

KOTRI BARRAGE: IMPACT ON SOCIAL AND PUBLIC HEALTH ENVIRONMENT OF LOWER INDUS BASIN

Muhammad Hussain Shaikh

ABSTRACT

Kotri barrage is an artery of both socio-economic progress and public health of lower Indus basin. All the subsequent planning to meet dynamic demands of socio economic progress and public health are closely attached with Kotri barrage. As canals of Kotri barrage are also main source of drinking water for both cities of Karachi and Hyderabad and towns at tail areas of the canal irrigation system. Therefore, socio-economic changes and public health required immediate progressive planning in water management based on Kotri Barrage.

INTRODUCTION

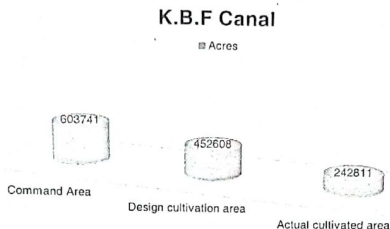
The river Indus plays an important role in irrigation, industry and drinking water of Sindh, mainly in southern part known as lower Sindh including Karachi and Hyderabad cities. Weather conditions and soil properties of lower Sindh has significant importance in agricultural sector. The Kotri barrage irrigation system has played key role in development of agriculture in the command area and has also provided drinking water to areas with brackish water aquifer. Earlier, the area was cultivated by natural/ artificial irrigation (Government of Sindh, 2006). While the natural irrigation is based both overflow of river every year and rainfall, the artificial irrigation depends on the flow of old channel courses. Artificial irrigation has helped to grow enough food products which fulfill daily necessities of growers, merchants and artisans, which has developed openings of trade of agricultural commodities to other areas (Kheli and Khan, 1960). The dynamic increase in demand of agricultural commodities forced new planning of the water management to expand the crop growing area. Recently, rapid growth in population of world in general and Pakistan in particular has necessitated prospective irrigation system with multipurpose water utilization in agriculture, drinking water and industry simultaneously.

IRRIGATION SYSTEM OF SINDH

British government started organizing canal system and opened a department in 1851, which was responsible to intensify flow capacity of the Begari, Desert and Nara canals. According to Snelgorore (1967), supervision system was introduced and developed on Jamrao in 1899. The British government also completed Under Wah, Dhamro, Pritchad, Nasrat and Dad Wah on the right and left bank of the Indus River respectively. Thereafter, substantial achievements of water management in agricultural sector required construction of a barrage to exploit waters for Kharif and Rabi seasons to enable cropping from grain to oil seeds. In the Indus basin, Sukkur barrage was completed in 1932 with 7 canals having total command region of 3.68 million hectares (Shelgrore, 1967). The Sukkur barrage irrigates area between Jacobabad – Khairpur and the upper reaches in the lower Indus basin. While newly developed irrigation canal system at Hyderabad was considered necessary to provide irrigation water to southern part of lower Indus basin. Kotri barrage with Kalari Baghar Canal on right side and Pinyari, New Fuleli, Akram Wah canals on left side was completed in 1955. The role of Kotri barrage in the socio-economic development of lower Indus basin is evaluated as under:

1. Kalari Baghar Feeder with 9000 cusecs capacity provides water for irrigation, drinking water and industry. This canal also feeds the Kalari Lake which has storage capacity of 370 million cubic meters, which in turn supplies the remodeled Kalari canal and Baghar canal. The salient features of command area of canal are given in Figutr-1. This feeder canal has 99 channels for supplying water to different sectors of life. The highest ten-day average discharge is 8,900 cusecs (UNESCO, 2006).

Figure-1
Salient features of K.B.F Canal



- The Pinyari Canal with 13636 cusecs capacity and 98 channels is designed to feed the command area of 644,760 acres to cultivate grain, fiber and sugar cane crops. The details of command area cultivations are given in Figure-2. The highest ten-day average discharge is 10470 cusecs (Government of Pakistan, 1989).

Figure-2
Salient Features of Pinyari Canal

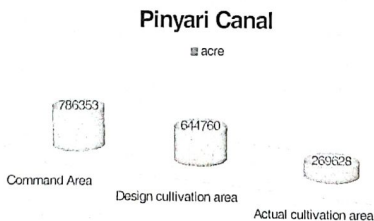
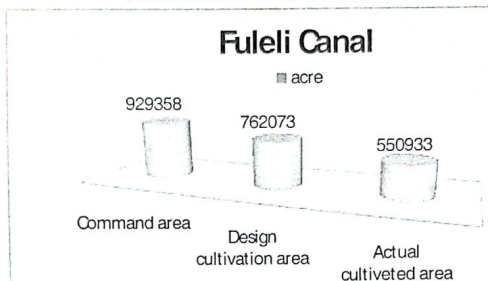
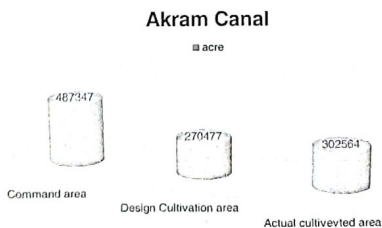


Figure-3
Salient Features of Fuleli Canal



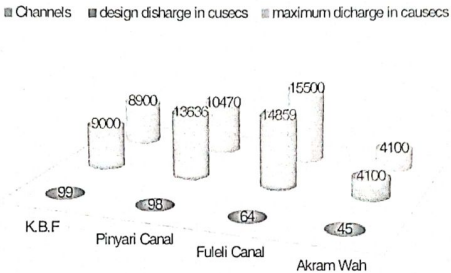
3. New Fuleli Canal with capacity of 14359 cusecs and 64 channels feeds the command area of 302,564 acres and play main role in agricultural sector. Its maximum ten-day average discharge of 15500 cusecs was noted (Government of Sindh, 1993). Figure-3 illustrates detailed design parameters of command area of canal.

Figure-4
Salient Features of Akram Canal



4. Akram Wah has discharge capacity of 4100 cusecs with total command region of 590,000 acres and cultivable command area of 490,000 acres (Figure-4). The Akram Wah has 45 channels and maximum discharge 4100 cusecs in 1990-1991 (Government of Sindh, 1993).

Figure-5
Channels and Water Discharge of Canals of Kotri Barrage



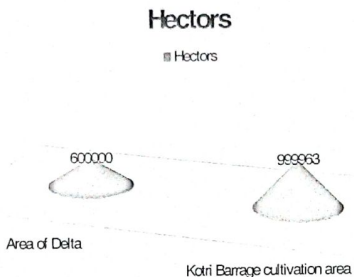
5. The figure-5 gives details about the channel and designed discharge and average maximum discharges in different areas.

IMPACT ON SOCIAL LIFE

As the climate of lower Indus basin favours early cultivation of agriculture products and meets food demands of the country, the Kotri barrage with its perennial canals was designed to develop agriculture of lower Sindh. This irrigation system has influenced social life and development of lower Indus basin. Meanwhile, the Kotri barrage has also unfavorable influence on Indus delta and has adversely affected biological ecosystem and socio-economic conditions of delta area (Meynell and Qureshi, 1993). The difference between newly cultivated areas and affected delta area illustrate positive sign of the canal project (Figure-6). This has

drastically changed the socio-economic environment of lower Indus basin counterbalancing the unfavorable socio-economic conditions of lower Indus basin.

Figure-6
Correlation Between Delta and Kotri Barrage



CULTIVATION AREA

The agriculture sector of southern part of Sindh is only possible under surface water irrigation which depends only on managed supply from the Indus River. The present water supply is inadequate to fulfill water requirement of agriculture. The shortage of irrigation water is usually compensated with groundwater, but available groundwater in lower Indus basin is saline and crop irrigation with such water will degrade soil and affect yield. The above-mentioned situation of water shortage is impeding the social development and new social changes are flourishing in this region.

Therefore, immediate measures, such as removing silt from canals and irrigation water utilization plan, are required for rehabilitation of the Kotri barrage to optimize yield in this region. The proper supply of water to tail growers and crop planning will control further social disaster. The planning of cultivation and the

promotion of fish products will change social and economic conditions of lower Sindh.

IMPACT ON PUBLIC HEALTH

The development of any barrage system along with socio-economic changes engenders supportive environment for detrimental effects on human health. The canal supply creates favourable environment for breeding of mosquitoes and snails which are fundamental sources for spreading syndrome such as malaria and scistosomiasis, but large quantity of water available for drinking control stomach disorders (WHO, 2000). However, the present situation of vector borne diseases demands to establish innovative water management in order to overcome the problem of resistance to insecticides and parasitic drugs. The urban development factor and use of wastewater for semi-urban agriculture is also a major challenge. To prevent above mentioned phenomenon, it is important to integrate health impact evaluation into preparation of water management policies and projects. The water management system development activities influence on environment and social variations, which jointly impact both on health and agriculture. Agriculture experts, ecologists and engineers need to make collaborative efforts to work out linkage of above mentioned problems and manage operational diseases.

CONCLUSION

Kotri barrage is a pathway to socio-economic changes in lower Sindh. The consequent development of lower Sindh is illustrated by development of agro-based industry in the region. However, shortage of water supplies due to different causes is contributing factor in socio-economic conditions of lower Sindh. Additional sources of irrigation bring with them adverse effects on public health. The immediate measures are required to control the situation and initiate innovative ways for socio-economic developments.

REFERENCES

- Government of Pakistan. (1989). *Kotri Barrage Rehabilitation Project*.
- Government of Sindh. (1993). *History and Irrigation Practices, Irrigation and Power Department*. Karachi.

- Government of Sindh. (2006). *Development Report of Sindh*. Karachi.
- Kheli, Tahir and Khan, R.A. (1960). 'Investigation of Gold and Other Precious Minerals in the Indus Alluvium', *Gold Survey*, Pakistan.
- Meynell, P. and Qureshi, T. (1993). 'Sustainable Management of Mangroves in the Indus Delta, Pakistan', in David, T. (Ed.) *Towards the Wise, Use of Wetlands*. Ramsar Bureau, Gland.
- Snelgrove, A.K. (1967). *Geo-hydrology of Indus River*. West Pakistan.
- UNESCO. (2006). *Water: A Shared Responsibility*, The United Nations World Water Development Report.
- WHO. (2000). *Human Health and Dams*, The World Health Organization's to the World Commission on Dams(WCD), Document WHO/SDE/WSH/00.01. Geneva: World Health Organization.
