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Scope for Reallocation of River Waters for Agriculture in the Indus Basin

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Abstract

Out of 21 million hectare of agricultural land in Pakistan, 14.8 million ha is irrigated through its large-scale irrigation systems, while 5 million ha is rain-fed or flood-based, with scattered well irrigation. This thesis argues that the large-scale irrigation systems of the Indus Basin have changed beyond the incremental level, to a qualitative level. This includes changes in the actual surface allocations, total availability of water from different resources and the responsiveness of irrigation diversions to the crop demand cycle. The Agriculture systems have also changed and are a definable hybrid of protective and productive irrigation. New boundaries (constraints in few cases and higher flexibility in others) have been added to the water allocation process with the Indus Waters Treaty of 1960 with India, the development of surface reservoirs and link canals, and the Water Allocation Accord of 1991 between the four provinces of Pakistan. In addition to the formal systems of water use, there are unaccounted uses in agriculture and new priorities of other sectors.

The research identifies how irrigation managers and users have been able to manage these changes by adapting the "operational rules", which has led to an increasing gap between "the planned" and "the operated" systems. Currently, diversified sustainability threats are faced at the canal command and the basin levels in terms of ground water depletion, water logging, compromised agriculture and an un-recognized shift of water. Comparing different allocation scenarios and their expected impact at the canal command, provincial and the basin scales show the scope for the reallocation of surface water at these levels. Three types of tools are used, temporal analysis (historical review, statistical analysis), Water Balance at different levels, and a basin level model of the whole network.

It was shown that in the Indus Basin, irrigated agriculture has attained a near to maximum potential in some areas, more surface water can be diverted during Kharif in some others, and water saving is possible in the saline areas, by better managing surface supplies. These scientific findings should find their way in the practical management solutions that generally focus only on the network potential. The small amount of science created in this big river basin, hosting a huge irrigation and water use system, has its origin in the empirical approaches of the design and irrigation operations. These approaches have been extended too long and too much in the basin. This study aims to contribute to the creation of science in the field of integrated water resources management and to protect the livelihood and agriculture growth oriented model.

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