

Groundwater over-pumping in a Tunisian coastal phreatic aquifer: impacts and remedial solutions

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ABSTRACT

As in many semi-arid areas, the agricultural development in the north-eastern coastal plain of Cap Bon, Tunisia has relied on groundwater use, as evidenced by the large increase in the number of pumping wells for irrigation purposes since the 1960s. After two decades of groundwater pumping, seawater intrusion has become a limiting factor for further agricultural development, and several negative impacts have occurred. For example, well field productivity has decreased, water quality has deteriorated, soil fertility has declined, and this has led to abandonment of agricultural lands. Due to the importance of the groundwater resources of the coastal aquifers of Cap Bon, several remediation scenarios have been proposed for this region:

1. the creation of a zone of protection that covers nearly 2000 hectares in Lebna–Menzel Horr areas, this zone is irrigated using surface water from Mejerda–Cap Bon canal;
2. the ban on bore drilling deeper than 50 m;
3. the construction of two dams (Chiba and Lebna) on the two main rivers in the north-eastern plain for the irrigation of nearly 3000 hectares;
4. the enhanced recharge of the phreatic aquifer by surface water injection in farm wells; this is a first attempt at managed recharge operation by the landholders of the region;
5. Recharge of the aquifers by surface water release and infiltration in the wadi;
6. Recharge of the phreatic aquifer by treated wastewater;
7. Mixing of brackish water from the phreatic aquifer with the freshwater of the deeper aquifer or with surface water from dams.

This paper will focus on the influence of increased groundwater pumping in the coastal plain of Cap Bon area, including its impacts on groundwater, soil fertility, crop production and the socio-economics situation. Also, remediation solution will be discussed and assessed in terms of piezometric trends and salinity evolution.

