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Water import and transfer versus desalination in arid regions: GCC countries case study

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ABSTRACT

The scarcity of water resources and the increasing gaps between demand and available supply in the Gulf Cooperation Council (GCC) countries is a major challenging issue facing the development sectors. GCC countries have extremely dry climates with rare rainfall, high evaporation rates and limited non-renewable groundwater resources. At present all GCC countries except Oman fall in the critical water scarcity category which is about 500 m^3 of renewable water/cap/year. In addition, governmental policies with regard to increasing the level of food self-sufficiency through subsidies and other incentives, have contributed to a major expansion in and unrestricted use of non-renewable groundwater resources. This coupled with a lack of defined policies and strategies geared toward optimizing and managing the scarce water supplies within the GCC region, have contributed to wasteful and uneconomic practices, as well as to the inefficient mining of non-renewable supplies. To meet the present and future water demands of the region the available options are limited to either long distance water transfer and import from other countries or investing in large scale seawater desalination installations. In this paper the economical, technical, sustainability and the political criteria affecting the two alternatives have been evaluated. Economic analysis revealed that the cost of long distance water transfer can escalate to more than 0.83 US$ per cubic meter. When sustainability considerations are taken into account this figure may reach up to 2.35 US$ per cubic meter. While these figures were competitive with the cost of seawater desalination 20 y ago, the situation has been recently shifted in favor of seawater desalination which dropped from 5.5 US$ in 1979 to less than 0.55 US$ in 1999 using the RO technology. It is concluded that sustainable development of GCC countries will depend in the future on large scale desalination. This fast growing technology should replace or at least be considered a viable alternative to presently planned water transfer projects. Expanding desalination capacity in the next 20 y will be possible by building new plants or upgrading the existing facilities in GCC countries. This process, however, will require high economic investment.

Keywords: Water transfer; Desalination; Water demand; Water management; Cost analysis; Decision making