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Introduction

Two opposite conceptions of water scarcity exist: scarcity seen as a natural phenomenon linked to a deficit of water resources and scarcity described as a geographically and historically situated social fact (Aguilera-Klink *et al.*, 2000; Anand, 2007). This research is in line with the second category of studies and validates the hypothesis that scarcity is directly linked with uses.

This research aims at deciphering water rarefaction in the Almeria region. Following Bardhan (2005), who considers that water scarcity is “mainly a product of the failure of institutions”, scarcity is analysed here as a failure of standardisation which appears as the result of a representation of water as an inexhaustible allocation resource, taken for granted. The institutionalisation of uses and rules all along History has been mainly responsible for the rarefaction of resources and for the unsustainability of the development scheme implemented.

After introducing our fieldwork and our theoretical corpus, we present the institutional evolution of the water sector in Spain and its implications on water uses in Almeria. We show that emergent scarcity is correlated with the idea that technique can solve the problem of water rarefaction, which has led to overexploitation. This conception of water is supported by the rhetoric of water scarcity developed to justify the expansion of hydraulic infrastructures.

I/ Materials and theoretical tools

1- Fieldwork: Almeria (Andalusia, Spain)

Our three-month qualitative field work was based on semi-directive interviews and on information collection (triangulation of sources: water users, local authorities and researchers). The Almeria province ranks first in the EU market regarding horticultural production and gathers the world's biggest concentration of greenhouses. It is situated at the South-East of Andalusia and is part of the Mediterranean Hydrographical District (MHD). The study was focused on the Campo de Dalías area, where most greenhouses are

located. The climate is semi-arid and the average annual rainfall was roughly 246 mm over the 1976-2006 period, with an important variability (109 mm in 1985, 412 mm in 2008) (Las Palmerillas, 2009).

2- Theoretical background: historical institutionalism

This research applies a historical institutionalist approach, which considers the description of water uses and their regulation over a long period. As Bakker (2000), we reckon that regulation is: “inherently (but by no means solely) a discursive practice, as well as an institutional framework embodying rules”. Our hypothesis stating that the study of water standards and norms offers a relevant perspective to apprehend the evolution of water uses can be justified from an analytical point of view. Indeed, norms are seen as both enabling and constraining instituted processes (“working rules”) (Commons, 2005 [1934]; Billaudot, 2008). They constitute the outcomes of compromises and tradeoffs between the various users and typify the economic and political orientations proper to a given territory and population. Then, analyzing them enables us to understand the evolution of uses and their potential limitations (Buchs, 2007). The theoretical tools we have chosen articulate both technical and social norms and show that norms can express a prevailing vision of water and, by and large, nature (from values to rules).

II/ Results and discussion

1- Water scarcity as the consequence of “hydraulicist” standardisation

Even though the recent texts and documents framing water uses testify to the improvements in integrating environmental factors, water uses remain rooted in the technique-driven tradition of the outdated “hydraulic paradigm” (Saurí, Moral Ituarte, 2001). At the national level, the 1985 Water Law, which replaced the previous one dating back to 1879, introduced a major change in water uses’ regulating processes in Spain, notably through the implementation of the principle of hydrological planning.

The main objective stated in the 2001 National Hydrological Plan is the transfer of the Ebro via Catalonia, Valencia, Murcia and Almeria, and this recalls the 1993 National Hydrological Plan, which suggested restructuring the Spanish hydrographical territory by connecting the different basins and building more than 200 dams. Nevertheless, the

anticipated transferred volumes are considerably lower than in 1993, with 1,050 Hm³/yr as opposed to 3,768 Hm³/yr (1,855 Hm³ of which only from the Ebro) (MMA, 2000). The White Paper on Water in Spain (MMA, 1998) supports this view. It is a database pertaining to resources and uses, as well as the available techniques, and concludes with the analysis of “potential transfers” in the framework of the National Hydrological Plan. Following the 2004 government changeover, the hydrological plan was modified in 2005, and desalination was substituted for the Ebro transfer (AGUA programme). Initially, the programme dealt with 105 projects promoting infrastructural improvement, network set-up and the creation of desalination plants all along the Mediterranean coast, and aimed at supplying a supplementary volume of 1,063 Hm³/yr for a total estimated cost of roughly €3,798 million (as opposed to more than €4,200 million for the previous plan) (MMAMRM, 2005). Just for the MHD, nine desalination plants were planned (including the already-existing Carboneras plant — 42 Hm³/yr).

Estimated costs and volumes of the AGUA programme in the Mediterranean hydrographical district (MHD), updated on the 02/03/2009.

	Available resources (Hm³/yr)	Estimated investment (€million)	
Almeria Province	109.5	726.2	
Total MHD	364.5	1,435.7	Granted contracts (€million)
Total Segura basin	9	35.8	
Total MHD + Segura basin	373.5	1,471.5	

Source: based on Acuamed, 2009.

For the MHD, hydrological planning is implemented through the South River Basin Hydrological Plan (CHSE, 1998). This process is paired with territorial planning, more particularly the 1997-2007 Plan for Infrastructures in Andalusia, which aims at increasing the resources by 2,470 Hm³/yr (COPT, 1999). For the Campo de Dalías, planning is framed by the Western Almeria Land-Use Development Plan (COPT, 2000). In these documents, water is considered merely as an input and the development of infrastructures, without taking into account spatial and environmental policies, is promoted. These documents belong to a tradition which encourages the development of the local agricultural sector with no limitations.

Indeed, the expansion of modern agriculture in Almeria began with the 1941 designation of the Campo de Dalías as a “national interest” irrigatable land area by the National Institute for Colonisation, which had been founded in 1939. In 1953, the Institute approved the first General Transformation Plan, the purpose of which was to foster population settlements by

transforming the area in order to irrigate it. As soon as the end of the 1950s, modern agriculture started superseding traditional agriculture (first plastic greenhouses in 1963, preparation of the ground in several layers — “enarenado” — and prevalence of micro-irrigation from 1976 onwards). In less than forty years, the Almeria region moved from a penultimate place ranking to a 24th place ranking out of the 52 Spanish regions in terms of GDP per capita. This growth has essentially been due to agricultural development: this sector accounts for an estimated 40% of direct or indirect participation in the region’s GDP (Molina Herrera, 2005). Even though the agricultural production methods in Almeria are among the most water-efficient ones, paradoxically, technical evolutions have led to an expansion of irrigated areas and thus, an increase of the total withdrawals. What some consider as an “economic miracle” is coupled with an “ecological disaster”. Despite the measures taken from 1984 onwards in order to curb the agricultural sector’s expansion (i.e. the 117/1984 Directive, the 15/1984 Law and the 2618/1986 Royal Directive), the total greenhouses’ surface area in the Almeria Province increased from 10,905 ha in 1985 to 25,983 ha in 2007 (Sanjuan Estrada, 2007), this is why more than half of the total area devoted to intensive agriculture is thought to be illegal. Considering the Campo de Dalías only, greenhouses are spread over 18,337 ha and the massive aquifer depletion is estimated at (at least) 40-60 Hm³/yr (Pulido Bosch, 2005).

At the local and national levels, water standardisation promotes this idea that natural constraints can be ignored thanks to technical efficiency. This hydraulicist standardisation, which is based on a vision of water as an abundant resource which can in no way become a limiting factor, does not aim at adapting uses to resources but at satisfying needs which apparently cannot be reduced. Most of the farmers we have met agree with this idea as, what is even more distressing, do most regulating bodies, whose deficient supervision is often criticised (“desgobierno hidraulico”).

2- The rhetoric of water scarcity to justify hydraulic infrastructures

The 1993 and 2001 National Hydrological Plans developed the rhetoric of water scarcity. Thanks to water transfers, the objective was to solve the problem of “structural deficits” (or “cyclical drought”) manifested in a “hydrological imbalance” between “dry Spain” and “humid Spain”. This orientation was supported by the White Paper on Water in Spain, which aims at: “determining the territorial balance of resources and needs, and identifying the possible imbalances”. It defines hydrological systems as being “structurally deficient”, “whatever the infrastructures they could be equipped with and even if water-saving

policies are optimised to their theoretical maximum”. These territories can solve their current lack of resources “only thanks to water transfers from other zones” (MMA, 1998, p. 387). In 2004, the former Prime Minister declared that: “Almeria needs water and will get more water. Almeria and Andalusia need the National Hydrological Plan to go ahead” (inauguration of the Ebro transfer’s first infrastructures, 18/02/2004, Huercál Overa).

These examples demonstrate the justification of hydraulic infrastructures and the minimisation of incentives to curb demand. From this point of view, the 2005 National Hydrological Plan, considered as ecologically innovative, remains grounded in the supply side. Moreover, it is based on the overestimated water needs calculated using theoretical endowments per use introduced in the former Plan (MOPT, 1992). More insidiously, interviews reveal that desalinisation could even accelerate groundwater depletion by providing farmers with a backup plan.

In the Campo de Dalías, intensive water use is justified and supported by the Western Almeria Land-use Development Plan, which radically defends productivist agriculture and considers water consumption as an exogenous factor which has to be satisfied. Thus: “it is logical not to impose limitations or to scale the sector down to adapt it to the possibilities offered by natural resources, but, on the contrary, it is more coherent and pertinent to design a general model to use resources, in particular water, in a sustainable perspective without questioning the sector’s evolution” (COPT, 2000; quoted by Moral Ituarte, 2001; our translation). It seems that the Andalusian farmers’ way of using water is not negotiable.

Conclusions

The History of Almeria from 1940 onwards shows a willingness to tame water in order to satisfy, first, a political objective, i.e. the occupation of a hostile territory deserted by the local populations thanks to the mobilisation of water resources; then, the objective has become more economic and has been linked with the need to develop and encourage a production model based on extremely profitable intensive agriculture. From the 1980s onwards, the local and national authorities have tried to mitigate some limitations by integrating the environmental perspective with no shift of paradigm. This policy takes part in a standardisation process in compliance with the hydraulic paradigm. Nonetheless, sustainable water use is not possible without taking the entire water cycle, in which human activities are embedded, into account. Integrated and territorialised approaches enhancing water as common heritage or as a common resource have to be promoted, while reconsidering our conception of nature as endogenous.

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