- **UG** - Urban greening (25%)
- **WSH** - Water saving in households
- **LR** - Leakage reduction (50%)



*Optimal  
tradeoff*

32%

57%

93%



## A collaborative challenge

- Building on existing experience in the river basins
- Twinning with national projects and international initiatives such as the UNECE Task Force
- Discuss and agree on approaches fitting river basin conditions
- Make available the best possible scenario-based assessments and scientific tools to decision makers



**Thank you for your attention**  
**[giovanni.bidoglio@jrc.ec.europa.eu](mailto:giovanni.bidoglio@jrc.ec.europa.eu)**

