On integrating high-end scenarios into real-world adaptation decision-making in Portugal:

water management in a transnational river basin highly vulnerable to droughts

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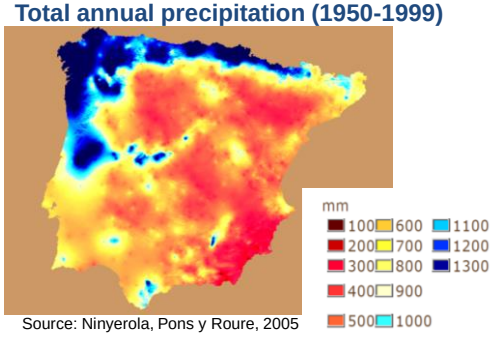
Iberian Case Study Context

- ✓ Mostly arid to semi-arid climate (except for the NW)
- ✓ High temperatures and high annual evapotranspiration rates
- ✓ Lengthy dry season (4-6 months)
- ✓ Strong inter-annual precipitation variability, with some very dry years in the past (e.g. 2005) – serious water management issues.

Total annual precipitation (1950-1999)



Source: Ninyerola, Pons y Roure, 2005

Iberian Case Study Context

- ✓ 5 shared rivers; agreement between Portugal and Spain (Convénio de Albufeira, 1998; revised in 2008)
- ✓ Freshwater withdrawls mostly for agriculture (61% in Spain and 72% in Pt)
- ✓ Strong increase in # reservoirs and water storage capacity
- ✓ Increase in large-scale water transfers (e.g. Tagus-Segura)

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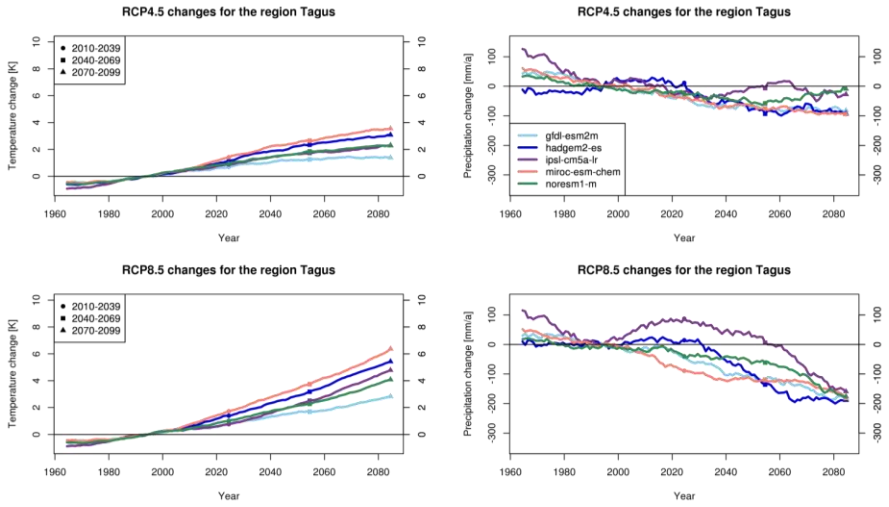
HES in the Tagus

→Reduced precipitation; increased drought frequency, severity and duration



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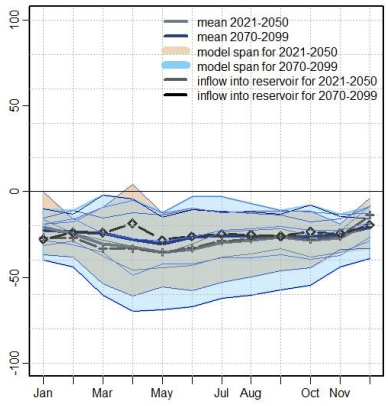
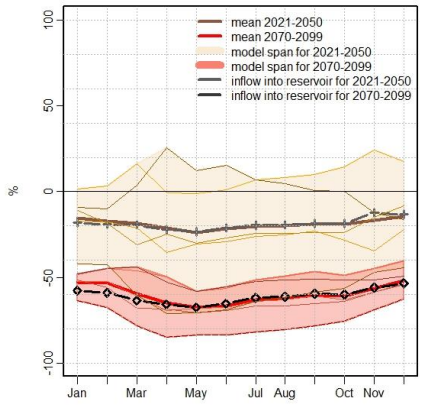
Impacts on hydropower production

Deviation in monthly power produced at the Fratel Reservoir



RCP 4.5



RCP 8.5

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Iberian Case Study Goals

1. Improve scientific understanding of the **implications of HES in South-west Iberia** (especially related with water-resource management)

2. Identify DMs critical needs and capacities for considering HES and their **associated uncertainties** in the development of **adaptation policy and practice**

3. Work jointly with DMs to explore **systemic transformative solutions** to problems related to the integrated resource management in Iberia under these HES.

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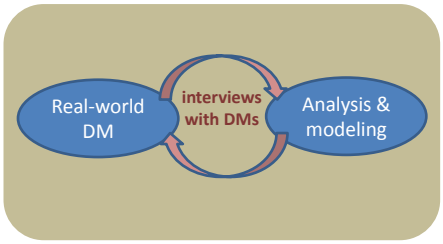
Interviews with decision-makers

Interviews with 12 Portuguese decision-makers from 9 institutions; focused on specific policy areas of relevance for the case study, namely:

- Cross-sectoral and cross-economic decision-making (i.e. nature protection, climate change, water resources, energy, insurance);
- Cross-border water management cooperation programmes;
- The role of administrative authorities in policy development and implementation.



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Types of decisions

Type of decisions	#	Examples of adaptation-related decision processes
Normative	8	Transposing EU policies (Nature Conservation Institute); Regulation of activities of water entities (Water Regulator Authority)
Strategic	9	Discontinuing water uptake points (Agricultural association, Water utility)
Operational	10	Changing tariffs and prices (Agricultural association, Water utility, Association of Insurers)

- All 3 types of adaptation related decision-making processes reported;
- Lead and consequence times of these processes are varied (mostly < 5 years for lead; < 10 years for consequence);
- Adaptation to climate change is generally seen as an objective that needs to be integrated with other policy objectives

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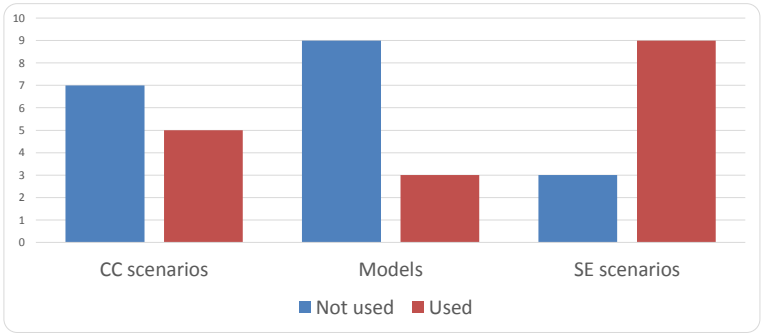
Use of scenarios and models

- Quantitative CC scenarios and models are not systematically applied in current DM processes; exceptions - water and energy utilities; insurers assotiation;
- Use of SE trends or scenarios is commonly reported;
- Most interviewees acknowledged that the DM processes in which they are involved would benefit from a more systematic integration of CC scenarios;
- HES have not been considered, since short time-scales still prevail (e.g. decisions with a consequence time <10 years).



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Limitations for data use

- Perceived limitations mainly related to format issues, lack of knowledge or technological capabilities to use such data;
- Uncertainty is generally not considered as a strong impediment for DM;
- Current approaches to adaptation seem to favour robustness and the precautionary principle thus reducing de need for very formal uncertainty-management approaches.

Theme of limitation	Perceived limitations to use of the future climate change information for decision-making	#
Availability	Data is not available	1
	Lack of projections on fire risk	1
	Not enough scenarios available	1
Usability	The information is not adequate – projections wanted at shorter timescales	7
	The information is not adequate – projections wanted at finer geographical scales (NUTS 2 or 3)	4
Understanding	Organisation lacks knowledge/ technological capacity to use this type of information	2
Others	Not the role of the organisation	1

Implications of HES?

Implications of HES	#	Examples
Starting implementing options earlier	5	Nature Conservation Institute: "We would need to be more effective in implementing the planned measures faster. The planning is there, but the implementation phase is too long as they are not considered urgent."
Being more effective in options' implementation	3	Tagus River Basin Authority: "We may need to be more serious about implementing some of the measures that have already been identified. Or we may need to consider more measures to reduce the impacts of droughts."
Designing new adaptation options	1	Insurers association: "We might need to change the risks we cover. Some may become good business opportunities for our sector; some may become too high to be covered."
Revise adaptation objectives	1	Tagus River Basin Authority: "We may need to change the objectives in our plans considering that the reference conditions will also change, e.g. WFD objectives."
Transformative thinking	1	Energy company: "Significant changes in technology use, decentralisation, recycling of water are all changes that may need to happen in HES. These may or may not be 'transformative'".
No implications foreseen	2	Agricultural association: "Our association is already coping with extreme events, so, we are already doing what is possible (e.g. saving water, increasing efficiency in distribution). Strategic thinking will need to change but we feel that there is little we can do as not much depends on us."
Implications cannot yet be foreseen	2	Portuguese Environment Agency: "This is still far from being thought of in the present discussions. Tipping points and HES are still not considered."

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Need for transformative options?

Is the need for transformative actions foreseen?	#	Examples/ quotes
Yes	1	Energy company: "Transformation (in objectives) going from utility (or energy solutions) to natural resource management."
No	11	Water utility: "No. The company is robust and can cope with severe climate change impacts. We would need to implement measures earlier, and probably more measures but not to use transformative options. Only disruptive or catastrophic events would "transform" the way we operate."

- DMs consider that their institution's strategies and plans already include robust adaptation measures that could suffice even under HES;
- They recognise that already planned (incremental) measures may need to be implemented earlier than expected;
- Monitoring schemes are seen as important in order to maintain flexibility.

Conclusions

Institutions	Water utility; energy company; insurers assotiation	National agencies (e.g. Env. agency; River basin authority); local authorities
Use of CC data and models	Systematic	No use or just qualitative use
Implementation of adaptation options	Selected, prioritized, implemented	Varying degrees of implementation (usually options for other policy goals that also have benefits for adaptation)
Info and data needs	Appropriate climate baseline data that they can integrate in their processes	Info/ data on integrative options/solutions and their effectiveness for multiple problems and policy goals
Why?	Clear mandates (inc. adaptation objectives clearly defined); strong background in dealing with risk; experience in integrating uncertainty, predictions, models in their DM processes	Changing and multiple policy goals; dificulties in using/interpreting data and models; available models do not represent all complexities that they need to consider (e.g. interlinkages with other stressors)

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"We don't see the need for using models, what we need is to find win-win, robust solutions that we know will work in different scenarios" (Portuguese Nature Conservation Institute)

Thank you for your attention!