



The Water-Food-Energy Nexus: building the evidence base in the Mediterranean region

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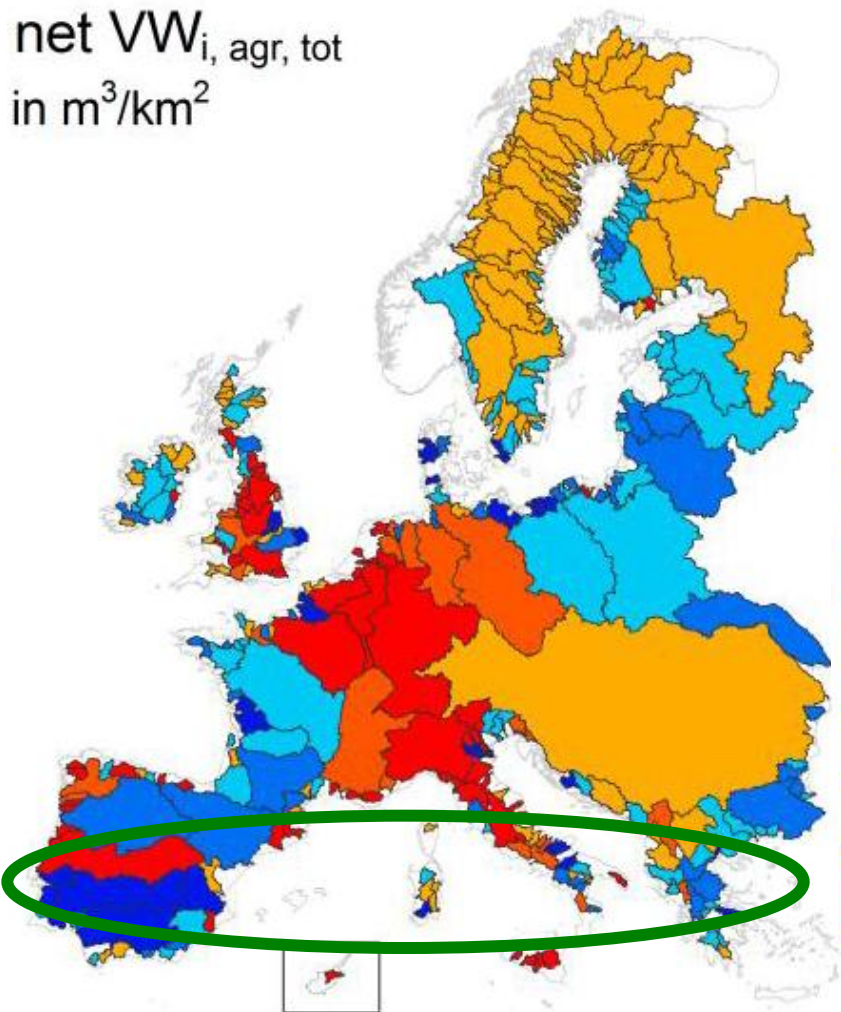
*SWIM-SM Fourth Steering Committee Meeting
Barcelona, 16 December 2014*



The Water Footprint of agricultural production and consumption

net $VW_{i, agr, tot}$
in m^3/km^2

An analysis of the agricultural Water Footprint of consumption (WF_{cons}) and production (WF_{prod}) and the resulting Virtual Water (VW) flow for 365 large river basins in the EU



*Net Virtual Water
export basins*

*Net Virtual Water
import basins*



Why the Water Nexus?

Close the gap between projected water demand and supply

Match availability and demand of water in terms of competing objectives of the different sectors

- Look at the implications of water resources allocation and **water security**
- Move from concepts to implementation by proving that all economic sectors in the Nexus can profit from a **change in the planning process**

Agriculture



Energy



Environment



Industry



Tourism



Drinking water





Twinning research and management experience on the Water-Agriculture-Energy-Ecosystem Nexus across transboundary river basins

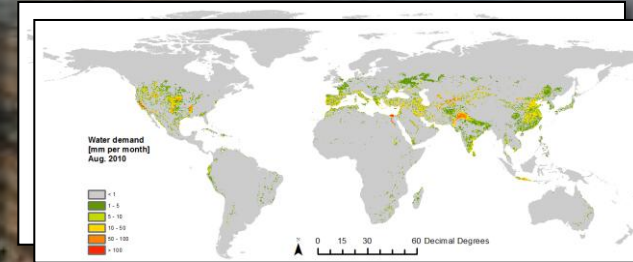
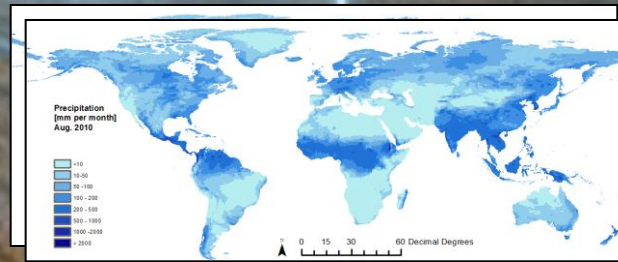
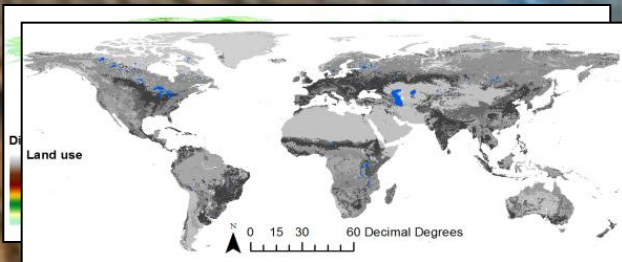


Understanding baseline conditions

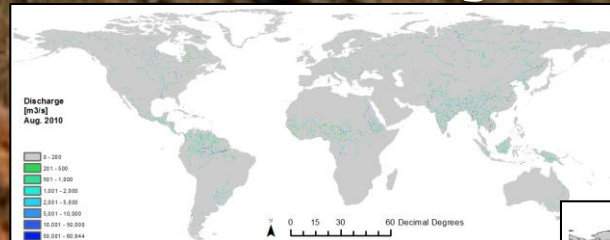
Global spatial data:
river network,
land cover,
elevation etc.

Daily data:
precipitation,
temperature,
wind speed etc.

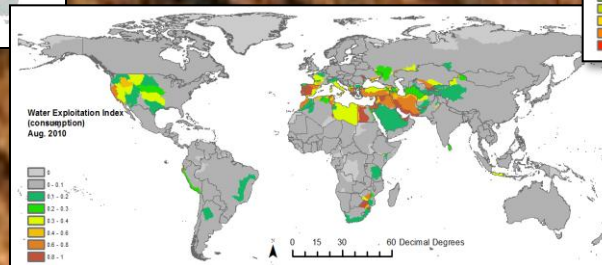
Water demand:
from industry,
livestock,
irrigation, energy, etc.



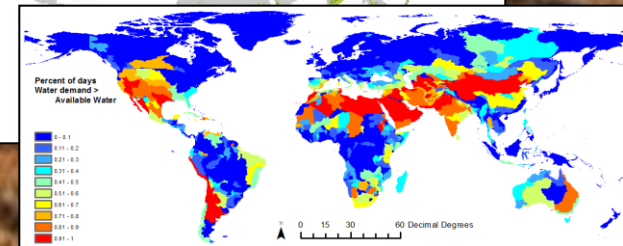
River discharges



Water Exploitation Index



Water availability

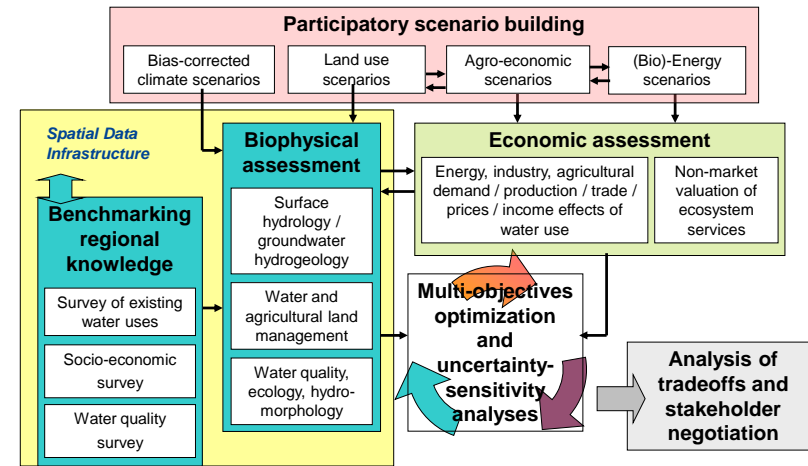


**Percentage of days
water demand >
water availability**

From baselines to solutions

- An **hydro-economic assessment** of impacts of **water use scenarios**

- for current and **future climate**
- for current and **modified land use** (e.g. increased irrigation)



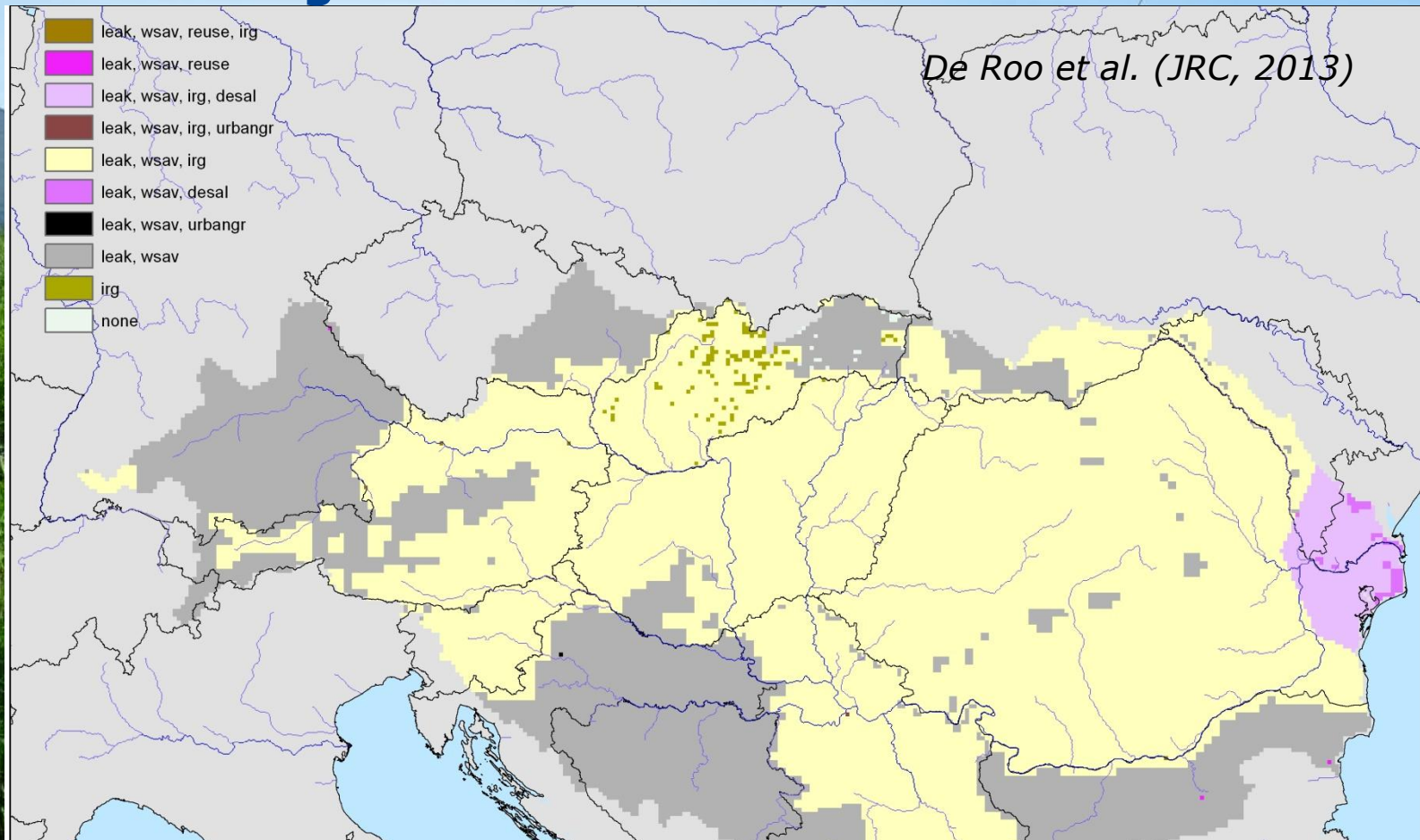
- Addressing **trade-offs** between **water availability, water demand** and **water quality**

- to identify **combination of measures** that would best fulfill the **water needs of various sectors** (agriculture, industry, energy, human consumption)

- Make tools available** to regional stakeholders and beneficiaries and associated training programmes

Testing scenarios for spatial planning of measures

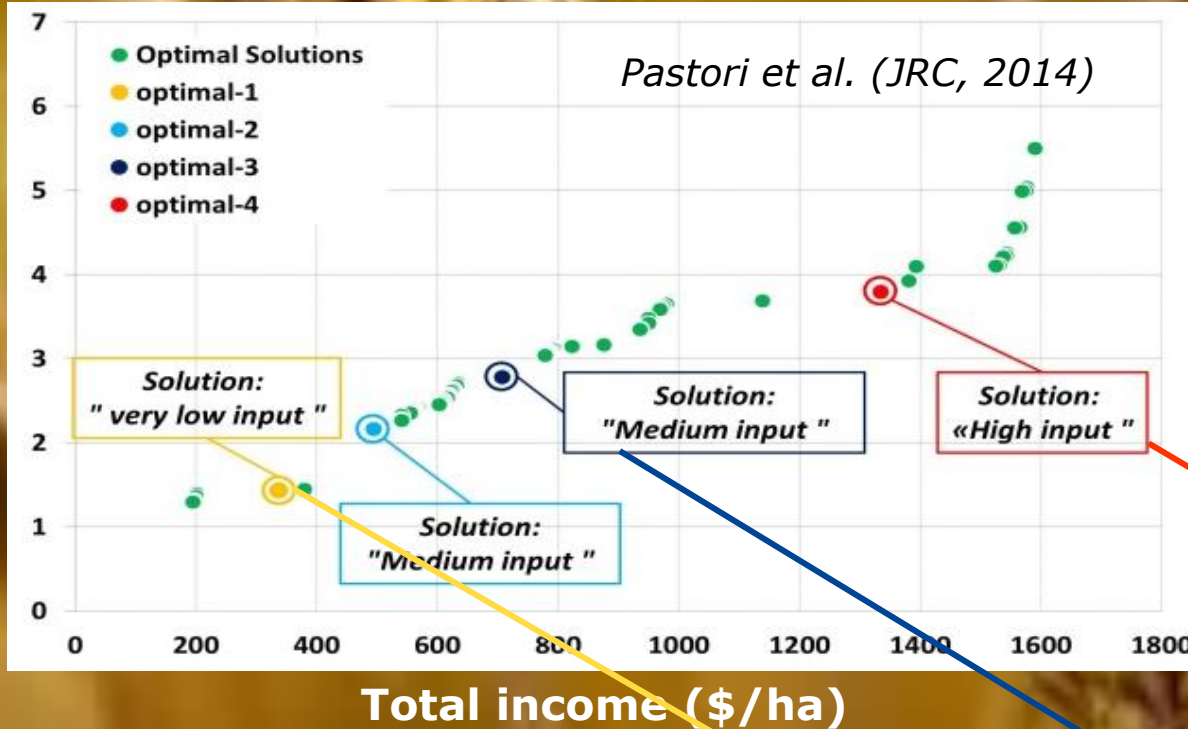
Maximizing water availability and minimizing impacts on ecological flow in the Danube river basin



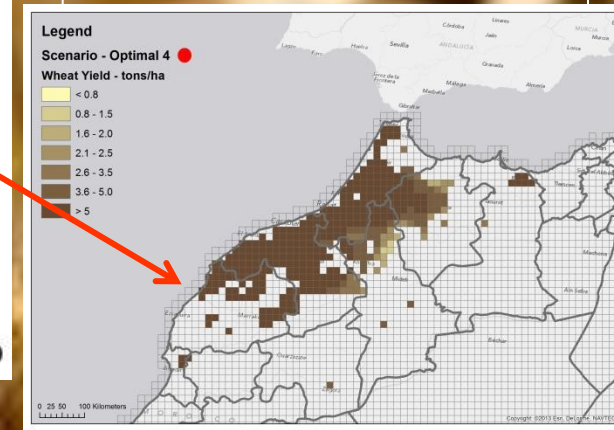
Irrigation water use efficiency - Leakage reduction - Urban Greening in Zagreb and Belgrade - Reuse of water in industry in Bulgaria - Desalination (Black Sea) - Water savings in households

Assessing trade-offs between economic and environmental objectives (nitrate leaching): optimization of irrigation and fertilisation practices

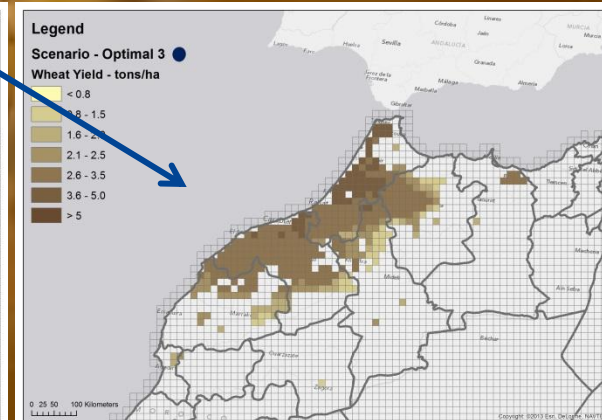
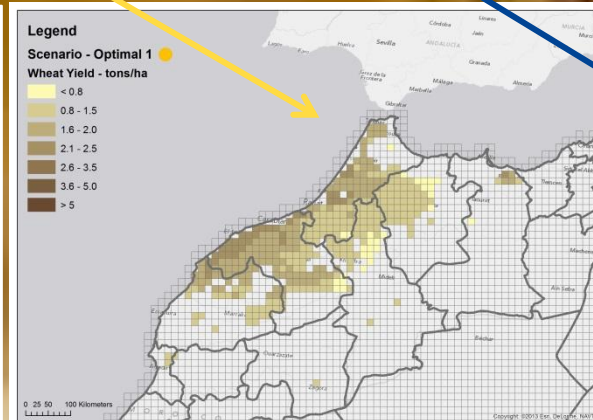
Nitrogen leaching (Kg/ha)



Wheat crop yield in Morocco (tons/ha)



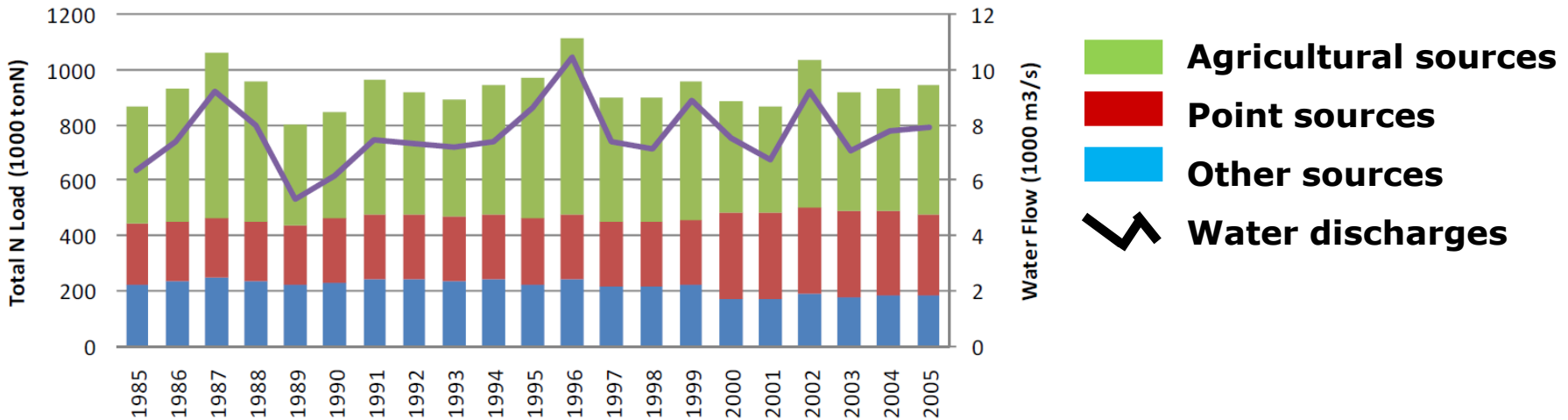
Total Income =
Crop yield * Crop selling price -
Water consumption * Water price -
Fertiliser consumption * Fertiliser price





Integrating inland and coastal waters: what are environmental loads of pollutants originating from land-based sources?

Nitrogen Load - Mediterranean Sea



- Determine **major sectors** of activities contributing to load of pollutants
- Evaluate the **efficiency of implementation** of legislation through a retrospective analysis (1985 – present)
- Elaborate a perspective **scenario analysis** of emission patterns (2020 and beyond)



Workshop “Can implementation of the Water-Food-Energy-Ecosystem Nexus support economic growth in the Mediterranean region?”

12-13 February 2015, Ankara, Turkey

- What are the *economic benefits* for stakeholders and companies to adopt a cross-sectoral perspective (the Water Nexus) for water management in the Mediterranean region?
- Involve participants from different disciplines and viewpoints: water economists, ecologists and agronomists, governmental and regional policy makers, business and water users from the across Mediterranean countries
- Deliver a joint background paper with recommendations for the promotion of a Water Nexus thinking for economic growth in the Mediterranean region

Thank you for your attention

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