



AGENCE DE L'EAU
ADOUR-GARONNE

ETABLISSEMENT PUBLIC DU MINISTERE
DU DEVELOPPEMENT DURABLE

Towards a strategy of adaptation to global changes

**Results of a forward-looking study on
water needs and supplies
at the Garonne basin level
In 2050**

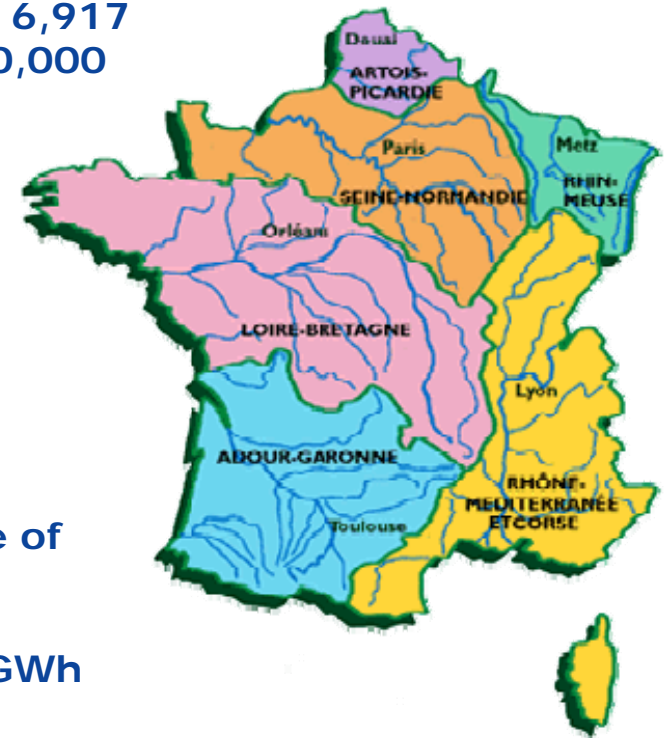


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The Adour-Garonne Basin

- **20% of national territory** (116 000 km²)
- 7 million inhabitants
- Two entire regions, Aquitaine and Midi-Pyrenees, 6,917 municipalities, including 35 cities of more than 20,000 inhabitants
- 120,000 km waterways,
- **Many lakes and reservoirs**
- 420 km of atlantic coast line
- **Agricultural vocation (34% of french irrigated crops in surface)** and an agribusiness industry
- High technology industries (aeronautics); Decline of traditional industries
- The **Hydroelectricity** accounts for 15,000 GWh that is 20% of national hydroelectrical energy production
- **Fish and aquatic ressources**



The management of the water resources in the Adour-Garonne Basin

A lack of water during summer which will increase with climate change

The Adour-Garonne Basin has severe low water levels during summer, resulting from an imbalance between needs and supplies of water

Maintaining a sufficient flow in the waterways will be a key to achieve the goal of good ecological status of water

A main objective, the satisfaction of a minimum objective of flow during the low water level period

The « DOE » = reference flow allowing a good ecological status of water and above which all human uses are satisfied on an average of 8 years every 10 years

A panel of working solutions (but insufficient) to achieve this objective :

- water savings
- Mobilization of existing reservoirs (in particular hydropower reservoirs)
to support low water level
- Creation of new reservoirs

Garonne 2050 : a forward-looking study on water needs and supplies ordered by the Adour Garonne Basin Committee

- **A resolution of the Basin Committee : A forward looking study**
 - to ensure **security of the low water levels on the Garonne basin rivers**;
 - to determine the **possible and necessary evolutions of water uses in human activities** (demography, agriculture and energy) and the **water needs for aquatic life**;
 - to assess the **impact of climate change**.
- **Dispositions in the river basin management plan (SDAGE)**
 - **A 30 "to understand the stakes and the impact of global changes"**; to share the diagnosis, to identify factors of changes, to clarify debate
 - **A 31 "to propose a strategy of adaptation to global changes"** and define actions of the next « SDAGE » for 2016-2021

Objective and methods of the « Garonne 2050 » study

- **Objective:** to know the incidences of global changes on the water resources, and water uses, through a quantitative angle :
 - Climate change
 - Demography,
 - Uses: energy, agriculture
 - Aquatic environment quality
- **Methods:**
 - Large scale: a watershed of 65, 000 km²
 - Term of 2050
 - A participatory prospective study
 - Involving stakeholders
 - Mobilizing scientific experts and modelling



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« Garonne 2050 »: data input and hypothesis

Uses

Population: 5.5 million inhabitants

- Consumption: 130 liters/day/inhabitant
- Densification of urban areas (small and medium cities)
- Improvement to avoid water leaks in the pipes

Energy:

- Energetic mix and level of decentralisation
- 1 billion m³ in the hydropower reservoirs
- 120 Mm³ for the support of low water level (160 Mm³ today)

Agriculture:

- Conventional practices
- A quota based on a new drastic legal reform: 400 Mm³
- 10 Mm³ of potential economy (crop rotation)

Climatic evolution for 2050 and impact on water resources

- increase of the average of the annual temperature between 0,5°C and 3,5°C
 - more periods of heat wave and drought
 - annual evapotranspiration (water loss) in clear increase
 - less effective rain, less flow (and less infiltration)
 - important reduction of the snow
- ⇒ **strong modifications on water regime :**
- Decrease of the averaged annual flows: between 20 and 40 %
 - Earlier, more severe and longer low water levels;

increase in the temperature of the water, which will have consequences on the uses and the aquatic ecosystem.



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Participative workshops: 5 contrasted scenarios

- Participative workshops useful for the debate and the co-construction of contrasted pictures for the future
- 5 scenarios:
 1. Partial desolation of the environmental policies
 2. Adaptation policies towards a water storage increase
 3. Adaptation policies towards a drastic lower agricultural consumption
 4. Local development without solidarity between the up and downstream
 5. Ultraliberal development where water becomes a trade good

A way to share the diagnosis and to identify key issues for the future, with the double question:
“What can happen and what are we ready to do? »

Final step of « Garonne 2050 »: 3 realistic scenarios

- The final scenarios refer to an Objective of Flow during the Low water level in 2050
= the most important parameter
- The notion of compensation
- It results a deficit, an imbalance between water needs and supplies

3 main scenarios (environmental flow)

- 1- To adapt by compensating a little (120Mm3)
- 2- To compensate completely
- 3- To partially compensate

Compared with the standard of today (Objective of flow at low water level)		If needs of industries, agriculture and urban needs stay almost equal between 2012 and 2050	
Minimum of Flow In 2050		Imbalance or Deficit in Mm ³	Variability Uncertainty
	To compensate for a little	75	25-160
	To compensate completely	760	480-1200
	To compensate partially	335	150-650

Conclusions and perspectives: Taking measures without regret

- **A more efficient water management**
 - **Saving water : insufficient to face the issue**
 - **Studies of non-conventional resources:**
 - Re-use of rain water and waste water,
 - Desalination of sea water,
 - Artificial refill of groundwater,
 - **Creation of new dams and reservoirs**
 - **Mobilization of existing reservoirs**

Conclusions and perspectives: Taking measures without regret

The study shows :

- The interest of multipurpose uses of reservoirs
- The interdependence between water and energy policies

- Arbitration at the **gouvernemental level**
- **Local negotiation**

to find the optimum between water
for summer and hydropower for winter



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Conclusions and perspectives: more knowledge and a strong support for innovation

- Research on climate change at a local level
- Research on impact of water regime and water temperature on aquatic ecosystems and on degradation of pollutants
- Is groundwater a credible alternative ?
- What about storage of water into the soils ?
- New technologies of irrigation to be more efficient ?

A study

↳ to prepare the changes

↳ To draw more desirable and accessible options

→ An adaptation strategy,
shared by the stakeholders,
included in the new Water
River Basin Management Plan (SDAGE)