WATER PUBLIC SUPPLY IN THE SPANISH RURAL AREAS: THE ROLE OF GROUNDWATER.

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1 INTRODUCTION AND PURPOSE.

According to the figures presented by Achttiemble (1987), Spain is one of the countries in Europe that makes least use of groundwater for town supply; only about 30% of the population is supplied from this source. A simplistic view might underestimate the importance of groundwater in Spain, apart from the special value of this resource in the island and Mediterranean regions.

Groundwater is seen, however, as the best water resource for town supply. Aquifers in Spain extend over about 35% of the country and it is estimated that 25% of them could supply large exploitations (ITGE, 1989). The recent years of drought have shown the instability of a large number of surface supplies in comparison with the more regular groundwater flow, less susceptible to climatic changes. Some of these supply systems have been able to avoid water restrictions by emergency drilling of wells or because they had a complementary supply from groundwater. A good proportion of these aquifers provide water of high quality as is shown by the use that is made by the thousands of wells and springs throughout the country.

Here we examine the importance of groundwater for small towns and villages in Spain.

Spanish statistics for the use of water have not been drawn up systematically by any official department; available estimates made and published sporadically, have been made either by individual investigators or by the government, so there are no reliable official figures since those available are based on extrapolations which are still clearly inadequate. The recent study made by the Ministry of Public Administration , CEDEX (2001) and A.E.A.A.S. of use of water supplies to towns with populations of over 50,000 and those with fewer than 20,000 should be extended to cover the use of water in industry and in agriculture.

The following organisations and authors have published reports on this subject: Organización Sindical Española (1975), Llamas et al (1976), IGME (1981), Llamas (1983), Iglesias López (1985), Sánchez Guzmán (1983), and Sanz (1995) A.E.A.A.S. (1987, 1990, 2002) CEDEX (2001).

An inquiry was made by the Ministry of Public Administration in 1995 into the level of infrastructure and equipment in use in a wide rural zone, defined as the group of townships with a population below 20,000. From this wide survey, data can be taken on withdrawal and supply for comparison with similar data collected by the Spanish Association of Water Supply and Sewage (AEAAS) (1987, 1990, 2002) and covering the 283 towns whose population is over 20,000.

2 RESULTS.

The results are considered in three sections: the first examines the nation-wide figures and the different types of withdrawal (Fig. 1) (CEDEX, 2001); the other two consider the differences among communities of different sizes and among the hydrographic basins (Figs. 2, 3). The differences between the autonomous regions are studied by Sanz (1995). In the classification by population size the uses of the water are not recorded.

3 COMMENTARY AND CONCLUSIONS: THE ROLE OF GROUNDWATER

Centres of population in the rural zone are vary small: 56.5% have fewer than 100 inhabitants. They are widely separated (the average distance between them being 8 km), lying near small springs or rivers that gave rise to the first settlements, and near the mountains. These feactures, together with the relatively low incomes if the inhabitants and the steady decline in population in the last fifty years have conditioned water supplies, and the following conclusions may be drawn:

a) Most of the withdrawals (62%) are for the use of only the community they serve whereas in the urban zone all are shared with other localities.

b) Most of the water withdrawn (62%) is conveyed by gravity, in contrast with urban systems which are nearly all pumped.

c) Perhaps the most striking feature is that 54% of the water is from springs, 23% from wells and 6% from rivers, since the dispersion of the population means that these local sources supply 78% of the whole rural population and form 83% of all the withdrawals. Drilling has been intensified in recent decades.

d) Groundwater is therefore of the greatest importance in water supply in the rural zone where communities are settled near the aquifers, mainly of layered type. Considering springs as groundwater, 70% of the water supplied in the rural zone is from this source, against 15.3% in the urban zone. In absolute figures, 1,041 hm^3/year of the supply in the rural zone was of groundwater while in the urban zone the equivalent supply was of 441 hm^3/year. The total figure of 1,485 hm^3/year is much higher than that of earlier reports which gave 1,050 hm^3/year, a difference of 41.4% which for an official estimate is too wide of the mark. The total groundwater supply, incluyed Navarra and Pais Vasco, is 1.639 hm^3/year.

e) The average available per capita (0.32 m^3/day) is almost the same in the rural and in the urban zones, but the quantity available per capita is highest in the 16,172 smallest communities of under 100 members. The emigration from these localities, the lack of meters and of regulation in most of them, and economic factors and others of the use of water, may explain this fact.

f) Groundwater is shown to be a great social and economic benefit since the dissemination of the aquifers provides a low cost supply in case of need throughout the country. This has reduced emigration and has raised the standard of living in the rural zone by contributing to its sustainable development. Groundwater also helps to supply the part of the population that spends the summer months in the country, and guarantees the supply to the tourist zones of such great economic importance to the country.

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FIGURES

Fig. 1. Origin of the water for urban consumption (rural and urban zone).

Fig. 2. Types of withdrawals for urban use (by hydrographic basins).

Fig. 3. Volumes available and supply (by hydrographic basins).

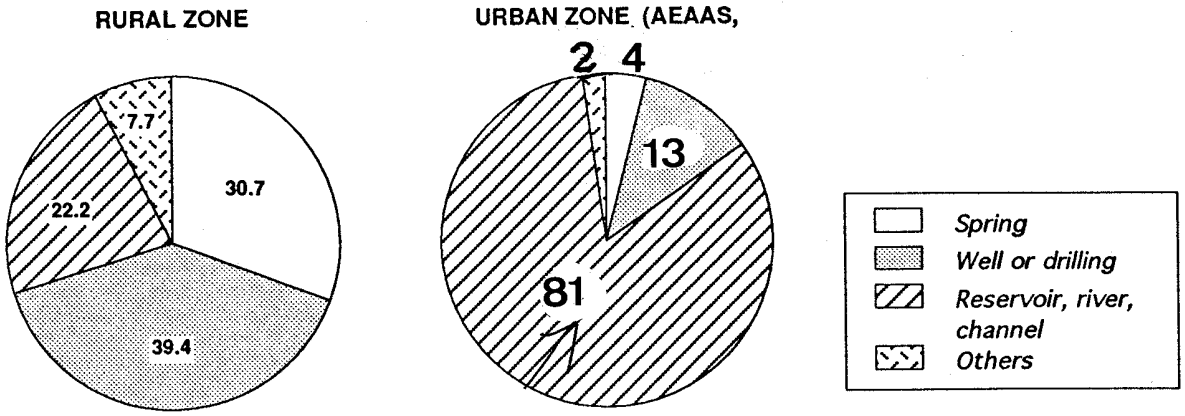

RURAL ZONE
30.7
39.4
22.2
7.7
URBAN ZONE (AEAAS,
2
4
13
81
Spring
Well or drilling
Reservoir, river, channel
Others

Figure 1

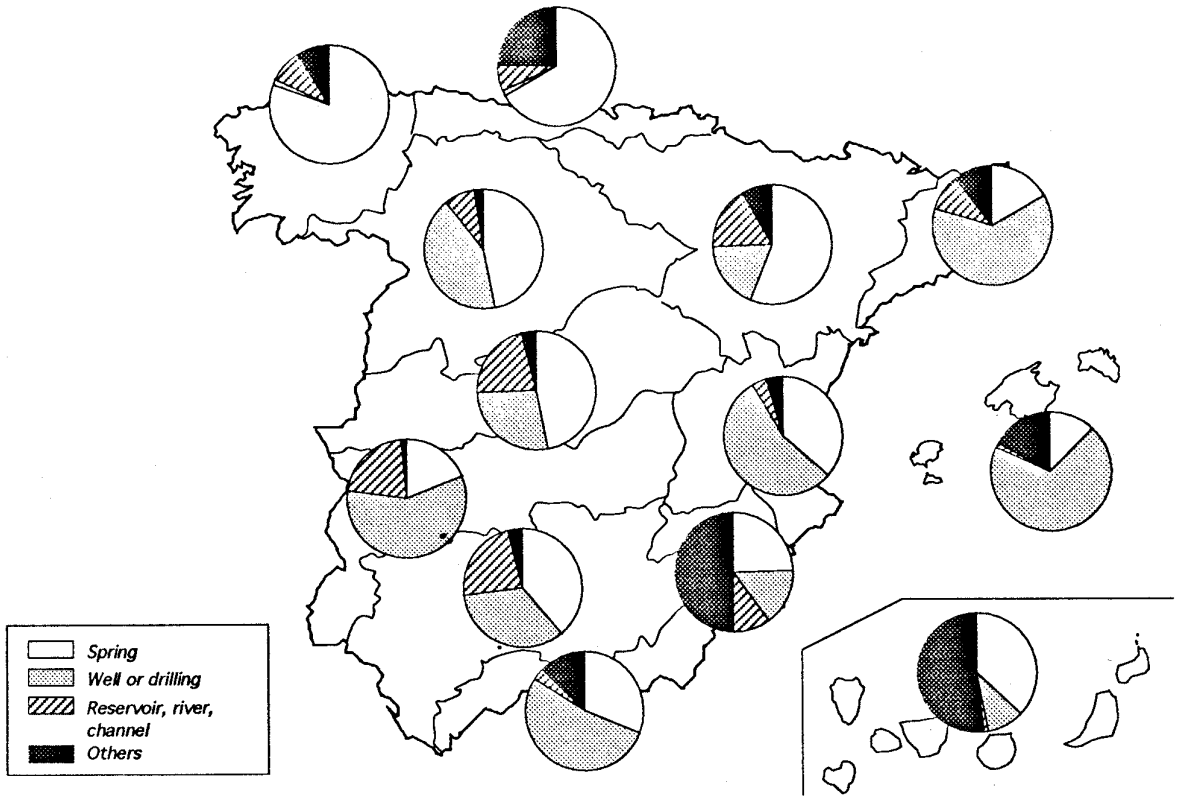
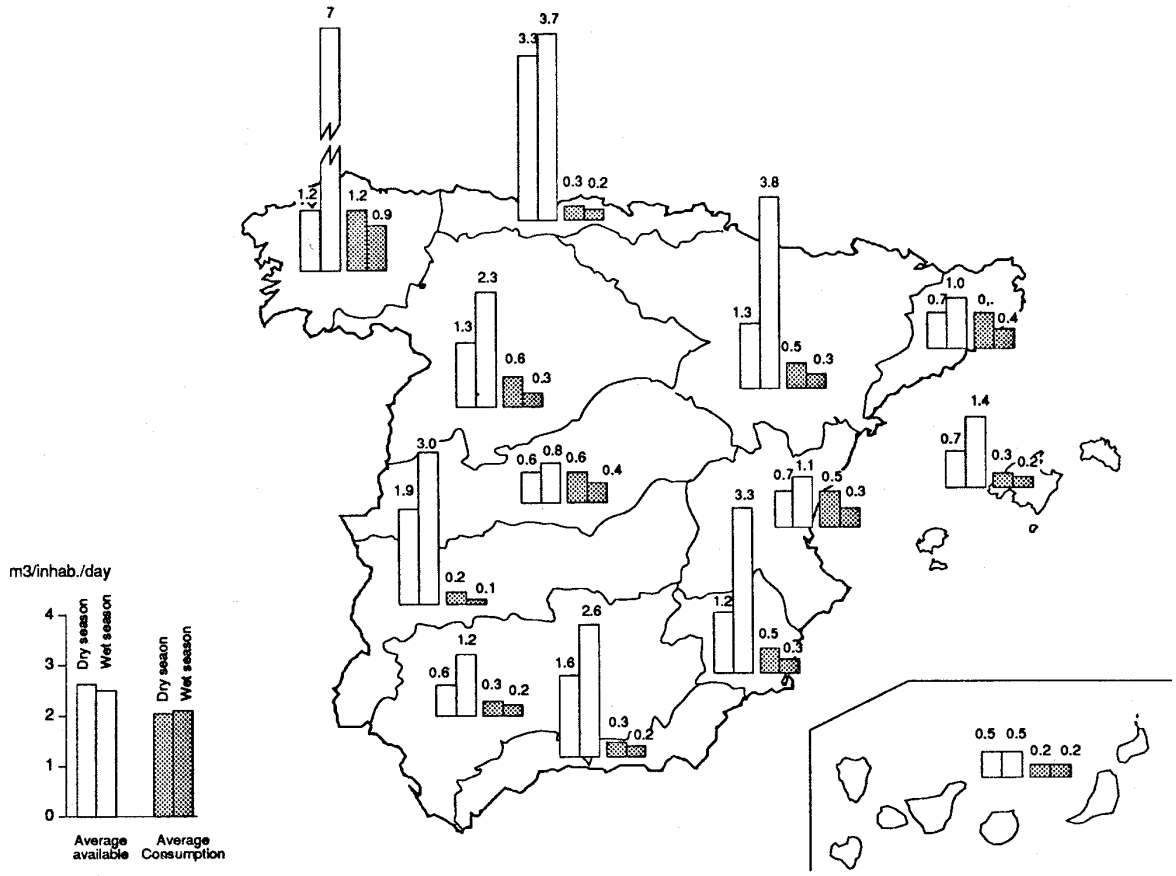


Figure 2


m3/inhab./day
4
3
2
1
0
Dry season
Wet season
Dry season
Wet season
Average available
Average Consumption
7
1.2
1.2
0.9
3.7
3.3
0.3
0.2
3.8
1.3
0.5
0.3
2.3
1.3
0.6
0.3
1.0
0.7
0.4
1.4
0.7
0.3
0.2
3.0
1.9
0.2
0.1
0.6
0.8
0.6
0.4
0.7
1.1
0.5
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3.3
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2.6
1.6
0.3
0.2
1.2
0.6
0.3
0.2
0.5
0.5
0.2
0.2

Figure 3