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TANGIERS RECHARGE PROJECT, MOROCCO*

The background information on the Tangiers recharge project is as follows:

- (a) Region: south-west of the city of Tangiers;
- (b) Geography: coastal plain;
- (c) Climate: Mediterranean; rainfall (autumn-winter), 600-700 mm;
- (d) Reservoir type: sedimentary coastal basin.

Ground-water reservoirs and utilization

The geological structure can be described as a synclinal basin. The formations of interest in the basin are Pliocene shell limestones and sandstones, 300 m thick, which overlie Cretaceous clays. The Pliocene limestones are karstic. The principal aquifers are the limestones and sandstones, which are unconfined. The syncline is considered as an isolated unit. Therefore, the boundaries of the syncline and the aquifer are the same. Hydraulic conductivity is 1-10 m/day. The surface area of the aquifer is 20 km²; it is 300 m thick. Natural recharge occurs by means of infiltration of rainfall and run-off into the aquifer; total yearly recharge is in the range of 1 x 10⁶m³. Natural discharge occurs through underflow towards the ocean. The aquifer is exploited by means of wells to provide a municipal water supply for Tangiers.

The exploitation of this reservoir has increased continuously. In 1953, the aquifer was over-exploited; in 1955, 3 x 10⁶m³ was extracted, but there was only 1 x 10⁶m³ of natural recharge. Storage was being depleted to the extent of a 15 m drop in the piezometric level in four years. With this, the problems of sea-water intrusion increased.

Artificial recharge

The purpose of artificial recharge was to stop the intrusion of sea water into the aquifer and to maintain the available supply. In 1958, a low check-dam was constructed on the Mhardar River to provide temporary retention for winter flood-waters, permitting the waters to percolate into the aquifer. During the six-year period, 1958-1964, an average of 1 million m³/year was recharged to the aquifer in this manner. Surface water is used exclusively during the winter, and the replenished aquifer is exploited in the summer. The artificial recharge technique has been effective in maintaining the water supply for Tangiers, and will be continued.

References:

Abroggi, R. et R. Hazan. Alimentation artificielle de nappes aquifères dans des grès fissurés. Tanger. Colloque de Dobrovnik. AIRS UNESCO, pp. 486-499. 1965.

* Case study No. 27 prepared by G. Castany (France).