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**THE RESEARCH ACTIVITY ON THE GEOGRAPHY OF WATER IN
THE GEOGRAPHY DEPARTMENT OF THE UNIVERSITY OF SEVILLE**

SIRCH Project, under the direction of Dr. Leandro del Moral

Social perception of water uses in the lower Guadalquivir river basin: myths and values.

Belén Pedregal - Pilar Paneque***

This paper is framed within the European research project Social and Institutional Responses to Climate Change and Climate Hazards (SIRCH). The Geography Department of the University of Seville has participated in this project along with other European universities and research institutions¹. Its main goals are:

- a) The evaluation of institutional responses to present and past hydrological hazards, especially to drought periods.
- b) The development of future hazard scenarios and the analysis of management options to confront them. The case studies are the Thames, Rhine/Mosel and Guadalquivir (specific studies for the Lower Basin) river basins.

In Andalusia, as in other regions of Spain, the imbalance between social demand and availability of resources results in a deficit. This deficit is especially clear in periods with rainfall below the average values: drought spells. This relation is also marked by the high level of agricultural demand as a percentage of total consumption -close to 82% in the whole region and 86% in the Guadalquivir River Basin - (Consejería de Obras Públicas y Transportes, Junta de Andalucía, 1997).

This paper studies the perception of Lower Guadalquivir's population regarding water resources, its uses, and the risks associated with those uses, taking the analysis of a survey as the starting point. The study is structured in three parts: firstly, a methodological introduction; secondly, the main findings, for the whole population of the Lower Guadalquivir Basin as well as for

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¹ The SIRCH project (ENV4-CT97-0447) is under the direction of Dr. Del Moral Ituarte in the University of Seville. Other participating members are: the Environmental Change Unit (University of Oxford); the Centro de las Nuevas Tecnologías del Agua/ Institute for Prospective Technological Studies (Joint Research Centre, European Commission); the Institute for Environmental Studies (Vrije Universiteit); the Flood Hazard Research Centre (Middlesex University) and the Department of Agricultural Economy (Universidad Politécnica de Madrid). More information at: <http://www.ecu.ox.ac.uk/sirch/sirch.htm>

population groups identified according to their socio-demographic features and their place of residence; and, lastly, some general considerations on the topic, taking into account other studies.

Introduction

The present study is the result of the analysis of a survey of the Lower Guadalquivir Basin population regarding water use.

The interviews were done in 1998 by the Centro de las Nuevas Tecnologías del Agua² (CENTA) and the Plataforma del Guadalquivir³, with the support of the regional government of Andalusia. Its purpose was to understand the social perception of water use in agriculture, although questions with much greater implications were included⁴. In 1999 a general analysis was published. A total of 1,357 interviews were carried out among residents of the Guadalquivir River Basin, aged 14 and older. The hypothesis was that, in order to support decisions concerning water policies, especially those more closely related to agriculture, it would be important to determine how informed the population is on this issue, the value which society gives to water resources, how public opinion sees a greater allotment of those resources to agricultural, and to what extent the contribution of agriculture is considered valuable to the whole community's higher standard of living. In other words, what part of the resource does agriculture get and what does it give in exchange, as the citizen sees it.

Due to the interest of this data within the context of the SIRCH project, the 506 interviews carried out among inhabitants of the Lower Guadalquivir Basin were selected in order to have a more thorough understanding of the results obtained and to establish whether there were differences in the answers between different population groups. Of the 33 questions designed for the

² Literally: "Center of New Water Technologies". Aside from the participation of CENTA, lead by Pascual Riesco, partner of the SIRCH project, other researchers from the University of Seville took part in the design of the survey. Access to the database with the survey's results was possible for this specific analysis of the Lower Guadalquivir Basin.

³ The Plataforma del Guadalquivir (Guadalquivir Platform) is an association born at the end of 1991-1995 drought, with the specific goal of defending the irrigator's agenda. It groups the small (UAGA, UPA) and large landowners (ASAJA) organizations, labour unions of all socio-political orientations (UGT, CCOO) and the local authorities (Ayuntamientos and Diputaciones, the municipal and provincial governments respectively).

⁴ The results of a first analysis, published in 1999 (CENTA and Plataforma del Guadalquivir, 1999), that show the social perception in Andalusia regarding water uses, are taken into account for this second partial exploitation of the survey. Those first analysis sums up the main results gathered in the complete exploitation of the survey, done by Carrasco, C., Jiménez, J.F. and López de Garayo, E., in a study titled *Percepciones de la sociedad sobre el uso del agua en el sector agrícola en conexión con la disponibilidad del recurso y la calidad de vida* (Society's Perceptions on the Water Uses in the Agricultural: Resource Availability and Quality of Life).

original survey, this study has focused in the 18 that are more relevant to our understanding of the area's inhabitants perception of the vulnerability of the water management system, the possible responses to drought and the role of irrigation in Andalusian society.

The different population groups were defined according to gender, age, level of education, and township of residence. The age and level of education groups correspond to the classification used in the design of the survey in order to gather the data, and is as follows:

- Age groups:
 - a) 15 to 24 years old
 - b) 25 to 44
 - c) 45 to 64
 - d) Over age 65.
- Level of education:
 - a) Illiterate population or without schooling
 - b) Population with a finished elementary education
 - c) Population with a finished secondary education
 - d) Population with a finished college education.

The townships of residence were grouped in four large areas depending on the different use of water resources: La Sierra, or highlands, as producer of water, the metropolitan area of Seville as urban consumer, and the Vega-Marismas and the Campiña, both lowland regions, as agricultural consumers.

The Chi square test was applied in order to determine whether there were statistically significant differences between the answers of the different population groups, with a significance level of 0.05.

2. Findings

The results for the three main themes that this analysis has centered on are presented as follows: the public perception of the Lower Guadalquivir's population of the vulnerability of the water management system, possible responses to water scarcity, and the role of irrigation in the region. First, the general results for the whole of the Lower Basin are presented and, secondly, the population groups' differentiated behaviors.

2.1 General Findings

2.1.1 Vulnerability

About 85% of the surveyed believe that drought is a cyclical phenomenon and that it will recur. However, there are opinion differences as to the existence or not of a guarantee for water supply in cases of drought. There is a

greater distrust regarding this question in the agricultural sector than in the domestic sector. About 67% of the Lower Guadalquivir population believe that irrigators have no guarantee of water supply, as compared to 38% that believe the same concerning the domestic sector. The perception of a high level of vulnerability is therefore apparent, with the differences mentioned.

A majority of the population (65%) believes that agriculture cannot bear a lower supply of water than what is currently available. The perception of how rural areas would be affected is a pessimistic one should availability diminish. From the options provided in the questionnaire, a majority of the surveyed believed that employment, agricultural income, and productive wealth would decrease, while rural emigration and soil and pollution of underground waters (aquifers) would increase. It is worthwhile to underline what the perception of the effects of water shortage on the environment will be. Decreasing irrigation would not only affect productive activity, but it would also affect the environment. It should also be noted that people believe the most serious environmental impact to be the possible negative effect on underground waters, even though 25% of the surveyed admits that they do not know whether underground waters are excessively exploited or not.

As for the impact of water shortage on the various sectors of the economy, the greatest damage is believed to be suffered by the agricultural sector (97.5%), followed by the damage to the domestic sector (94%), the industrial sector (89%), services and tourism (55%), and the environmental sector (48%). In last place ranks the recreation sector (15%). Therefore, the great importance of the tourism sector is not felt to be a key factor, while the impact of drought on the environment is underestimated, and the impact on recreational and leisure activities is virtually ignored. This last view highlights the society's weak perception of in situ water uses.

2.1.2 Responses

During a drought period, respondents give maximum priority to domestic water supply (90%), followed by agricultural sector (71%), the industrial sector (22%), the environmental sector (9%) and tourism (6%). Recreational and leisure uses come in last place once more (2%). This order of priorities contrasts with the priority order established by the Spanish Administration (1st domestic uses, 2nd environmental uses, 3rd agricultural uses). Society's tendency to relegate the environment to secondary positions is clear, as is privileging productive activities, although not tourism, in spite of its economic importance earlier mentioned. The devaluation of recreational activities is confirmed, which is related to a perception of water alien to the idea of a space for social enjoyment and appropriation. Even though the agricultural sector is perceived as being the most affected, it should be noted that the

population considers that in a period of shortage priority should be given to the domestic sector.

As regards the knowledge and the perception of water prices, 65% of the Lower Guadalquivir's population believe that the full cost of supply is covered with the current price in the case of the domestic sector. However, only 35% share this view for the agricultural sector, since there is an evident lack of information as to whether its cost is covered in the current water bill (44%). At the same time, it should be pointed out that there is a general lack of understanding of water supply costs and the criteria needed to evaluate cost. This is the case both of the domestic sector bill as well as in the case of the agricultural sector bill. The percentage of the surveyed that declared not knowing whether or what specific criteria and concepts were included in the calculation of the domestic water bill is above 40%, and above 80% in the case of the agricultural sector bill.

An investment effort should be undertaken to a greater extent by the administration and is considered necessary in order to increase water supply reliability in both the domestic sector (66%) and in the agricultural sector (57%). Only a small percentage of the surveyed (24%) believe that the public sector and the consumers should share the investment effort. Furthermore, that the consumer should undertake the investment effort is a minority opinion (6.4% in the domestic sector and 10% in the agricultural sector).

In response to the question of how to deal with future drought scenarios, the surveyed were asked to prioritize a series of measures in relation to their importance in guaranteeing water supply. That prioritization can be seen below, with the percentage of population that considered each measure very useful.

1. Construction of reservoirs (86%)
2. Modernizing irrigation (72%)
3. Education of Farmers (70%)
4. Improvements in water pipelines (68%)
5. Transfers (66%)
6. Management improvement (65%)
7. Campaigns to raise public awareness (58%)
8. Cultivating crops with lesser water requirements (55%)
9. Installing water counters (53%)
10. Restriction of supply (36%)
11. Not increasing irrigated lands (19%)
12. Increase in the price of water (19%)
13. Abandoning irrigated lands (5%)

2.1.3 Social legitimacy of irrigation

Generally speaking, the population highly values the existence of irrigated agriculture in Andalusia (88%) and even 68% of the surveyed believes that it is necessary to link new agricultural lands to already existing irrigation systems. This positive perception is related with the fact that a majority of the inhabitants of the Lower Guadalquivir believe that water used in irrigation contributes to the development of the region (84%); that it creates jobs in the agricultural sector (80%); that it is a raw material (81%); that it creates jobs in infrastructures (79%); and that it does not affect the environment (67%). Of the questions raised in this section regarding the effects of water used in irrigation, only the question concerning the equity in water distribution presents a great division of opinions, with a high percentage of lack of knowledge (27%), and a majority of people that believe that it is not distributed with equal criteria (49%).

In the same way, whereas 73% of the surveyed believe that domestic consumers waste "large quantities", only 41% think the same way about agricultural consumers. Furthermore, the negative effects of irrigated agriculture on the environment are not clearly perceived. On the one hand, a considerable degree of lack of knowledge on the issue is evident (between 12% and 23% "don't know" answers). On the other hand, only between 25% and 34% of the population believes, with the options proposed in the survey, that irrigation causes soil pollution, is detrimental to protected natural spaces, pollutes underground waters, causes loss of soil, and pollutes irrigation water.

Lastly, the broad social legitimization of irrigation is completed with the generalized idea concerning agricultural consumers' good use of water: while 73% of the population believe that domestic consumers waste a lot of water, only 41% feels the same way about agricultural consumers.

2.2 Findings by Population Strata

Concerning the perception of risk and vulnerability, the people with a higher level of education and the residents of the Seville metropolitan area are the ones which, to a greater proportion, perceive drought as a cyclical phenomenon that will recur. This fact can possibly be explained by the dramatic water restrictions experienced by this population during the last Spanish drought (1992-1995) and by the notion of "social construction of droughts" which find a factory of periodical alarms in the mass media, especially in local newspapers. At the same time, this is the group that presents a greater degree of distrust towards the reliability of water supply for domestic and agricultural uses in a time of shortage. In the case of domestic supply, it should

also be noted that women show greater distrust than men, more often choosing the "little or not guaranteed" option than men.

Significant differences were observed among age groups regarding the opinion on degree of vulnerability of the different uses when confronting water shortage. Although the main body of the answers agrees with the generalized opinion of pointing to the domestic and agricultural sectors as the most affected, the youngest groups (ages 15-24 and 25-44) recognize to a greater degree the vulnerability of agricultural and environmental uses. This could be explained by the well-tested fact that younger generations are more sensitive to environmental concerns than older generations (Navarro, 2000: 217 and 226).

In the section on questions related to the responses or possible measures to achieve a more effective water management it is worth noting that place of residency and age account for variations in assigning priorities in water supply during periods of shortage. Thus, the youngest population group concedes, to a greater extent than the rest of the surveyed, less priority to the allotment to agricultural use and greater priority to environmental uses. By regions, the inhabitants of the Sierra relegate agricultural uses to a second and third place in the table of assigned priorities, whereas a majority of the inhabitants of the remaining regions put it in second place.

As for the investment responsibility in order to increment domestic and agricultural water supply reliability, the youngest group's opinion oscillates between consumer and private sector shared responsibility, and exclusive public sector responsibility, while the oldest population group is more clearly for exclusive public sector responsibility. By levels of instruction, differences in opinion are detected among people with secondary education, for they are the only ones willing to accept consumer participation in the investment to guarantee domestic supply.

According to levels of instruction, the population segment with no schooling believe, in 69% of the cases, that the full cost of supply is covered by the rates, as compared to 53% of the population with a college degree. It is also worth noting that 42% of population with a college degree believe that raising the price of water is very useful option to assure the water supply in future periods, as compared to 13% of population with elementary education and 19% of population without formal education.

It should be noted that, in the section centered on public opinion regarding irrigated agriculture, in the context of a generalized positive view of this kind of agriculture in Andalusia, it is the population with higher education that gives it the least importance (59% as compared to 91% of the population with no education). In that sense, the need to increase the irrigation surface is backed to a greater extent by groups without education, as well as by the oldest age groups. Concerning the negative and positive effects of agriculture on

the economy and the environment, the analysis of the survey has revealed statistically significant differences according to socio-demographic characteristics and regions of residence, although the results do not indicate clearly defined positions by these features.

Regarding the perception of equality, it is worth pointing out that the most educated sector of the population, usually the most socially influential sector, is the one that in a smaller proportion (6%) believes that water used in irrigation is distributed with equity criteria, as compared to the uneducated population (33%).

3. Conclusions

The results of the survey point to a great extent to the situation defined by Moral (2000) as perpetuating the values and myths that support the traditional water paradigm.

On the one hand, water is mainly perceived as a production factor, a resource that is far from being considered as having any environmental function. In this sense, a broad social legitimization of irrigation was evident throughout the whole questionnaire and through all the population strata, even among the urban and highland inhabitants. This positive perception is related to the fact that a majority of the inhabitants of the Lower Guadalquivir believe that water used in irrigation contributes to the development of the region (84%), creates jobs in the agricultural sector (80%) and does not affect the environment negatively (67%). It is clear that agricultural uses are considered to be more crucial for the region than any other uses: in this sense, the great importance of the tourism sector is not recognized, the impact of drought on the environment is underestimated, and the impact on recreational and leisure activities is virtually ignored. This last view highlights society's weak perception of in situ water uses.

This favourable image of the sector is further consolidated with the generalized idea concerning the supposed good use of water made by agricultural consumers: while 73% of the population believe that domestic consumers waste a lot of water, only 41% feels the same way about agricultural consumers.

On the other hand, responses to water problems are clearly perceived as relying on structural solutions: more infrastructures are believed to be the primary solution to the great "vulnerability" of the water system that is threatened every now and then by the phantom of droughts. The water works projects, as one might suspect, are expected to be financed by the public sector: in order to increase water supply reliability, investment commitments are expected from the public administration in both the domestic (66%) and in the

agricultural (57%) sectors. Only a small percentage of the surveyed (24%) believe that the public sector and the consumers should share the investment burden.

Some incipient changes in these values can be recognized in the younger and better educated sector of the population : the first group seems to be more concerned about environmental problems while the second one does not support in such a great proportion the legitimacy of irrigation as the region's main goal for acquiring wealth and development.

Nevertheless, these incipient differences are not representative enough of the new water culture that has been broadly identifiable in other countries since the seventies and is meant to be spreading in gradual steps, as outlined by the European Union's New Water Programme.

References

- CENTA y Plataforma del Guadalquivir, *Percepciones de la Sociedad sobre el uso del agua en el sector agrícola*, Junta de Andalucía, 1999.
- CARRASCO C., JIMÉNEZ J.F., AND LÓPEZ DE GARAYO E., *Percepciones de la sociedad sobre el uso del agua en el sector agrícola en conexión con la disponibilidad del recurso y la calidad de vida*, Programa de concertación para la realización de actividades de investigación y desarrollo en el campo de las ciencias agrarias, Dirección General de Investigación y Formación Agraria, Consejería de Agricultura y Pesca, (1999, sin publicar).
- CONSEJERÍA DE OBRAS PÚBLICAS Y TRANSPORTES-JUNTA DE ANDALUCÍA, *Plan Director de Infraestructuras de Andalucía 1997-2007*, Sevilla, 1997.
- MORAL ITUARTE L., *Problems and trends in water management within the framework of autonomous organization of the Spanish State, Living with Diversity*, XXIX IGU Congress: Seoul 2000, *Spanish Contribution*, AGE, Madrid, 617-636, 2000.
- NAVARRO YÁÑEZ C., *Competencia política, ambientalismo y cambio social. Normas y comportamientos ambientales en Andalucía*, Política y Sociedad, Vol. 33, pp. 217-231, 2000.