Abstract

Title: Comparative water management practices in California and Spain
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California and Spain are very similar in terms of climate, availability of water resources. Both countries have Mediterranean climate and their surface water resources are naturally available in the north, whereas most of the population and agricultural activities are located in the dry areas of the center and the south. Despite having similar population and economy, water use in California is two times higher than in Spain. Such a large difference is mostly explained by private residential landscaping and highly inefficient agricultural water management. With regards to future challenges, both regions are facing water demand growth, climate variability and environmental vulnerability. However, California and Spain have developed very different planning strategies. While California is using a number of different water management practices, Spain relies strongly in its traditional sources of supply and seawater desalination. It should be noted that water resources planning is strongly linked to socio-economic factors such as urbanization, industrial development, agricultural production, etc. Therefore finding the optimal water supply system is not only a question of technology and environment, but actually involves strong political and economical interests.

In order to support future development without compromising their natural resources, California and Spain should build a diversified water supply portfolio that would lessen the pressure on the environment and would be affordable at the same time. The formula includes many different sources of supply and the optimal combination would vary in time and space according to availability and demand. Water management plans in California and Spain include a number of diversified practices, yet each region has established different priorities. On the one hand, not only does California carry out a number of aggressive conservation programs, but the State also holds two of the World’s most innovative water recycling and conjunctive use facilities. On the other hand, water conservation and conjunctive use are barely inexistent in Spain, while this country ranks number 4 in desalination capacity worldwide.

California is usually seen as an example of good water management for other dry regions like Spain. However, despite the State’s environmentally friendly water management practices, California remains one of the largest water users of the world. Therefore, I believe that besides setting an example of innovative water management, California has a lot to learn from Spain in terms of water use efficiency. The aim of this thesis is to develop a comparative analysis of water use and water management practices in California and Spain and determine how the experiences carried out in each region could contribute to improve management of their water resources.

This thesis will focus on five major water management practices: 1) urban water conservation, 2) agricultural water use efficiency, 3) water recycling, 4) conjunctive use of surface and groundwater and 5) desalination. Urban water conservation and agricultural water use efficiency intend to reduce water use, without cutback in its derived benefits by minimizing losses and unnecessary water uses. Water recycling and desalination provide a new source of water supply, although both entail relatively high costs driven by intensive energy use. Conjunctive use of surface and groundwater consist of storing water within natural aquifers during surplus years to be used later on during dry periods. This thesis contains five chapters that compare benefits and drawbacks of each of the five water management practices previously mentioned, as well as their costs and potential applications in California and Spain. To summarize, I will point out which management strategy should be prioritized in California and Spain and why. Finally, the conclusions will include a series of recommendation that could contribute to improve water management in California and Spain.

It should be noted that this thesis is an update of the project presented at the École Nationale des Ponts et Chaussées in Paris in December 2007. The improvements included in this latest version have been made possible thanks to the guidance of Professor Rafael Mujeriego from the Civil Engineering School of Barcelona.