

Characterisation of climate change vulnerabilities for the Corsica basin: an index-based method to assess water issues

Caractérisation des vulnérabilités du bassin de Corse au changement climatique : une méthode indicielle pour graduer les enjeux liés à l'eau

Context

- Corsica, a Mediterranean island particularly exposed to climate change,
- Magnitude of vulnerabilities to climate change poorly characterised,
- Lack of relevant information for climate change adaptation decision-making,
- High cost of adaptation measures.

Objective

→ **Prioritise sectors to grade response to climate change**

Method

Adaptation of a semi-quantitative method, developed on the Rhone-Mediterranean basin.

① Defining major issues

Four major issues identified from the knowledge synthesis on the impacts of climate change for the Corsica basin (Aubé, 2016):

- Surface and underground water availability,
- Soils progressively getting dryer,
- Wetland, rivers and littoral biodiversity,
- Water eutrophication.

② Dividing Corsica into homogeneous zones

Corsica divided into 13 territories according to two criteria:

- Retaining homogeneous data for climate change analyses,
- Retaining coherent hydrological behavior for each territory.

③ Characterising vulnerability

Vulnerability to each issue defined as the combination of **exposure** to climate change and **sensitivity** of the territories.

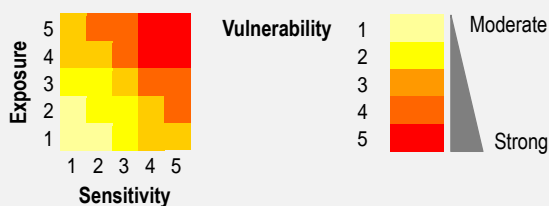
- **Exposure** = climatic variations affecting an area for a particular issue. Uncertainties related to climate projections taken into account,
- **Sensitivity** = features making an area more or less fragile to a specific exposure.

Example with surface water availability

→ Express the impacts of climate change on water balance needs

Surface water availability		
	Exposure	Sensitivity
Description	Critical period during summer	Impacts of climate change: - Increase in water demand, - Decrease of average water resources, - Reinforcement of low-flow periods.
Indicator	ΔSummer flow (July – October)	Annual flow Ratio water consumption / QMNA5

- Each indicator divided into 5 categories (1=low, 5=high),
- Following combination to express vulnerability:



→ Each territory with graded vulnerability.

The resulting maps identify areas where climate change adaptation measures are needed the most, facilitating the decision-making process.

Data

Exposure: Explore 2070 project

Hydroclimate projections to study the impacts of climate change on water resources across France (Carroget, et al., 2017; Chauveau, et al., 2013).

- Climate change projections available on an 8 x 8 km grid for 7 models (IPCC AR4) under the A1B scenario and hydrological projections for two hydrological models on resp. 28 and 34 sub-basins in Corse.

→ **Critical control** of the stations and **regionalization** to produce a set of hydrological projections for 53 basins with both hydrological models,

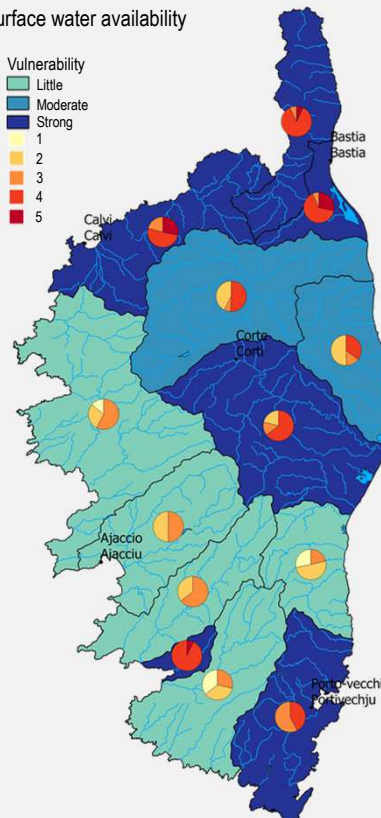
→ Basin **weighted averages** to produce a **consistent set of 14 hydroclimate projections** for each territory.

Sensitivity: depending on the issue

- Example with surface water availability: water withdrawal (Agence de l'eau) and streamflow (Banque HYDRO)

Results

Surface water availability



- 14 vulnerability scores for each territory representing uncertainty to climate change (pie charts),
- Little vulnerability when less than 30% of scores are 4 or 5,
- Strong vulnerability when more than 75% of scores are 3, 4 or 5.

→ Sectors in north, center and south of Corsica highly vulnerable to climate change for surface water availability,

→ Priority sectors where adaptation measures should be established.

Figure 1: Vulnerability map for surface water availability

Discussion

- Value judgments on indicators and categories requiring a diagnosis traceability,
- Results depending on the division of the territory,
- Homogeneous data required over all territories to characterise sensitivity.

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