Adaptation of a Portuguese water supply company (EPAL) to climate change: producing socio-economic and water use scenarios for the XXI century

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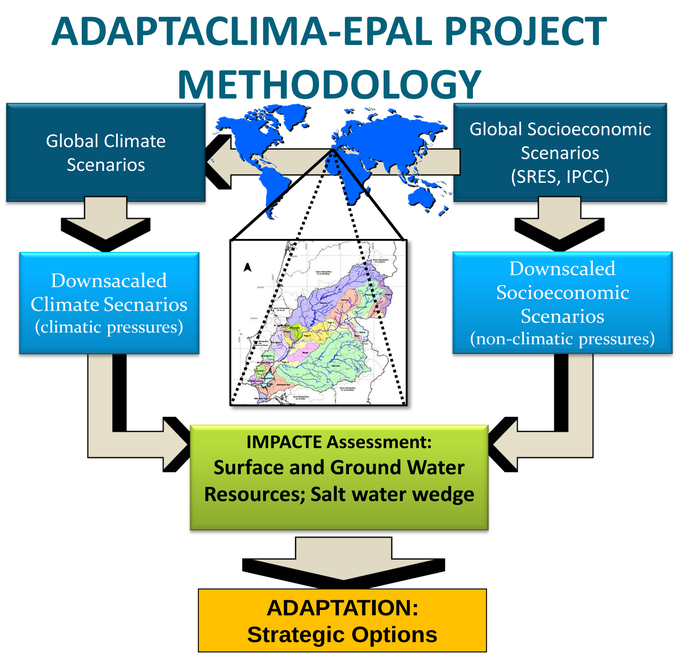

	A1	A2	B1	B2
Coefficient of industrial growth	++	"	"	"
Coefficient of change in industry water use due to efficiency	- -	-	- -	-
Total Industry Water Use	+	-	-	-
Agricultural area	- -	- -	-	-
Coefficient of change in water use for crops due to climate change	++	++	+	+
Coefficient of change in agricultural water use due to efficiency	-	-	-	-
Total Agriculture Water Use	- -	- -	-	-
Population	-	+	-	-
Coefficient of change in behaviour	"	"	-	-
Coefficient of change in consumption due to climate change	+	+	+	+
Coefficient of change in domestic water consumption due to efficiency	-	-	-	-
Total Domestic Water Use	-	"	- -	- -

Table 1 - Main trends in the various forcing factors for water use for each scenario.

	Base year	A1	A2	B1	B2
Agriculture *1	1,44 km²	22,7%	46,6%	37,5%	52,2%
Industry *2	2194069 m³	60,2%	59,4%	28%	58,3%
Domestic *2	237702531 m³	87,60%	98,25%	48,72%	49,77%
Services *2	6466211 m³	65,70 %	63,90%	48,72%	74,12%

Table 2 - Water consumption by sector in the project study area Adaptaclima-EPAL in the base year (2000) and scenarios (percent of base year values) for 2080. * 1 - Baseline data: National Water Plan 2001, Corine Land Cover 2000 * 2 - Baseline data: INSAAR 2007, Corine Land Cover 2000.

Introduction

The project ADAPTACLIMA, promoted by EPAL, the largest Portuguese Water Supply Utility, aims to provide the company with an adaptation strategy in the medium and long term to reduce the vulnerabilities of its activities to climate change. The first objective of this project was to produce scenarios of water use in the area of action of EPAL until 2100

Methods

We used the IPCC (Intergovernmental Panel on Climate Change) scenarios A1, A2, B1 and B2 to explore future developments in local water use. We downscaled available population scenarios for Portugal using a linear approach. We produced land use scenarios using the following methodology:

1) characterized the present land use for each municipality of the study area using Corine Land Cover and adapting the CLC classes to those used by the IPCC;
2) identified the recent tendencies in land use change for the study area;
3) identified the tendencies of the IPCC scenarios for land use change in Europe; and
4) produced scenarios of land use. Water use scenarios were derived considering both population and land use scenarios as well as scenarios of change in other parameters (technological developments, increases in efficiency, climate changes, or political and behavioral changes).

Results and Discussion

The A2 scenario forecasts an increase in population (+16%) in the study area while the other scenarios show a reduction of resident population (-6 to 8%). All scenarios, but especially A1, show a significant reduction in agricultural area and an increase in urban area. Regardless of the scenario, water use will progressively be reduced until 2100. These reductions are mainly due to increased water use efficiency and reduction of irrigated land. Our results agree with several projects that model water use at regional or global level.

Conclusions

Our results show that all different scenarios considered indicate reductions in water use in the study area. Another important result is that behavioral and technological factors are determinant in shaping future water use in the study area. In Portugal, water use inefficiency corresponds to about 41% of the total withdrawals (MAOT, 2001). Thus, it is not surprising that there can be enormous gains in water efficiency, especially in the agricultural and industrial sectors.

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Highlights

- The socioeconomic scenarios are a useful framework for thinking about the future and a fundamental step for EPAL to prepare a long-term strategy to climate change that is "future-proof", i.e. that can contribute to reduce vulnerability to climate change in many different future societies.
- EPAL successful adaptation to climate change is vital for the economic activities and the local population. The tasks that look at the impacts in the resources (quantity and quality of water) will also need to be taken into account in the process, so that the adaptation occurs in a sustainable way.
- To build a consistent strategy for climate change adaptation, both climate and socioeconomic scenarios are likely important, and socioeconomic scenarios can decrease the decision failures (Drunen et. al., 2011).

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