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Strategies to Manage Aquifer Recharge in Balochistan, Pakistan; an Overview

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Strategies to Manage Aquifer Recharge in Balochistan, Pakistan: An Overview

Abstract

Balochistan plateau dominated by the drainage system of eighteen river basins, where precipitation recharge consolidated and unconsolidated aquifers. In eleven river basins the groundwater levels are steadily decreasing for the last three decades due to unsustainable long-term groundwater extraction. The cumulative decline of water-table ranges from 2 to 3 meters/y. The most significant decrease, i.e. 60m in the last 12 years has been recorded in parts of Quetta valley. The estimated total groundwater recharge in an average year of all river basins is 2.21 Mm3, whereas the withdrawal is 2.66 Mm3 causing an overdraft of 0.45 Mm3. To increase the groundwater recharge, many proposals have been developed and several studies have been carried out by different public and private sector organizations, encompassing artificial and natural groundwater recharge. However, implementation of the recommendations of these studies remained limited with little progress. Assorted strategies have been developed by the concerned government departments for the protection of natural resources, including water, but a comprehensive provincial strategy to address and augment groundwater recharge in Balochistan is yet to be formed. In this article the natural resource protection strategies and their sub-strategies that are directly or indirectly associated with the natural recharge of groundwater have been reviewed and summarized. The policies that are reviewed in this article include water policies and environmental policies for the water sector. The sub-strategies include; a) strategy for climatic variability, b) strategies for aquifer recharge, c) strategies to improve governance, d) Balochistan conservation strategy, e) environmental strategy, f) biodiversity strategy, g) integrated water resources management strategy and h) participatory groundwater management strategy.

In some of the previous studies certain measures have been proposed for the improvement of water resources. These measures include; a) ban on agriculture tubewells in urban areas, b) water loss reduction and leakage control, c) provision of recycled wastewater to farmers, d) effective monitoring and metering system, e) rehabilitation of drainage system, f) development of new water resources, g) construction of storage and supply dams, and h) construction of delay action dams (DADs). Subsequently, 326 DADs with an overall storage capacity of 276 Mm3 were constructed in different river basins. The construction of 100 DADs to mitigate groundwater decline is in progress. To assess the impact of DADs on aquifers, studies were conducted on 14 and 25 dams in two phases during 1997 and 2008 respectively. These studies show that estimated seepage of groundwater through 14 DADs was 5.46 Mm3/y and 28.38 Mm3/y from remaining 25 DADs. The estimated discharge through Karez (underground water channels) located in the downstream side of 25 DADs also increased from 6.86 Mm3/y to 24.27 Mm3/y. These studies represent that in current circumstances, the DADs are the most appropriate means to recharge aquifers if supported by comprehensive catchment area specific water management strategies. The effectiveness of DADs may be further enhanced by the increased height of the dam and storage capabilities to supply for community utilization and introducing outlet systems for sediment-free water recharging.

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