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REsilienT water gOvernance Under climate CHange within the WEFE NEXUS

Jucar River Basin Case Study

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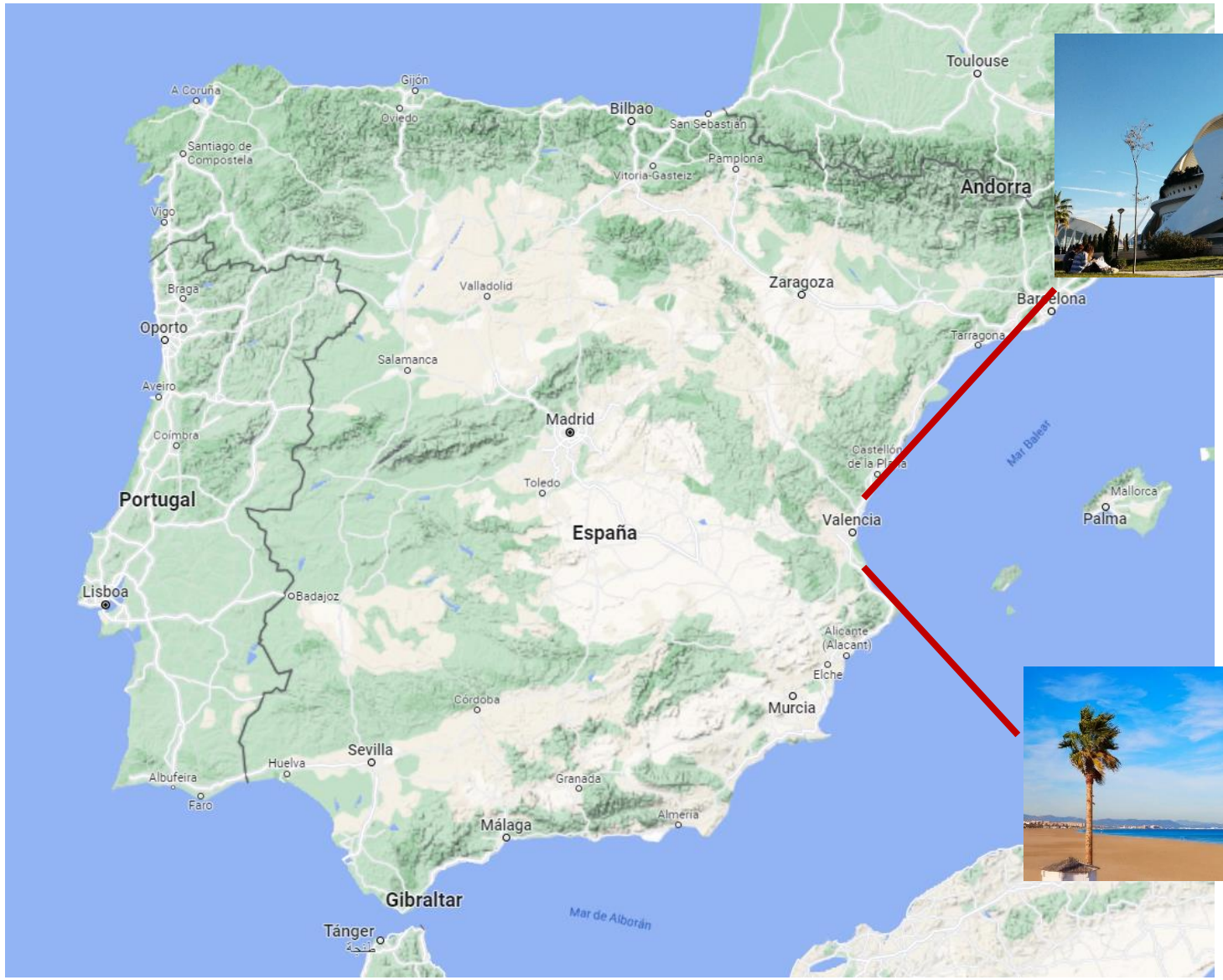
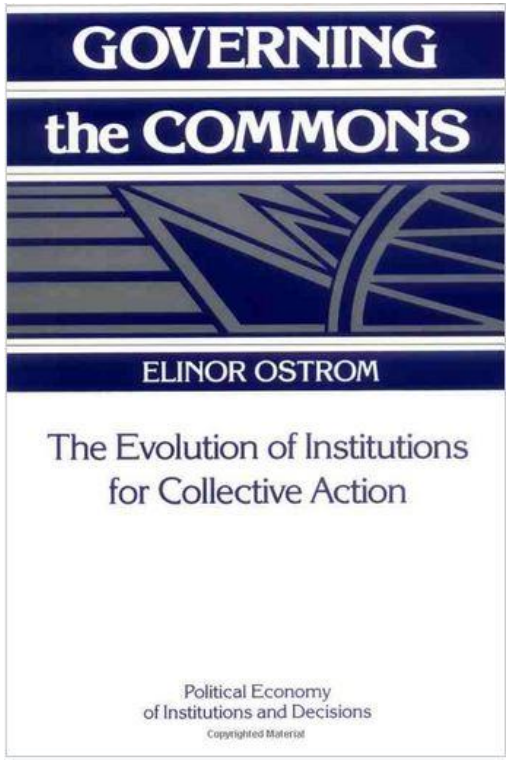
Valencia, Spain

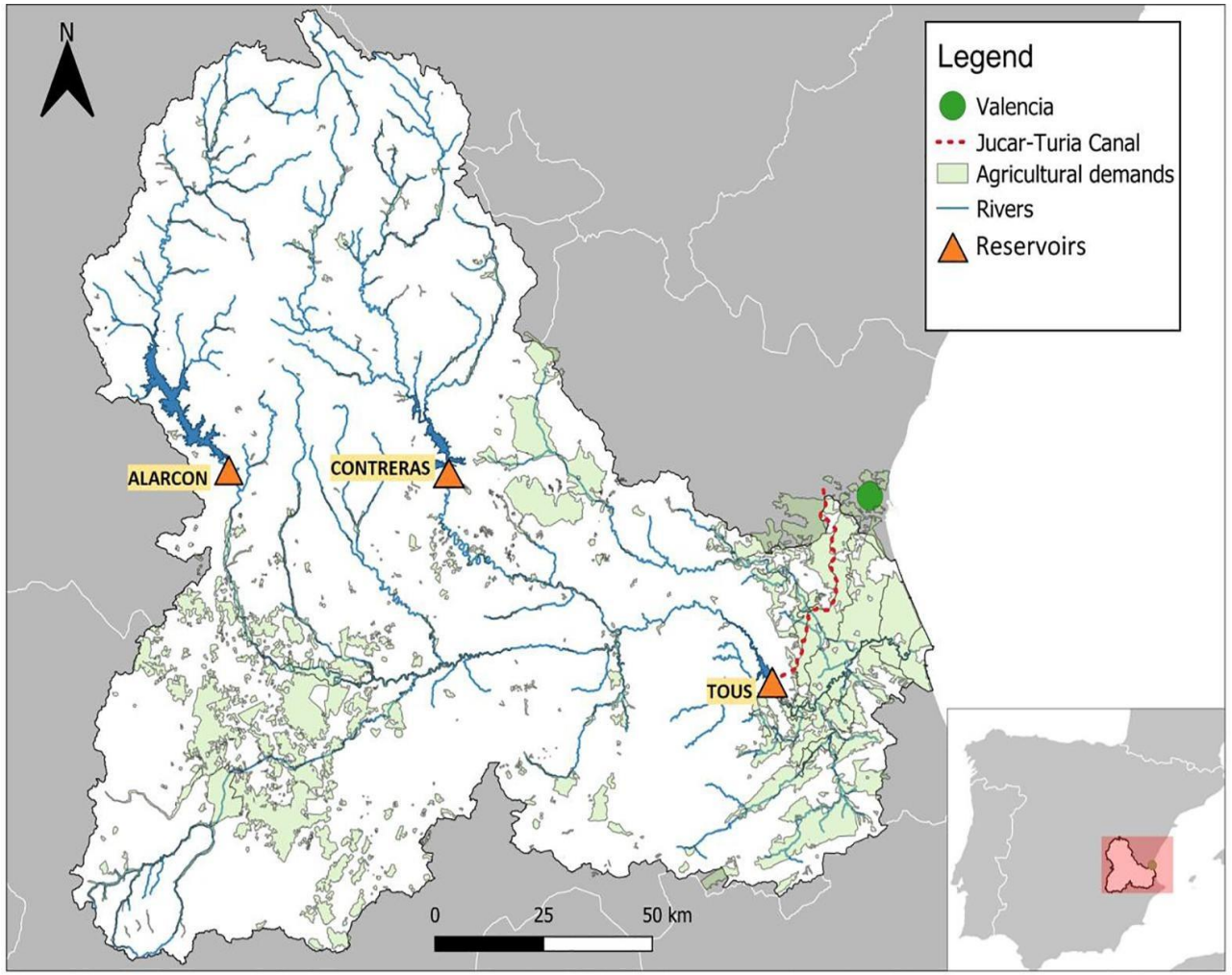


The WATER COURT ("Tribunal de las Aguas")



- Customary court since Middle Ages (10th century or even before… Roman times?)
- Institution for collective action
- Intangible cultural heritage, UNESCO (2009)

Jucar Features



- Water use by sector: agriculture (80%), urban (14%) and industrial (6%).
- Delicate equilibrium between water resources and demands.
- Upper-Lower basin conflicts for water allocation.

Av surf resources	1,605 Mm3/year
Urban demands	190 Mm3/year
Agric Demands	1,403 Mm3/year
Industrial demands	32 Mm3/year
Hydropower capacity	2,373 MW + 1,092 nuclear
Environ flows	104 of 143 water bodies
Reservoir capacity	2,627 Mm3

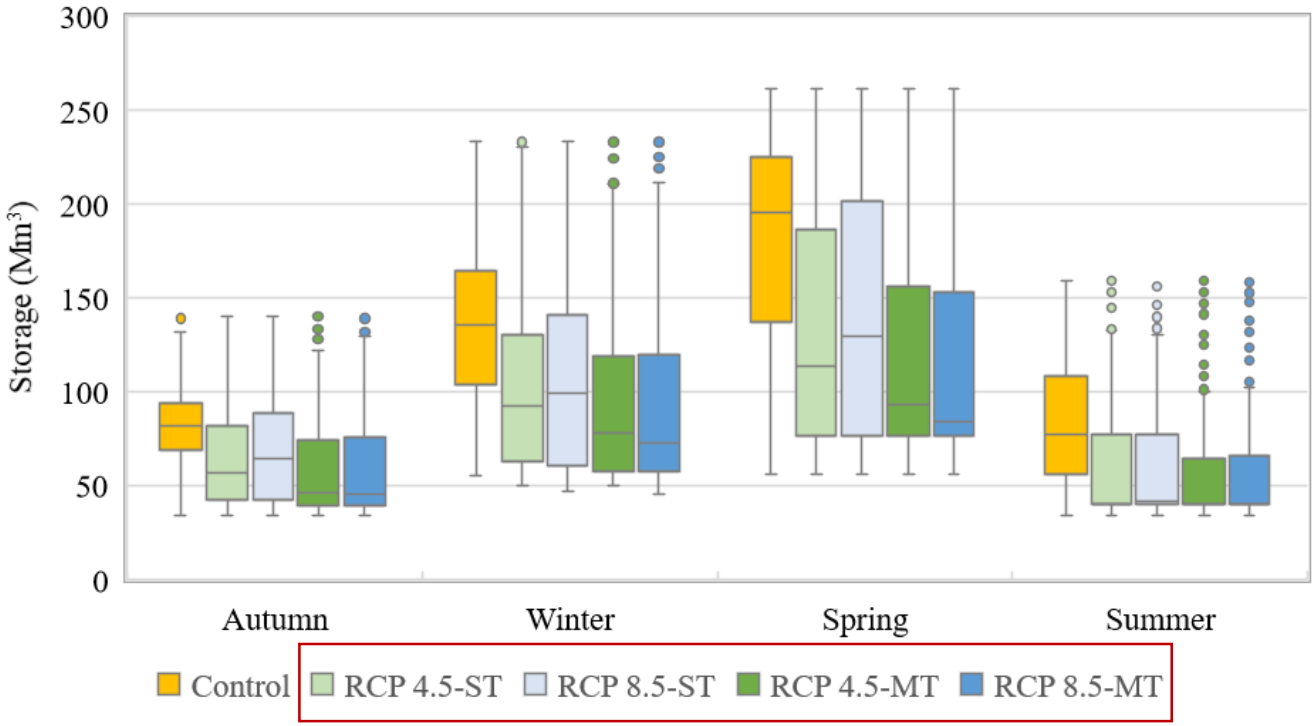
Jucar Features
Agriculture

- Citrus and rice (lower basin), vineyards and almond trees grow in groundwater-overexploited areas (upper basin)
- Agricultural activity highly dependent on market prices
- Climate change will increase the likelihood and intensity of droughts

Jucar Features
Ecosystems

- Iconic Spanish protected wetland l'Albufera (south of Valencia)
- Aquifer in bad qualitative and quantitative status
- Ecological flow regimes based on hydrological and habitat modelling methods for different fish species
- 18 monitoring sites in the Jucar River basin

Jucar Main Challenges
Climate change



Climate change scenarios

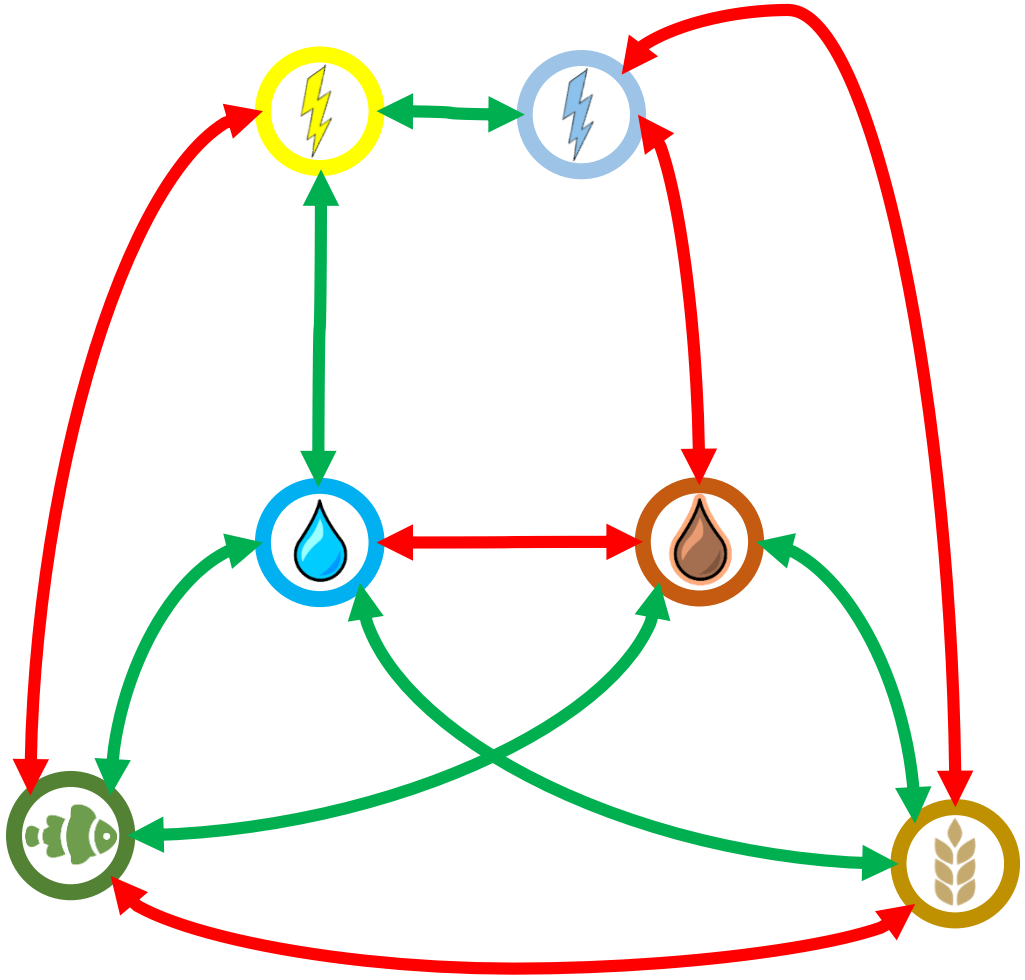
Control period (1970-2000)

Total water storage predicted variation ranges from -27% to -50% depending on the season and climate change scenario

Rubio-Martín, Adrià; Llario, Ferran; Macian-Sorribes, Hector; Pulido-Velazquez, M.; Garcia-Prats, Alberto; Macián Cervera, Vicente Javier. (2023) ***Climate services for water utilities: Lessons learnt from the case of the urban water supply to Valencia, Spain***. Climate Services (29)1 - 13

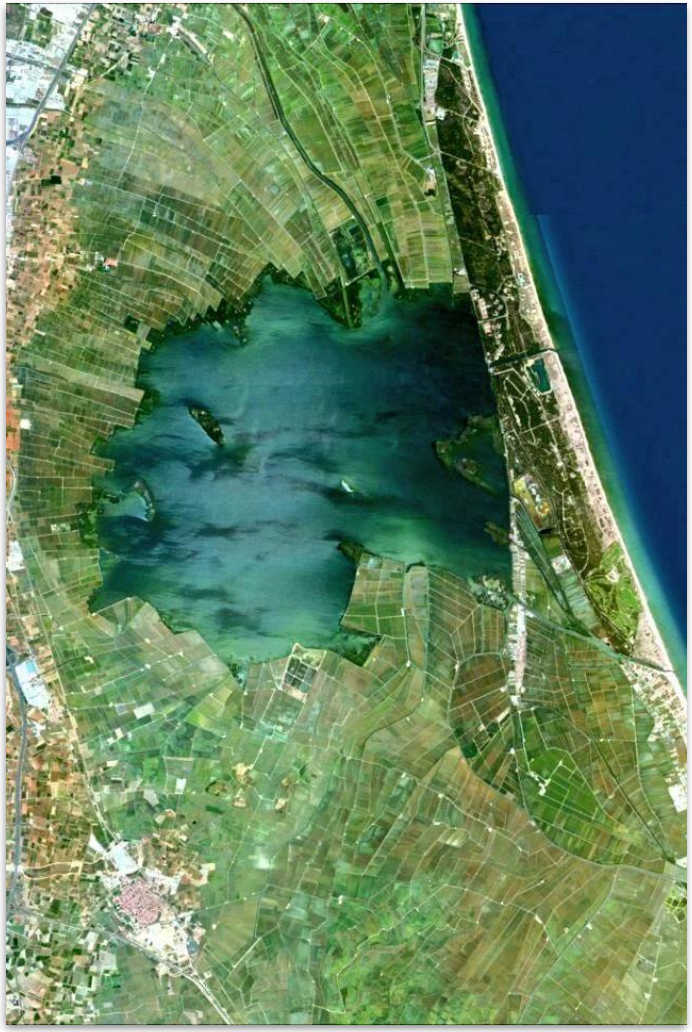
Challenge: Developing robust adaptation measures in such a deep uncertainty context.

Interlinked challenges



Trade-offs and synergies between sectors

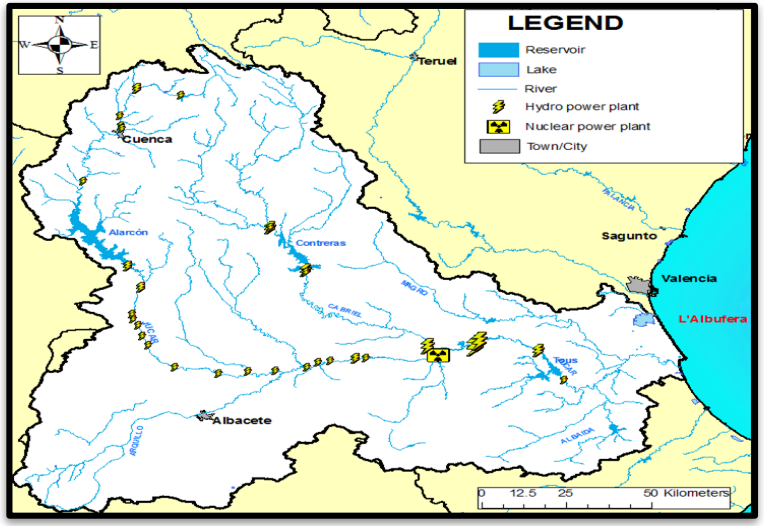
Jucar Main Challenges
Bad ecological status of ecosystems



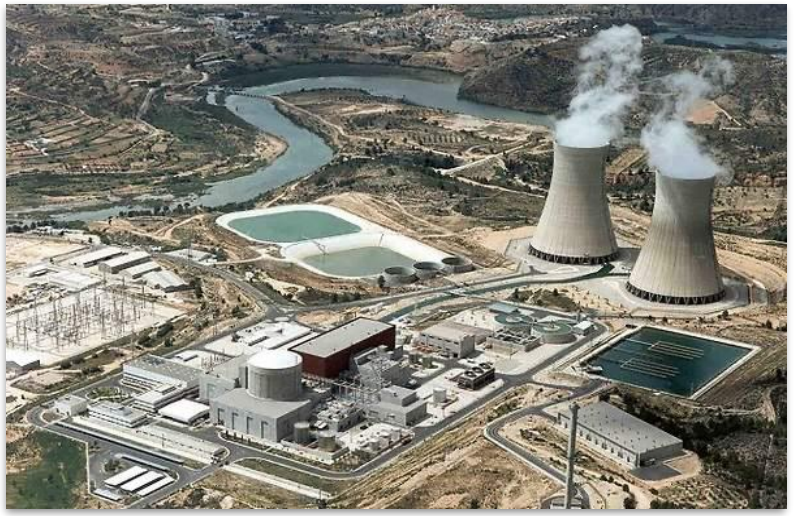
L'ALBUFERA

Jucar Main Challenges

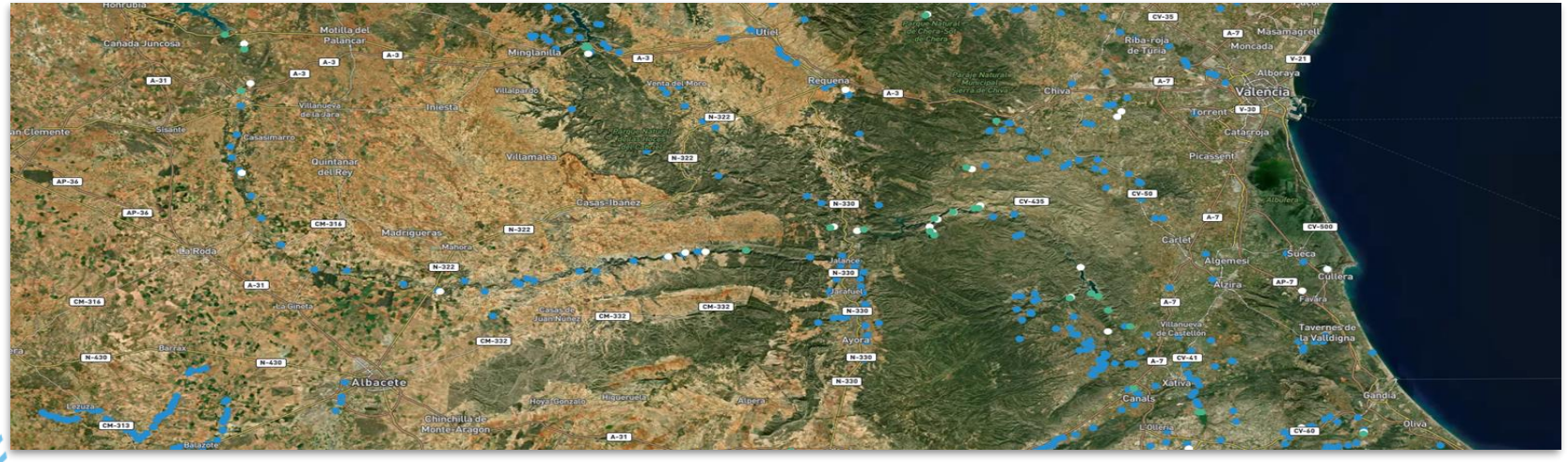
Energy transition towards sustainability



Hydropower Plants



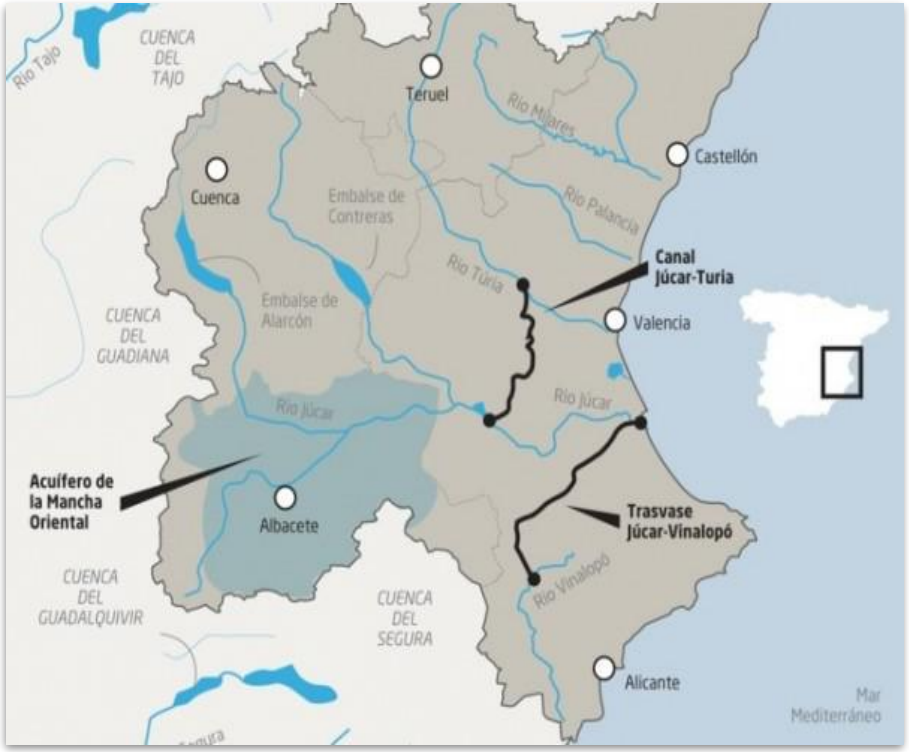
Cofrentes Nuclear Power Plant



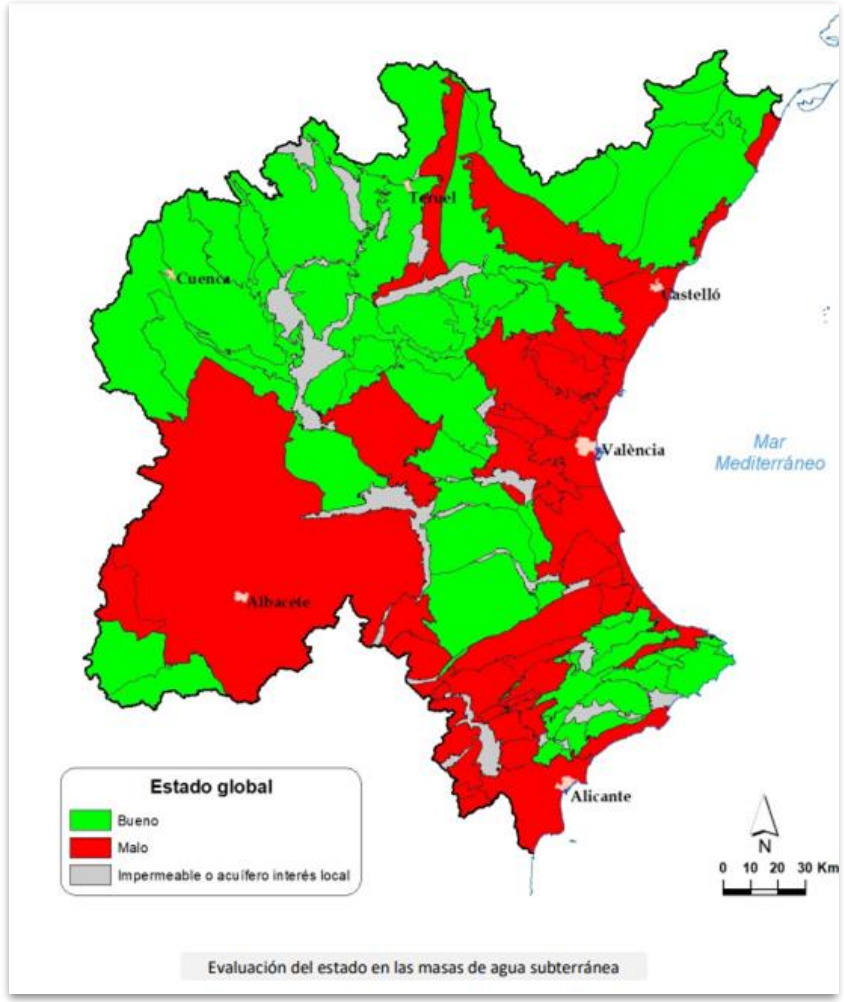
Jucar Dams & Reservoirs (Amber Barrier Atlas)

Hydromorphological & Hydroelectric impacts: 1 Nuclear Power Plant (Closing 1 092 MW in 2030) **+ 9 Hydropower plants** (Largest pumped storage facility in Europe → Cortes-LaMuela)

Jucar Main Challenges
Sustainability of aquifer water management

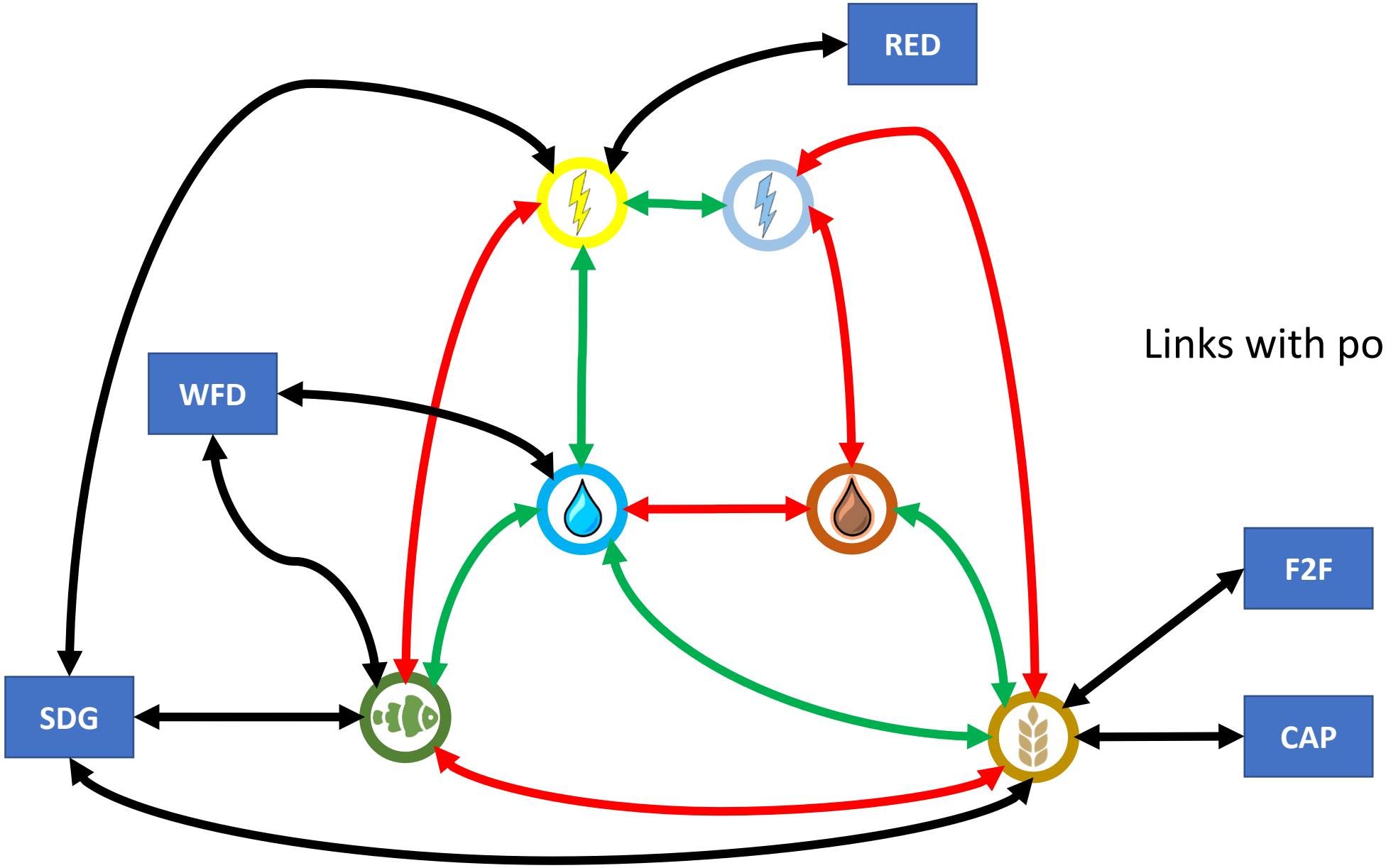


- **Groundwater management & (drip) Irrigation** (Vineyards & almonds challenged by markets)
- **Agricultural Pollution: Nitrates & phytosanitaires**
- **Surface water bodies & Groundwater bodies bad status** (Mancha Oriental + Vinalopó-Alacantí)



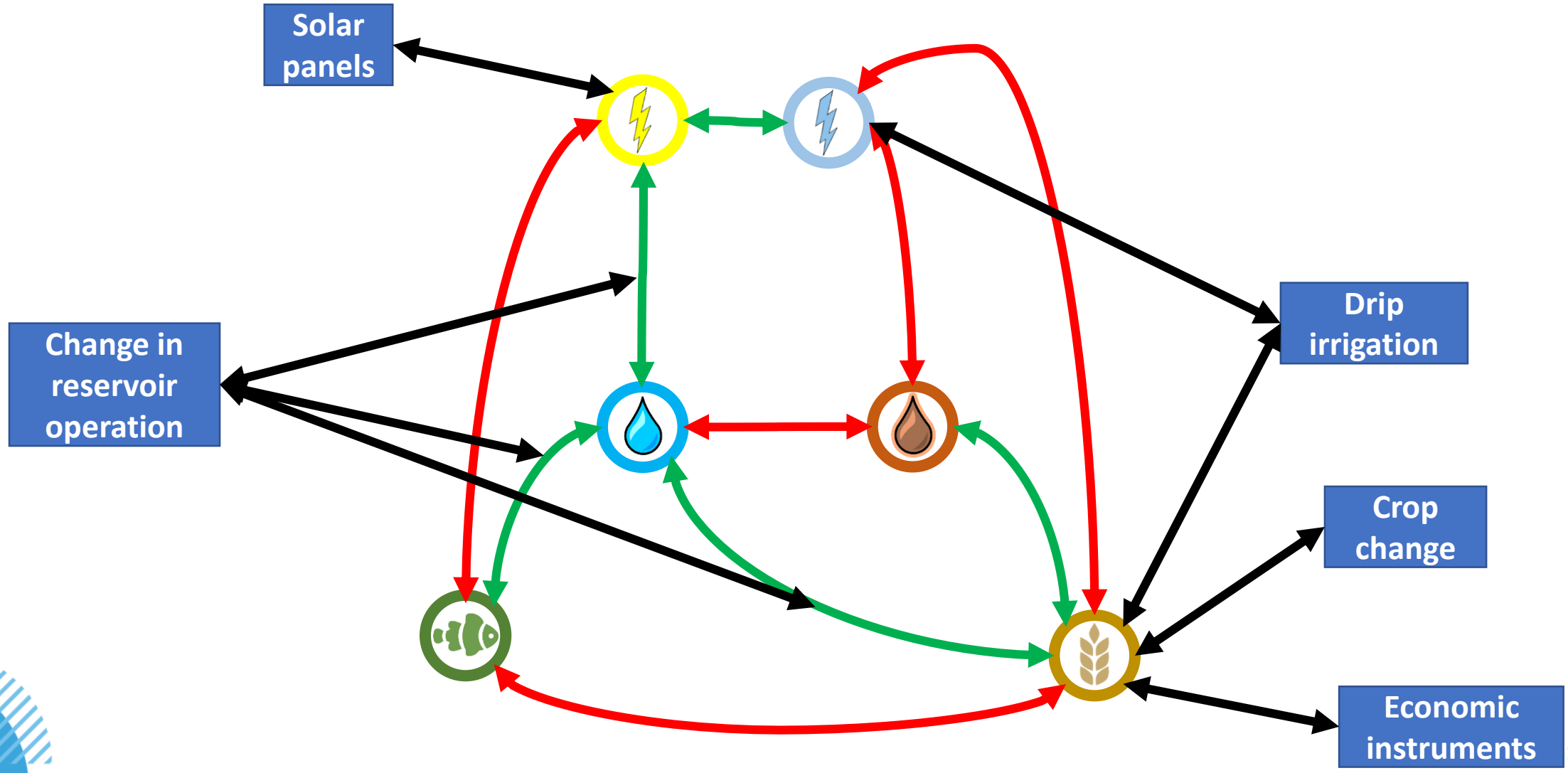
Groundwater bodies status (PHJ)

Links with policies

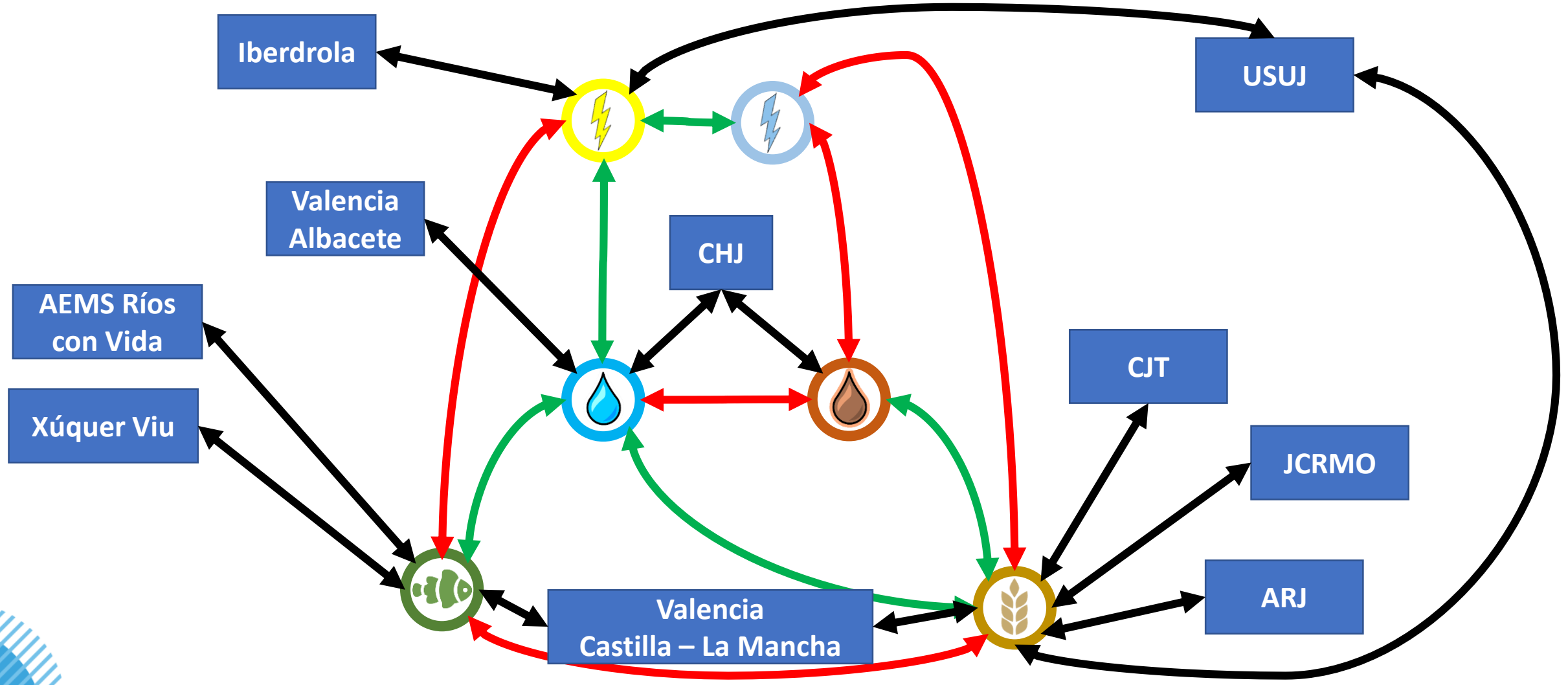


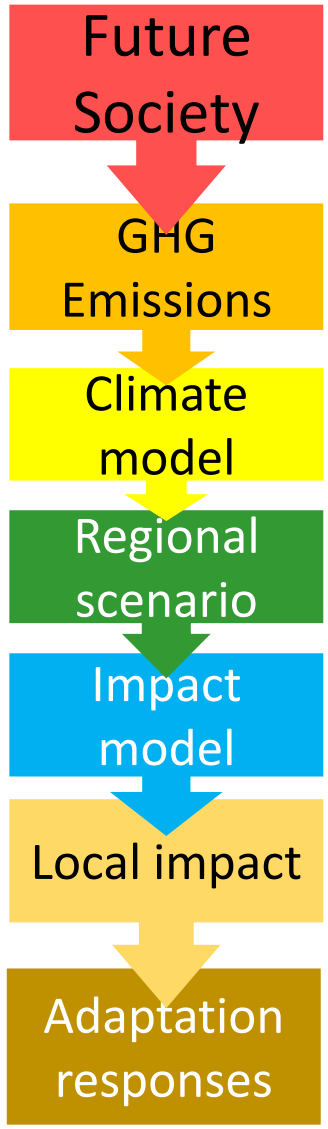
Links with policies

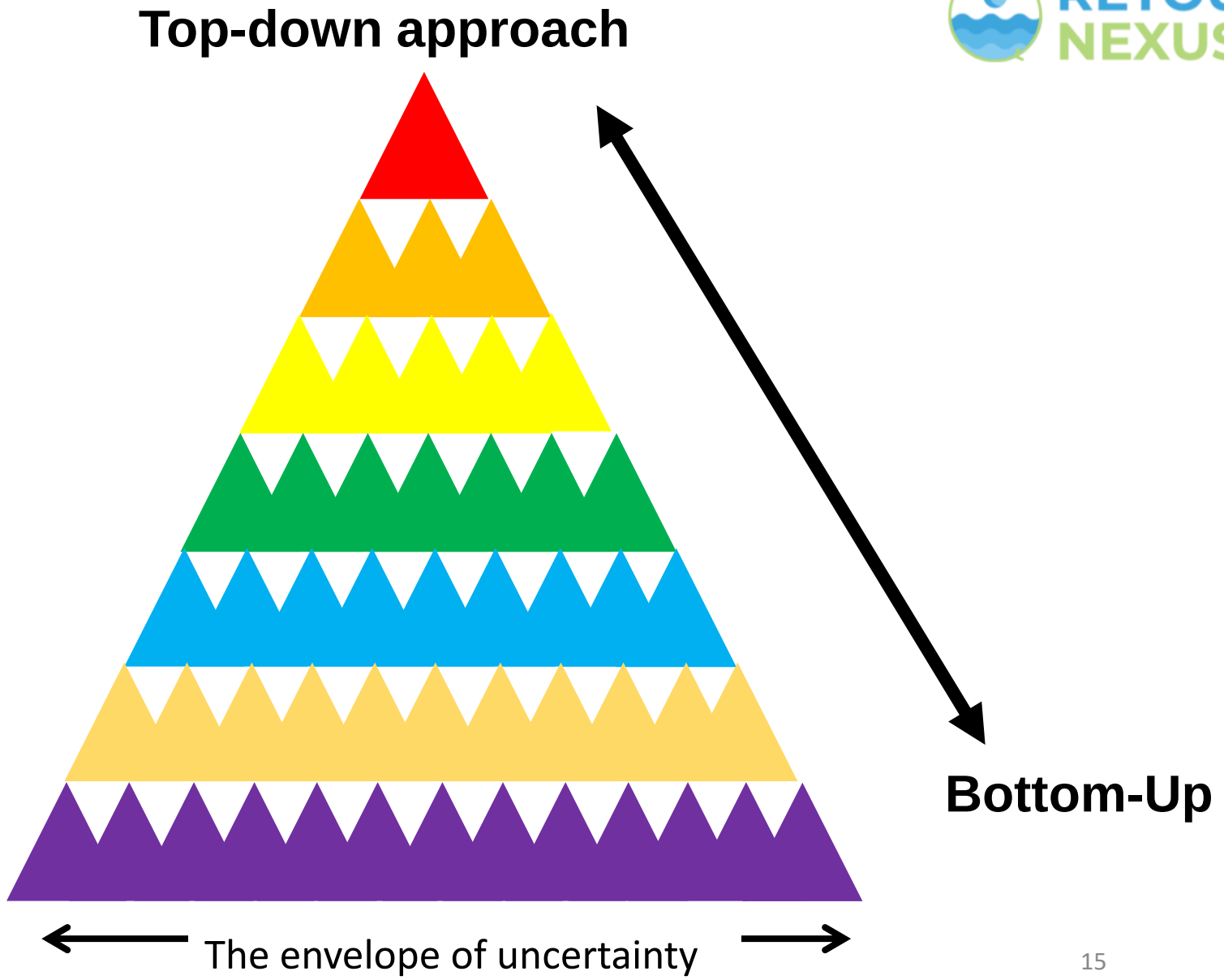
Solutions impacting different sectors



Main Stakeholders



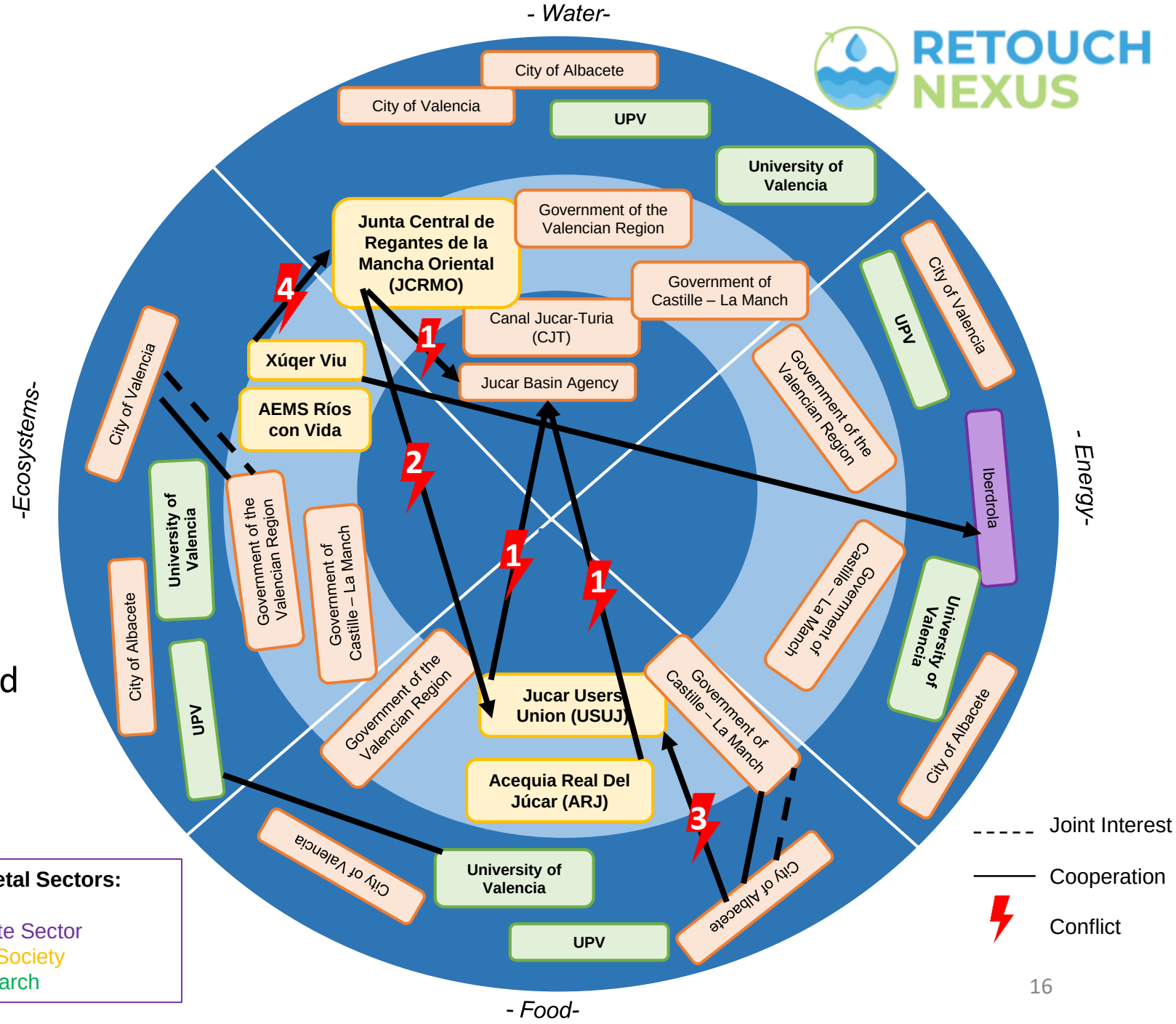




Wilby and Dessai (2010)

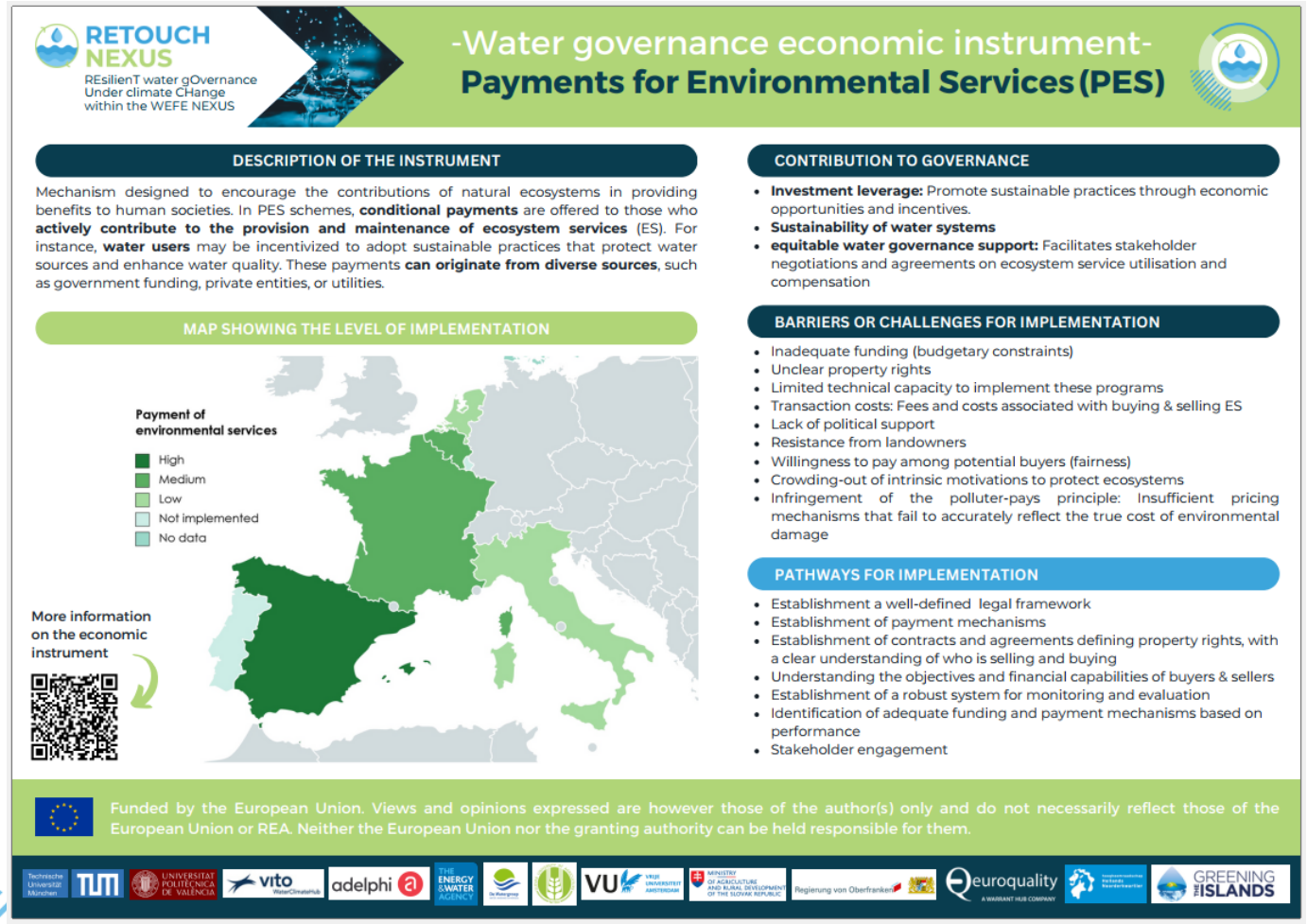
Main Stakeholders

1. Potential conflict during drought periods due to restrictions in water use
2. They would oppose any curtailment of the current surface water share
3. Unpaid financial compensation in the past
4. Its relationship with the CHJ and the hydropower company goes back and forth.



The Jucar River Basin
Workshops and dialogues

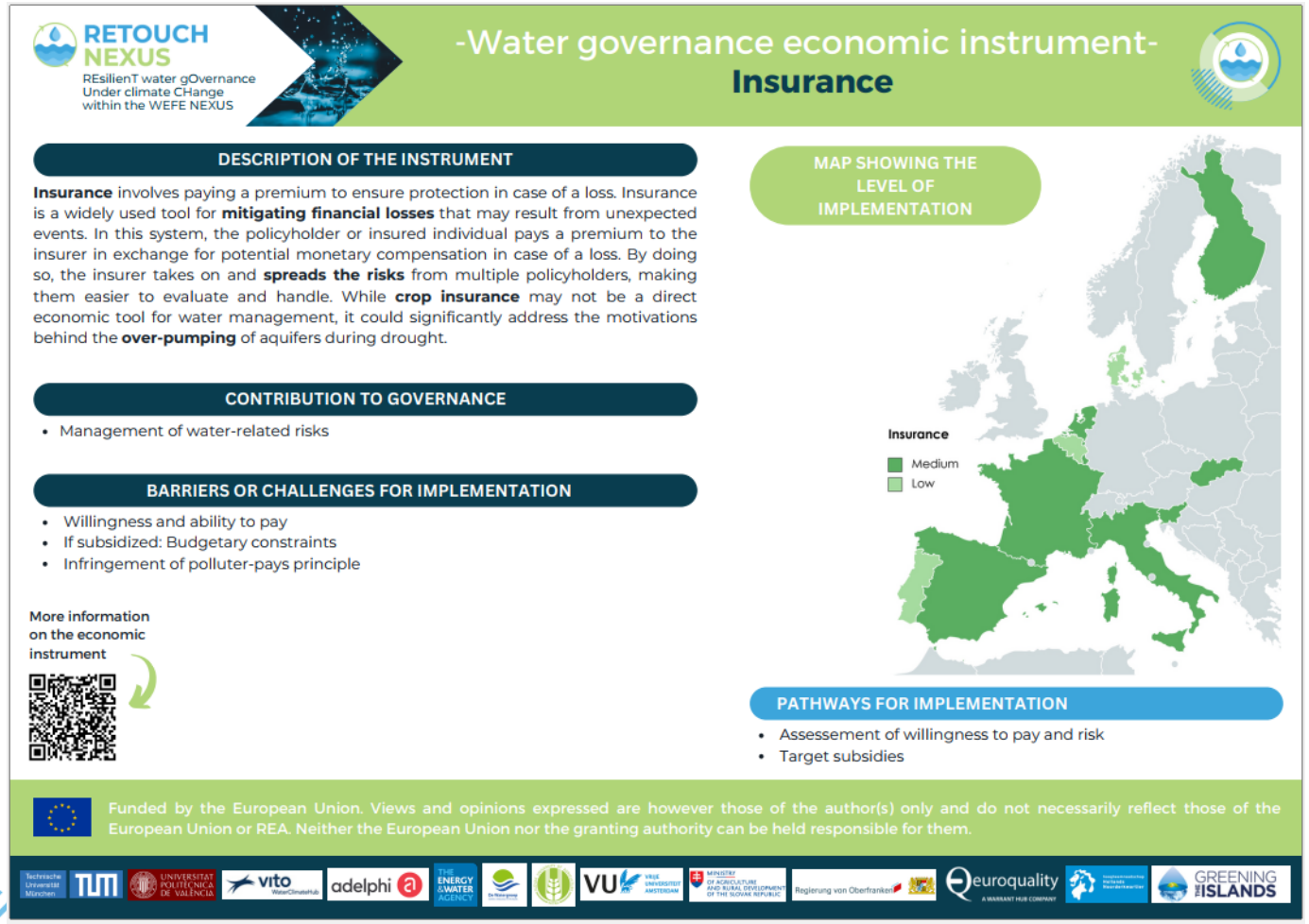
Water Governance Economic Instruments
Factsheets



- Description of the instrument
- Contribution to governance
- Barriers and challenges for implementation
- Pathways for implementation

More information on the economic instrument

Water Governance Economic Instruments
Factsheets



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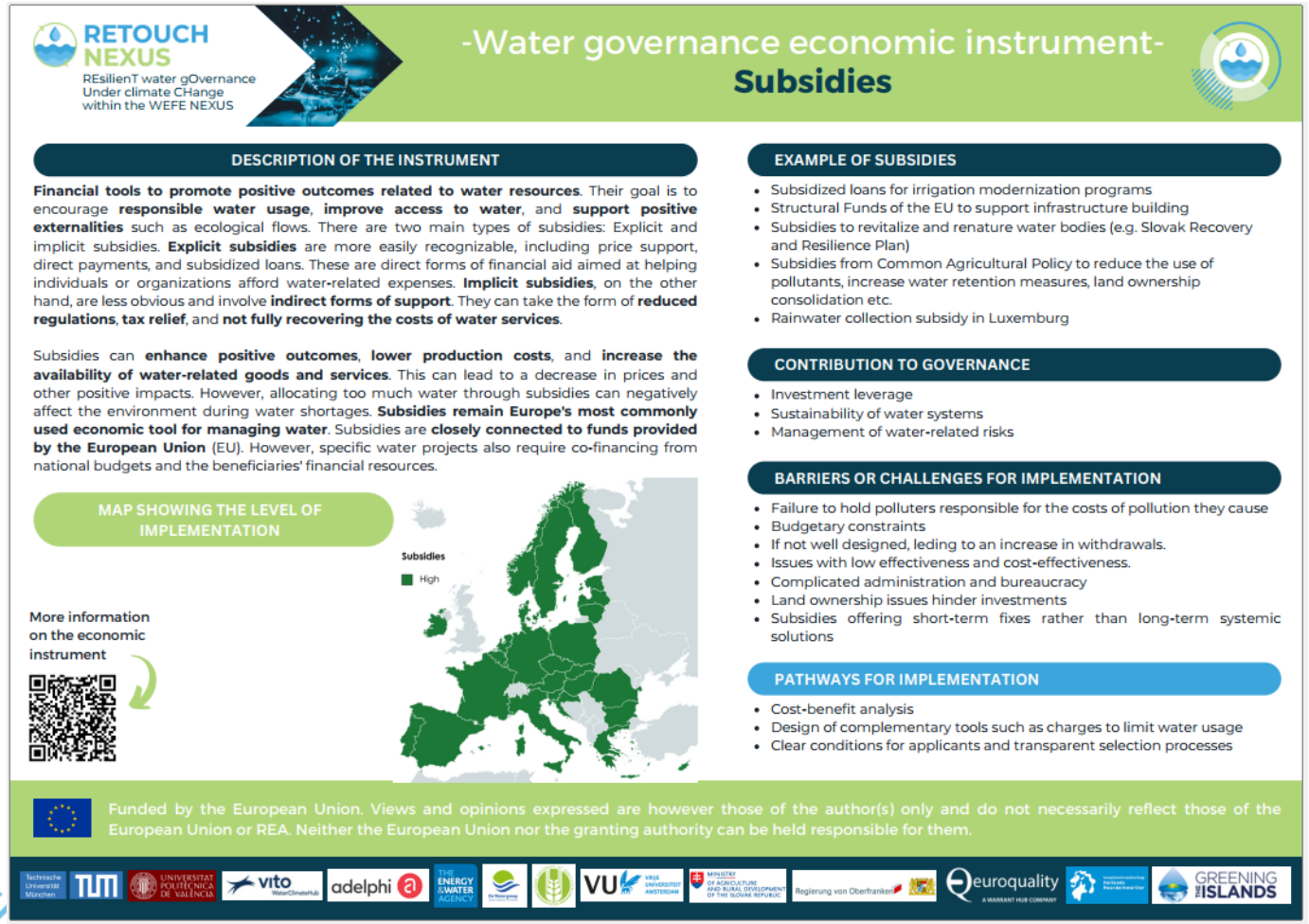
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-Water governance economic instrument-
Subsidies

DESCRIPTION OF THE INSTRUMENT

Financial tools to promote positive outcomes related to water resources. Their goal is to encourage **responsible water usage**, **improve access to water**, and **support positive externalities** such as ecological flows. There are two main types of subsidies: Explicit and implicit subsidies. **Explicit subsidies** are more easily recognizable, including price support, direct payments, and subsidized loans. These are direct forms of financial aid aimed at helping individuals or organizations afford water-related expenses. **Implicit subsidies**, on the other hand, are less obvious and involve **indirect forms of support**. They can take the form of **reduced regulations**, **tax relief**, and **not fully recovering the costs of water services**.

Subsidies can **enhance positive outcomes**, **lower production costs**, and **increase the availability of water-related goods and services**. This can lead to a decrease in prices and other positive impacts. However, allocating too much water through subsidies can negatively affect the environment during water shortages. **Subsidies remain Europe's most commonly used economic tool for managing water**. Subsidies are **closely connected to funds provided by the European Union** (EU). However, specific water projects also require co-financing from national budgets and the beneficiaries' financial resources.

MAP SHOWING THE LEVEL OF IMPLEMENTATION

Subsidies
High

More information on the economic instrument

EXAMPLE OF SUBSIDIES

- Subsidized loans for irrigation modernization programs
- Structural Funds of the EU to support infrastructure building
- Subsidies to revitalize and renature water bodies (e.g. Slovak Recovery and Resilience Plan)
- Subsidies from Common Agricultural Policy to reduce the use of pollutants, increase water retention measures, land ownership consolidation etc.
- Rainwater collection subsidy in Luxemburg

CONTRIBUTION TO GOVERNANCE

- Investment leverage
- Sustainability of water systems
- Management of water-related risks

BARRIERS OR CHALLENGES FOR IMPLEMENTATION

- Failure to hold polluters responsible for the costs of pollution they cause
- Budgetary constraints
- If not well designed, leding to an increase in withdrawals.
- Issues with low effectiveness and cost-effectiveness.
- Complicated administration and bureaucracy
- Land ownership issues hinder investments
- Subsidies offering short-term fixes rather than long-term systemic solutions

PATHWAYS FOR IMPLEMENTATION

- Cost-benefit analysis
- Design of complementary tools such as charges to limit water usage
- Clear conditions for applicants and transparent selection processes

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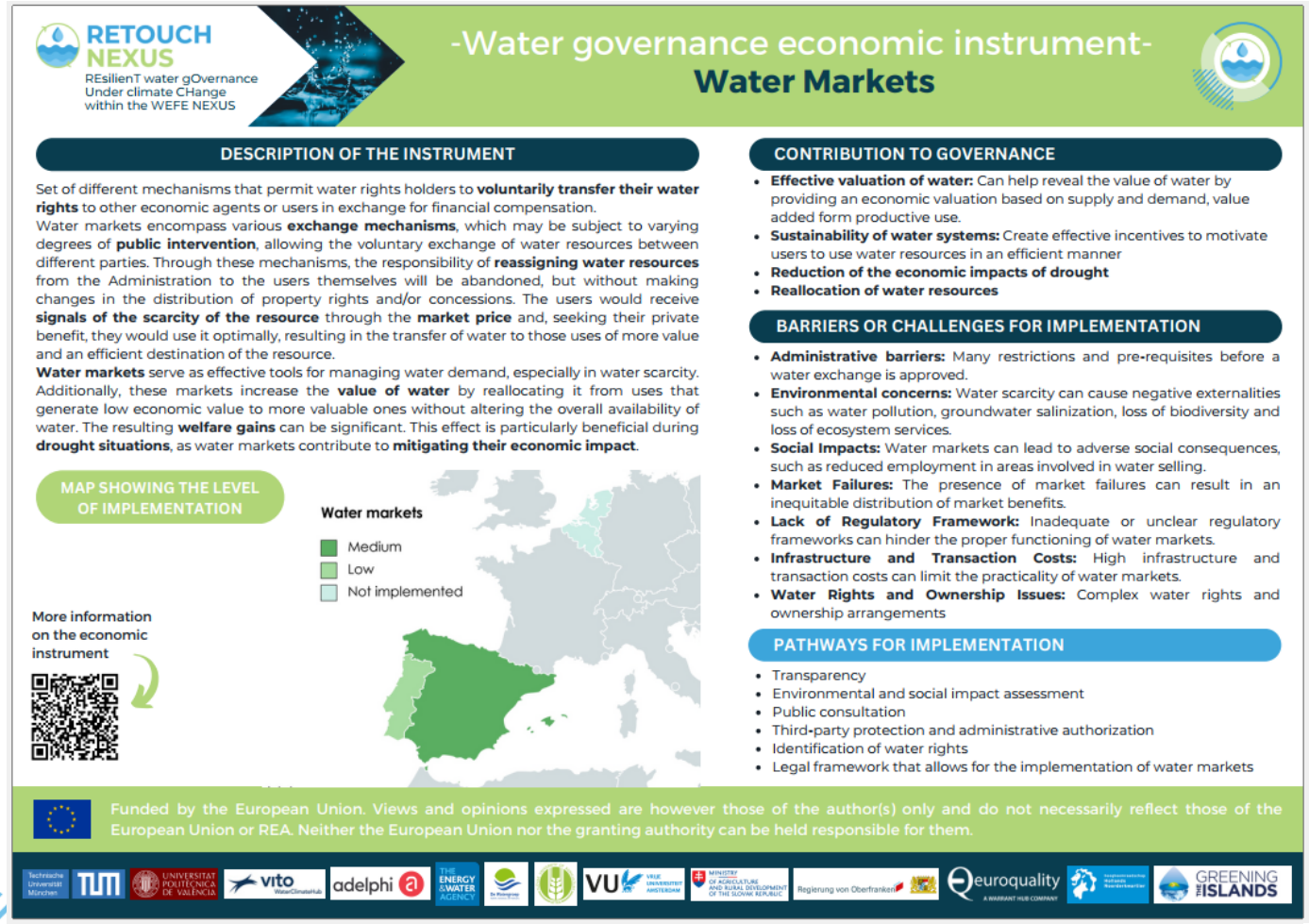
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-Water governance economic instrument-
Water Markets

DESCRIPTION OF THE INSTRUMENT

Set of different mechanisms that permit water rights holders to **voluntarily transfer their water rights** to other economic agents or users in exchange for financial compensation.
Water markets encompass various **exchange mechanisms**, which may be subject to varying degrees of **public intervention**, allowing the voluntary exchange of water resources between different parties. Through these mechanisms, the responsibility of **reassigning water resources** from the Administration to the users themselves will be abandoned, but without making changes in the distribution of property rights and/or concessions. The users would receive **signals of the scarcity of the resource** through the **market price** and, seeking their private benefit, they would use it optimally, resulting in the transfer of water to those uses of more value and an efficient destination of the resource.
Water markets serve as effective tools for managing water demand, especially in water scarcity. Additionally, these markets increase the **value of water** by reallocating it from uses that generate low economic value to more valuable ones without altering the overall availability of water. The resulting **welfare gains** can be significant. This effect is particularly beneficial during **drought situations**, as water markets contribute to **mitigating their economic impact**.

MAP SHOWING THE LEVEL OF IMPLEMENTATION

Water markets
Medium
Low
Not implemented

More information on the economic instrument

CONTRIBUTION TO GOVERNANCE

- **Effective valuation of water:** Can help reveal the value of water by providing an economic valuation based on supply and demand, value added form productive use.
- **Sustainability of water systems:** Create effective incentives to motivate users to use water resources in an efficient manner
- **Reduction of the economic impacts of drought**
- **Reallocation of water resources**

BARRIERS OR CHALLENGES FOR IMPLEMENTATION

- **Administrative barriers:** Many restrictions and pre-requisites before a water exchange is approved.
- **Environmental concerns:** Water scarcity can cause negative externalities such as water pollution, groundwater salinization, loss of biodiversity and loss of ecosystem services.
- **Social Impacts:** Water markets can lead to adverse social consequences, such as reduced employment in areas involved in water selling.
- **Market Failures:** The presence of market failures can result in an inequitable distribution of market benefits.
- **Lack of Regulatory Framework:** Inadequate or unclear regulatory frameworks can hinder the proper functioning of water markets.
- **Infrastructure and Transaction Costs:** High infrastructure and transaction costs can limit the practicality of water markets.
- **Water Rights and Ownership Issues:** Complex water rights and ownership arrangements

PATHWAYS FOR IMPLEMENTATION

- Transparency
- Environmental and social impact assessment
- Public consultation
- Third-party protection and administrative authorization
- Identification of water rights
- Legal framework that allows for the implementation of water markets

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