

Executive Summary

Mitigation of Water Stress in Coastal Zones

THE BACKGROUND OF THE MITIGATION OF WATER STRESS IN COASTAL ZONES REPORT

This publication was published in October 2010 and it is based on a report presented by the WssTP to the European Commission, 12 October 2009.

Coastal Zones are where surface water, groundwater, transitional 'brackish' and coastal water interface at scales where changes in the river basin affect this interfacing and the related biota and human activities. This explains why transitional and coastal waters are recognized by the Water Framework Directive (WFD) as an integrated part of the river basin management districts.

It is the area with the greatest variety of water bodies: river estuaries & deltas, coastal lakes & lagoons, wetlands – including temporary water bodies – that play an important role in the water cycle and in the ecosystems (major nursery systems) as well as in the mitigation of climate change impacts. More than half of Europe's wetlands have disappeared in recent years according to RAMSAR7.

In terms of economical value associated to water use in coastal zones; worldwide coastal tourism in 1998 represented 161 billion US\$, followed by trade & shipping 155 billion US\$, offshore oil & gas 132 billion US\$ and fisheries 80 billion US\$¹⁸ (Estuaries having by far the highest estimated mean value, compared to continental shelf & open ocean). Aquaculture production in marine water, freshwater and brackish water is rapidly growing. Freshwater aquaculture is predominantly influenced by water limitations; about 8,750,000 ha freshwater and 2,333,000 ha brackish water ponds are in use today (2009)²⁰. Brackish aquaculture is highly depending on the quantity and quality of inflowing freshwater and in turn impacts water quality such as through associated algal proliferations. In general in coastal zones there is a high correlation between industrial areas & seasonal zones of oxygen depleted waters²¹.

CHALLENGES OF MITIGATION WATER STRESS IN COASTAL ZONES

Addressing water stress by integrated water resources - or cycle - management in coastal zones is made difficult by the number of different water bodies, but also by the large variety of stakeholders, legislations, policies and conflicting interests. In spite of legislation and policy implementations since the 1970s (e.g. Bathing Water, Groundwater, Drinking Water, Fish Water & Shellfish Water Directives between 1975-1980), a number of surface water and groundwater bodies will fail to meet the EU Water Framework Directive (WFD 2000/60/EC) objectives by 2015. In parallel, fast growing new sectors such as complex aquaculture or the use of microalgae for biomass production are in need of adequate regulatory frameworks. even if it is acknowledged that they will not be sufficient to maintain economical growth in coastal zones.



A Common Vision for Water Research and Innovation

Water issues in coastal zones, such as overdraft, salt water intrusion and inadequate laws²⁹, have generated the development of alternative water supplies that raise a number of new issues that also need to be addressed. For example, desalination plants are a fast growing new source of freshwater along the coastlines with specific intake and discharge needs (although billions of US\$ have already been invested since the 1950s, investment figures are still increasing). At the same time, water injection to restore aquifers and for storage due to impedance of recharge by surface modifications, or effective saltwater intrusion mitigation, are still limited. As well, there are still measures that can be taken to reduce the consumption and losses of resources.

MAIN FINDINGS AND FUTURE RESEARCH NEEDS

The following major RTD needs have been identified to support the implementation of the WFD and Daughter Directives:

- Sufficient fit for purpose data, based on defining common measurements accuracy and precision for coherence of uses
- Seamless data integration at a systemic level, with propagation and dissemination of results
- There is a need to develop a European coastal zone freshwater bodies classification and matching alert system based on key physical and economical identifiers in terms of land use changes, water inflow changes and increasing groundwater extraction rates for the analysis
- There is a need to further develop guidance or triage tools and methodologies for water managers
- There is a need to implement managed aquifer recharge field pilots in coastal aquifers to test and validate parameters and indicators fulfilling the needs of water managers and policy makers and define the technical and economical feasibility of this technique
- There is a need to develop coastal ecohydrology methodologies for sustainable water resources management and flexible in-situ bioremediation, to restore and maintain at a catchment scale water circulation, nutrient cycles and energy flows and enhance the carrying capacity of ecosystems against human impacts
- There is a need to reassess freshwater in the Mediterranean basin, developing a systemic approach to study, manage & protect Mediterranean karst groundwater resources in a sustainable way, in the light of the Messinian salinity crisis
- Finally, for coastal zones that are more and more dependent on tourism, there is a need to find water and wastewater technological solutions to keep the tourism industry competitive in a global economy

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