

LOCAL REGULATIONS FOR WATER SAVING: THE EXPERIENCE OF VARIOUS CATALAN MUNICIPALITIES IN URBAN WATER DEMAND MANAGEMENT

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Abstract

Recent droughts and increasing environmental awareness have prompted 46 Catalan local government organizations (Councils) to introduce water saving regulations on urban water consumption with the two-fold purpose of enhancing water use efficiency as well as promoting the adoption of the concept "fit-for-purpose water use". This paper aims to assess critically these pioneering initiatives in water demand management. Firstly, an overview of concepts and numbers is presented based on a review of such regulations and municipal statistics. Secondly, online survey and in-depth interviews were conducted to municipal technical experts from the study area to explore the factors that may determine the effective implementation of water saving regulations. Outcomes from both methodologies have been integrated and a SWOT matrix has been used to highlight common good practices and frequent impediments detected by respondents. Results reveal that despite the political support that water saving regulations has received, there are many social, institutional and technical barriers that policy makers should address in order to successfully implement such regulations.

Keywords: water demand management, local regulations for water saving, alternative water sources, SWOT matrix, Catalonia

Introduction

During the first years of the 21st Century Catalonia suffered two severe and prolonged droughts. The last episode that took place between April 2007 and the end of 2008 led to water restrictions for a number of uses and populous cities (including Barcelona) were just days away of domestic cuts. This episode illuminated the limitation of the conventional water supply approach (Molist, 2009). Furthermore, climate change scenarios for the region predict an intensification of the Mediterranean climate with both an increased frequency and intensity of drought periods (ACA, 2009). In Catalonia, urban demand accounts for 30 percent of total water consumption. However, for the Inner Basins of

Catalonia¹ where 92 percent of the population lives, urban water demand accounts for two thirds of the total demand and the domestic sector is the most important component of this demand (ACA, 2000). Domene *et al.* (2006) argue that, among other factors, domestic consumption is likely to rise in the Metropolitan Region of Barcelona (MRB) as a result of the expansion of the low-density urbanisation model and the growth of outdoor uses such as gardens and swimming pools.

Consequently, it is necessary to advance into a more sustainable urban water management (Brown *et al.*, 2009). In Spain, the so-called *new water culture* paradigm involves: (a) new approaches in agreement with the Water Framework Directive (such as protection and conservation of aquatic ecosystems, full cost recovery, integrated watershed management); (b) new ways of promoting participation and commitment of stakeholders; (c) new management based on water demand control policies that should be implemented at the local scale (Sanjuán, 2004).

Sant Cugat del Vallès, a rapidly expanding upper middle class town near Barcelona, was the first council that approved a water saving regulation in October 2002. The main objectives of this ordinance are to regulate the installation of water saving devices and the use of alternative water resources (rainwater harvesting, grey water reuse and swimming pool water reuse) in new buildings and major renovations. In December 2005, the Diputació de Barcelona (a provincial public body) published a template of water saving ordinance in order to help municipalities to develop their own local regulations. Besides water saving devices, this ordinance template also promotes the installation of individual water meters and the adoption of xerogardening practices in both public and private gardens.

Several studies conducted in the MRB reveal that outdoor water uses associated to the garden and pool urban model result in enhanced water consumption (Domene & Saurí, 2006; Domene & Saurí, 2003; Domene *et al.*, 2004; Parés *et al.*, 2004). However, many factors such as consumer habits, technology or the housing age can also modify this consumption (Domene *et al.*, 2004). It is significant that an important fraction of domestic consumption is employed in secondary uses (both indoors and outdoors such as toilet flushing and irrigation) which according to the fit-for-purpose water use concept can be provided by the alternative sources proposed in the ordinances. As the implementation of local ordinances has already a certain temporal margin, it is important to gain certain knowledge about the performance on these new regulations and to whether or not they may have contributed to reduce urban water consumption. The overall aim of this research is to assess the implementation process of water saving regulations based on practical experience and the perceptions of municipal technical experts.

¹One of two major management fields in which water planning in Catalonia is divided (the other being Ebre basins). Corresponds to the eastern slope of the hydrographic network which includes rivers born in Catalonia and ending in the Mediterranean. It occupies 52% of the territory and it is exclusive jurisdiction of the Generalitat of Catalonia.

Methods

An on-line survey was administered in the 46 councils of the study area to municipal technical staff that are responsible for the implementation of the water saving ordinance. The questionnaire consists of 20 semi-open questions about the different phases of the implementation process (policy development, communication, monitoring and evaluation). Specific data about the municipality was also requested in the on-line survey. In order to collect additional and more detailed information about these experiences, in-depth interviews were conducted in 16 selected municipalities.

Results and discussion

To date, 46 municipalities (Figure 1) with a population of 1.121.950 inhabitants and a domestic water consumption of nearly 60 hm³ in 2008 (11 percent of total domestic consumption in that year in Catalonia) have approved water saving regulations. The average water domestic consumption in the study area (Figure 1) is 219.1lpd (litres/person/day) which is somewhat higher than the Catalan average (152.8 lpd). However, the extreme values are disparate, varying from 111 lpd (Roda de Ter) to 487 lpd (Fontanals de Cerdanya). Between 2006 and 2008, domestic consumption per capita declined substantially with the lowest values attained in 2008 coinciding with the extreme drought mentioned previously.

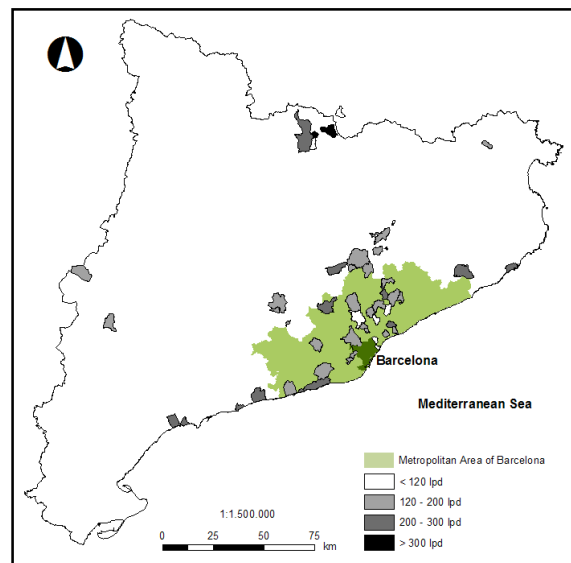


Figure 1. Average litres/person/day of the municipalities in the study area.

Responses and contributions of the municipal technical staff members are summarized in a SWOT matrix (Table 1). The SWOT matrix serves to identify the internal and external factors that are favorable and unfavorable to achieve an effective implementation of water saving regulations and highlight the opportunities and threats that respondents have detected from their practical experience.

Table 1. SWOT matrix of water saving ordinances and their implementation

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> - Educational tool - Flexible and suitable for the municipality features - Fit-for-purpose water use concept - Inclusion of xerogardening guidelines - Water saving devices to enhance efficiency - Wide-ranging scope that includes domestic, industrial, 	<ul style="list-style-type: none"> - Lack of supervision capacity in the operating phase of the systems - Sizing of rainwater tanks is too strict; calculation should take into account planned uses - Lack of economical resources to implement the ordinance and monitor its compliance

commercial and municipal sectors	- Fragmented responsibilities
- Monitoring through construction permits during design and execution phases	- The dimension of grey water system are based on grey water production
- Maintenance contracts for a minimum of 2 years for grey water reuse systems	
OPPORTUNITIES	THREATS
- To incorporate all the alternative water sources available in the municipality	- Risks associated with public health
- To Promote a change of mentality inspired in <i>new water culture</i>	- Legal gap about quality standards of recycled water
- Innovation in water demand management	- Lack of funding and effective market incentives
- To strengthen regulations of higher rank: "Decret d'Ecoeficiència" [Eco-efficiency Order] in Catalonia and "Código Técnico de la Edificación [Technical Building Code] in Spain	- Uncertainties about the performance and cost of alternative water supply systems
- To extend the ordinance application to existing buildings in the municipality	- Insufficient practitioner's skills and knowledge
- Development of prevention and action protocols for drought periods	- Unawareness or misinterpretation of the ordinance by citizens, developers, etc.
	- Perception of the ordinance as an economic impediment in the ongoing context of crisis

Conclusions

In Catalonia local governments have executive powers in urban water supply and sanitation management. Given that much of the solution to water crisis requires promoting water demand management strategies, local governments are called to play an important role since they are the closest administration to the citizen. Councils can also play a demonstrative and exemplifying role in advancing sustainable water policies. For instance, Sant Cugat del Vallès is the municipality that paved the way and first implemented a water saving regulation targeting efficiency and fit-for-purpose water use in urban consumptions. To date, 46 municipalities have similar regulations. It is still relatively early to determine whether or not water savings have been achieved because of these regulations. Moreover, the decrease of consumption associated to the drought of 2008 was observed also in municipalities not having such regulations. At any rate and despite political rhetoric supporting water saving ordinances, there are many social, institutional and technical barriers to their effective implementation.

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