



Sustainable Use of Water Resources in Coastal Areas

A recent paper by Spanish researchers illustrates how an inappropriately planned coastal development can lead to increasing water consumption to unsustainable levels. The results highlight the importance of focusing on the environmental impacts of resource use in order to achieve sustainable development.

The rate of land-cover alteration is increasing dramatically worldwide due to increasing and intensifying human use of land. In Europe, built-up areas have expanded by 20% during the last two decades. In semi-arid and dry Mediterranean areas, where water scarcity is one of the main factors influencing the way ecosystems function, any change in land use can modify the hydrological cycle, which in turn may limit the availability of water. For many decades, tourism and agriculture have been the main economic sectors in these areas and major drivers of the changes that have occurred in both landscapes and regional water balance. Nevertheless, the environmental impacts of these changes have rarely been evaluated.

As part of the EU-funded research project AQUADAPT¹, Spanish researchers have investigated the human impact on water balance that resulted from changes in land use and land cover over the last half century in an area on the Mediterranean coast. To this end, different management strategies implemented in three of the area's municipalities were compared during three time periods (1956, 1978 and 2000). Land-use and land-cover were mapped using aerial photographs and image-processing techniques. A digital elevation model and precipitation data were used to calculate the water balance for each type of land use and cover.

The results show that in the municipality that had promoted and experienced the greatest tourism development (Benidorm), the proportion of the area covered by natural vegetation and agriculture has decreased by 3.2% and 30% respectively, while the proportion of urban area has increased by 33.6%. A decrease in natural vegetation (4.2%) was also observed in the municipality that had developed a highly specialised cropland irrigation system devoted to the production of citrus and other fruits for export to Europe (Callosa d'en Sarria), with the proportion of the area devoted to irrigated agriculture increasing by 20%. On the other hand, in the municipality that had implemented a strategy based on retaining more of the natural and agricultural environments (Guadalest and Beniarda), the proportion of area covered by natural vegetation increased by 16.5%.

The authors argue that the changes in land use between 1956 and 2000 increased water consumption to levels exceeding the water resources in Callosa (increase in the area of irrigated cropland) and Benidorm (increase in the area of urban development for recreational use). Furthermore, tourism development in Benidorm was accompanied by an increase in transport infrastructure and by expansion of areas with impermeable surfaces, which resulted in a lower level of infiltration into the aquifer systems. These changes generated a net water deficit in these two municipalities of more than 6 million cubic meters per year (Mm³/year), thus creating a high demand for water imported from other municipalities in the region to maintain current use. However, current trends in land use suggest that an increased water deficit will occur at regional level in the future, and, therefore, that water transfers from outside the region will be necessary, which in turn may affect the sustainability of other remote areas.

The authors conclude that to avoid the adverse effect of unsustainable development in coastal areas, planners and decision-makers should balance the current availability of natural resources with the proposed new changes in land use before permitting further changes.

On 21st December 2005 the European Commission proposed a Strategy on the Sustainable Use of Natural Resources used in Europe². The objective of the strategy is to reduce the environmental impacts associated with resource use and to do so in a growing economy.

¹AQUADAPT project (<http://www.ua.es/es/internacional/internacionalizacion/aquadapt/>), supported by the EC 5th Framework Programme, under the thematic programme 'Energy, Environment and Sustainable Development' Key Action 1 "Sustainable Management and Quality of Water" (Contract N° EVK1-CT-2001-00104).

²For more information on the Thematic Strategy on the Sustainable Use of Natural Resources: <http://ec.europa.eu/environment/natres/index.htm>

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Contact: Juan.bellot@ua.es

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