

Transboundary Groundwater Sharing and Contamination: UNESCO-IAH-UNEP Conference, Paris, 6-8 December 2010

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ABSTRACT

This is a proven fact that water plays pivotal role in economic development of a country like Pakistan. There is no substitute for water, water is finite, has economic value and least immune to misuse, underuse, pollution and poor management. Pakistan can be classified as one of the most arid countries of the world with average rainfall of 240 mm a year. Its population and economy heavily depend on the annual influx into the Indus System (including the Indus, Jhelum, Chenab, Kabul and some un-captured flows by India of Ravi, Sutlej and Beas rivers) of about 190 BCM of water mostly derived from snow-melt in the Himalayas. In addition, Pakistan has 16 mha of aquifer with a total potential of 68 BCM of groundwater, mostly getting recharged through canals network and partially through some limited structural arrangements. The 81% of the surface water is available in the wet season (Kharif) which runs from April to September. Seventy seven percent (77%) of Pakistan's population is located in the Indus basin – 40 million People in Pakistan depend on irrigation water for their domestic use especially in areas where groundwater is brackish. In general Pakistan is a water scarce country, has high precipitation variation, high water stress indicators, high ecosystem deterioration, extremely low water use efficiency, poor access to clean drinking water and sanitation, poor conflict-management capacity and deferred maintenance of water infrastructure. Trans-boundary aquifer mining and trans-boundary surface water pollution are factors which adversely affect water resources of Pakistan, both surface and ground water.

Pakistan is extracting 50 MAF of groundwater against total resource of 59 MAF. The remaining 9 MAF has already reached its economic limits. The over-mining of aquifer has resulted in secondary salinization along with presence of fluorides and arsenic. This is degrading the quality of agricultural land and resulting in multiple diseases.

The major issue of Transboundary groundwater sharing and contamination is faced by Pakistan because of the fact that the very liberal policy of groundwater extraction with very subsidized electricity tariff for farmers of the Eastern Punjab in India and release of industrial effluents in the Ravi River which enters in to Western Punjab in Pakistan not only cause fast declining groundwater table but also contaminating the groundwater reserves of Pakistan.

This paper will thoroughly review the Transboundary groundwater occurrence, uses in both neighbouring countries India and Pakistan, groundwater reserves health in Pakistan, factors contaminating and declining groundwater resources, possible suggestions to improve the situation without compromising relations with the neighbouring country. The paper would also suggest some measures to be adopted to improve groundwater management on sustainable basis.

Key words: Transboundary Groundwater, Shared River Flows, Contaminating Groundwater, Health Hazard.

1. INTRODUCTION

The Indian Sub-Continent carries a long history of irrigated agriculture practiced by locals living along the water bodies including rivers, lakes, ponds, etc. and tapping seasonal inundations. This traditional irrigation practices changed into perennial irrigation in the 1880's through the advent of hydraulic structures and vertical pumps.

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million People in Pakistan depend on irrigation water for their domestic use especially in areas where groundwater is brackish. In general Pakistan is a water scarce country, has high precipitation variation, high water stress indicators, high ecosystem deterioration, extremely low water use efficiency, poor access to clean drinking water and sanitation, poor conflict-management capacity and deferred maintenance of water infrastructure. Trans-boundary aquifer mining and trans-boundary surface water pollution are factors which adversely affect water resources of Pakistan. Pakistan therefore, falls in the category of high vulnerability to climate change.

During the British Rule in India, the joint Punjab (East Punjab in India and West Punjab in Pakistan) was considered food basket not only for the subcontinent but also for the Asia continent because of its fertile lands, groundwater resources and hardworking farmers. This land was called Golden Sparrow.

2. RISE OF PROBLEM

Groundwater resources of Punjab were being recharged with annual water flows of five major rivers namely Jhelum, Chenab, Ravi, Sutlej and Beas. However partition of the sub continent in August 1947 cut across the Indus irrigation network whereby control structures on eastern rivers fell within the territory of India and rivers/canals remained within Pakistan. Soon after the partition, India conveyed its intention of diverting the waters of eastern rivers. This would have meant strangulating the agro-based economy of a newly created Pakistan whose 75% of GDP was solely dependent on agriculture as other sectors of the economy were non-existent. This not only was impacting the flow of surface water to Punjab but also to extremely decline the recharge of groundwater resources which were major source of irrigation during Kharif (Winter) season when surface flows become very thin.

With stoppage of water from the three eastern rivers by India, Pakistan's 3 million hectare of fertile land of West Punjab, the food basket of Pakistan would have gone barren. This created a serious water dispute between India and Pakistan. However, over a period of 8 years of exhaustive negotiations under the auspices of the World Bank from 1952 to 1960 the famous Indus Waters Treaty between India and Pakistan was signed in September 1960. The World Bank was also a signatory to this transboundary water allocation. Under the Treaty, India was given exclusive rights to the uses of water of three (3) eastern rivers with limited uses of waters of western rivers and Pakistan got exclusive rights on the waters of three (3) western rivers. Pakistan was given a grace period of 10 years to complete its Indus Basin Replacement Works. This Treaty though extensively lauded internationally as an example of resolving transboundary water issues between two sovereign states, created some serious hydrological shocks and challenges for Pakistan. The first challenge as stated earlier arose because the lines of partition of the Indo-Pak subcontinent separated the irrigated heart land of Punjab from the life-giving waters of the three eastern rivers. The second challenge was that there was a serious mismatch between the location of Pakistan's water (in the western rivers) and the major irrigated areas in the east. To overcome major water challenges, Pakistan had to undertake major engineering works within a fixed time period of 10 years. The initial works included construction of mega rock and earth fill dam on one of the western rivers i.e. Jhelum River at Mangla, construction of inter-river link canals to transfer the waters of western rivers to eastern rivers with a number of Head-works and Barrages and later the world largest volume rock and earth fill dam i.e. Tarbela Dam was also built on River Indus, the largest river of the Indus Basin Rivers System.

With additional storage water available at Tarbela, additional canals and control structures were constructed in all the four Provinces of Pakistan. With the construction of Tarbela, Mangla and Chashma Multi-purposes storage dams, storing close to 20 billion cubic meters of water and water distribution network consisting of 19 barrages, 60,000 km of main canals and 1.60 million km of

secondary and distributary canals, the Indus Irrigation System became the largest contiguous irrigation system in the world. The interlink canals provided a source of recharge to the groundwater of Punjab which was earlier recharged by the three eastern rivers. If this situation was maintained, there was no harm to the groundwater aquifer of West Punjab in Pakistan.

3. DISCUSSIONS

Unfortunately, India adopted very liberal policy towards extraction of groundwater from the adjacent aquifers of East Punjab in India. This is causing over-mining of sweet water and causing degradation of the groundwater aquifer. On the other hand, India is also releasing its industrial waste of Hadiara Drain into the River Ravi which not only pollutes the un-captured rainwater which it carries to Pakistan after entering into its boundaries. This mixing of untreated industrial waste into the un-captured freshwater of River Ravi causing havoc to the fertile lands of West Punjab in Pakistan. This attitude on part of India is extremely dangerous not only for the meagre flows of Ravi River but also putting the whole groundwater aquifer on stake. This is also a serious violation of all international norms and ethics.

On the other hands, a part from the above-mentioned serious transboundary issues, though groundwater is an important resource, there is no firm policy in place for regulation of groundwater in Pakistan as well. It is causing groundwater level to fall rapidly in many fresh groundwater areas of West Punjab. Mining of groundwater is leading to intrusions of saline water into fresh groundwater and increasing deterioration of groundwater quality in many areas. In addition, pumping cost of groundwater increases as the water table goes down. This implies that more expensive and poor quality groundwater will now be drawn for agriculture, domestic and industrial use. The sweet water volume is 43 MAF and saline water volume is 3 MAF. This also results in lateral or vertical movement of saline interface which limits its use primarily due to unsystematic and unplanned exploitation. Site specific and in-depth analysis of data is required for further or on-going exploitation of groundwater resources and its use has to be based on a very scientific formula for sustainability of this valuable resource.

4. CONCLUSIONS

It is quite evident from the above discussions that:

- 1) There should be a firm policy on groundwater regulation should be in place in both India and Pakistan to give space of living to each other.
- 2) Release of untreated industrial waste in water bodies which are being shared with other neighbours should be avoided to keep the water bodies alive.
- 3) Deterioration and degradation of groundwater aquifer will not only cause damage to West Punjab but in the long run it will also impact on the groundwater quality of East Punjab, therefore in the wider interests it is necessary to save the aquifer from deterioration and degradation.
- 4) Liberal groundwater mining policy would not pay in the long run and ultimately it will impose problems for East Punjab in India. Therefore, a strict and determined policy to regulate groundwater resources commensurate to the need of agriculture would have to be implemented.
- 5) Fair play is necessary to guarantee regional cooperation on transboundary waters and aquifers in South Asia. Both India and Pakistan have to discuss their issues on the table to reach amicable solutions for wider interests of both nuclear powers.
- 6) Finally Pakistan should regulate its groundwater resources wisely and there should be some regulatory mechanism so that it could be possible to make optimum use of the groundwater

resources together with the surface water to increase productivity to higher levels imparting wellbeing to its poor farmers who mostly are living below poverty line.

- 7) Both India and Pakistan should maintain inventories of tube wells installed in their respective area to extract groundwater a there should some checks on extraction. The free electricity tariff allowed in India should be withdrawn.

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