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Indira Gandhi canal project and their adverse impact on the environment of western Rajasthan

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Abstract

The present research paper an attempts has been made to evaluate the adverse ecological impact of Indira Gandhi Canal Project in Western Rajasthan. As the Indira Gandhi Canal Project is a very typical and one of the most gigantic project in the World, aiming to de-desertify and transform desert wasteland into agriculturally productive area and maintaining the eco-system of the region. It has been constructed in the north- western and western part of the state Rajasthan, covering a part of the THAR DESERT districts i.e. Ganganagar, Hanumangarh, Churu, Bikaner, Jodhpur, Jaisalmer, and Barmer. The construction of 649 Km. long Main Canal and about 9000 Km. distribution system in such an inhospitable and hazardous area has been a very challenging task. The introduction of irrigation through Indira Gandhi Canal in sandy, barren and hot climatic land has caused if tremendous positive impact within a short duration, on the other hand it has led to adverse impact in the form of water logging, soil salinity, raising of ground water level, siltation of canal by sand, seepage of canal water, water Born diseases etc.

Keywords: IGCP, water logging, salinity, seepage, siltation

Introduction

The Indira Gandhi Canal Project (IGCP) has been constructed in the north-western part of the state of Rajasthan, covering a part of the `THAR DESERT`. The construction of this canal in such an inhospitable and hazardous area has been a challenging task. The word `Barren Land `takes on a new meaning when one travel through the western most districts of Bikaner, Jaisalmer and Barmer of Rajasthan. In these districts even the shrubs find themselves difficult of survive against the relentless movement of fine desert sand, gradually burying everything in its path.

The IGCP formally commenced on 31st March 1958 and at present rank first amongst the largest project in India. It is 40 meters wide and 6.4 meters deep. The carrying capacity of canal is 18,000 cusecs of water at its head. In view of large size of the project, their construction has been taken up into two stages for convenience of management, mobilization of resources and achievement of early benefits.

Stage-1

It comprises of 204 km long Feeder Canal in Punjab and Rajasthan, 189 km long Main Canal, 151. 5 km long Kanwar Sain Lift Canal along with a network of distribution system. This stage covers a cultivable command area of 5.25 lakh hectares, 4.79 lakh hectares by flow canal and 0.46 lakh hectares by Kanwar Sain Lift Canal, with 110% designed intensity of irrigation. Except some minor works, stage-1 has been completed.

Stage-2

It comprises of 256 km Long Main Canal, six lift schemes with maximum static lift of 60 meter with 34 pumping stations and a network of distribution system. This stage of the project will cover an area of 10.12 lakh hectares of cultivable command area (7.00 lakh hectares by flow and 3.12 lakh hectares by 06 Lifts canal), with 80% intensity of irrigation. The works on the Main Canal has been completed up to tail and progress on distribution system (Fig.1). The Indira Gandhi Canal Command Area (IGCCA) however, covers approximately four per cent of the `Arid Zone` of India and nearly one-tenth part of the Rajasthan state.

Experiences of IGCP

The major experiences of IGCP after the commencement of irrigation are as following:

- 1. The canal water is available for drinking and other domestic uses.
- 2. Crops can be grown every year with the help of canal water.
- 3. Rapid rise in the population, increase in the number of village's new colonies and mandies.
- 4. Change in socio-economic conditions of the people and spurt in all economic activities.
- 5. Improve in house hold income and expenditure structure.
- 6. Change in attitudes and life style of people resulting in greater urge for education and raise in mobility and communication.
- 7. Increasing in heterogeneity of population, enhanced inter and intra community interaction and quicker diffusion and adoption of technology of irrigated farming.
- 8. Elimination of drought condition.
- 9. Changing in fauna in the area are limited to the introduction of fisheries.
- 10. Improve in the micro-climate and decrease in incidence of sand storms.
- 11. Rise in ground water table.





Data base

The study is based on both primary and secondary sources of data, which is collected from the Head Office of the canal command area in the Districts concerned and office of the State Secretariat of Rajasthan, Districts Hand Books, Personal interviews etc. Apart from this many experts have contributed individually.

Discussion: Adverse Ecological Impacts

The introduction of IGCP in the barren and hot climatic land of Western Rajasthan are bound to have a profound influence on the ecosystem. The irrigation facility provided by IGCP has a great influence on the eco-system. The IGCCA could be classified into various major land forms, these land forms had been created by endogenic and climatically controlled by exogenic processes. The fluvial process created vast alluvial plain under prolonged wet phase. The sand dune and sandy plain were formed by Aeolian process during the prolonged dry phase. Fluvial and Aeolian land forms have different production potential because of significant variation in the morphological characters.

The IGCP is both glory and sorrow of Rajasthan. No one can have dispute over the fact that the building of such a canal in a hostile desert environment is a tremendous technological feat, experience foresight, planning has combined effects on the beneficial aspects of the Indira Gandhi Canal Project. The IGCP was deliberately planned to run parallel along the India and Pakistan border. But now it appears that these strategic and political compulsion might have blinded the project authorities to the ecological and socio-economic problems that would come up with the IGCP.

a) Water logging and Salinity are the major problem developed due to the presence of hard-pan at a shorter distance below the surface. The authorities were aware of the existence of large areas with hard-pan of gypsum along the route, but they lined the canal to minimize seepage. The existence of the hard-pan especially in stage-2 was not very much known. Hydrological and Geological surveys are under way and suggest that the previous findings, which put the critical area at around 22% of the command area under estimation. This area was also studied by Food and Agriculture Organisation (FAO) to assess the impact of canal irrigation in desert area. They recommended the development of pasture land on the basis of topography and the traditional occupation of the people, but the advice of the FAO and others were not taken into consideration. The cumulative effect of all these have led to a gradual rise of water table, even in areas where there is no hard-pan close to the surface. As a result vast areas along the canal have become water logged. Several families have become homeless and landless and more settlements and agricultural land will be affected in future if the suitable measures are not adopted. The official estimate is that 30% of irrigated area in stage-1, is affected by water logging or salinity, chiefly in Ganganagar, Hanumangarh and Bikaner districts command area.

The main factors responsible for rapid rise of water level are liberal use of canal waters for irrigation and ground water recharge due to Ghaggar flood inflow. The other factors responsible may be as under:

- 1. Seepage of canal water.
- 2. Over-irrigation by cultivators.
- 3. Absence of natural drainage and out-falls in the area.
- 4. Continuous ponding of water in Ghaggar diversion Depression.

In most of the area the problem is likely to be eased with the reduction of availability of water due to opening of more and more areas in Stage-2, since the water share of Stage-2 is also hitherto used in this area. This hypothesis finds support from the observed behavior of ground water system during the drought years, in which there were significant reductions in the affected area.

- b) The irrigation raises the salt content of the ground water because, about 65% areas of the Rajasthan desert has highly mineralized ground water with dissolved soil content over 3200 ppm. Similarly at shallow depth the sub surface salt rich formation may also contribute in the mineralization of ground water. The large acreage of fertile land in Barmer, Hanumangarh, Bikaner, Ganganagar and Jodhpur districts have been degraded or turned into waste land, because of the use of mineralized ground water. The soil working and water infiltration has been difficult in parts of Barmer and Bikaner districts because of the irrigation with ground water, exploited from granitic formation which has higher content of residual sodium carbonate.
- c) The incidence of malaria and others water born diseases are also the major adverse impact of IGCP in Western Rajasthan. However, at least survey conducted by NCAER on the health, impact of the canal has discounted this too, saying that the reporting of such cases are more because of higher level of awareness among the people in canal command area.
- d) As far as colonization is concerned, the Authorities are seemingly happy about Stage-1,but feel the rate of settlements in the Stage-2 is low due to lack of proper water facilities, the difficult terrain and remoteness It is a vicious circle, as long as the rate of settlements are low the terrain too is likely to remain inhospitable. The distribution system gets chocked with sand unless water flows continuously and blown sand is removed from time to time.
- e) Seepage of water through canal.
- f) Problem of soil siltation due to high velocity of winds.
- g) Continuous ponding of water in Ghaggar diversion depression.
- h) Over irrigation by cultivators, particularly in Stage-1 command area.
- i) Opening of more and more areas in Stage-2 command area.
- j) Excessive loss of water in deep percolation.
- k) Leaching of soil in some areas.
- l) Transportation of salt and
- m) Rising of ground water level.

In order to check the adverse ecological impact of the canal irrigation in IGCCA of Western Rajasthan to reclaim the already desertified land, the following suitable measures are suggested.

- 1. To the lining of all distributaries and minor channels also with suitable materials to check the seepage of water losses, rise of water level and development of salinity.
- 2. To the water level should be maintain at the critical limit of 6 meter by providing vertical drainage. The shallow well should be dug and the excess water should be pumped out which may be use for irrigation to higher land and recharge the adjoining aquifers.
- 3. To excess and injudicious use of water for irrigation particularly in light texture permeable sandy soil should be avoid to check the development of salinity and water logging hazards. The irrigation by drip and sprinkler system should be done to control these hazards.
- 4. To check the adverse impact of canal irrigation, the unfavorable geomorphologic sites such as the confluence of the buried courses of the prior drainage channels should be avoided to construct irrigation network like tanks, reservoirs and well.
- 5. The salinity/alkalinity could be reclaiming by leaching and applying proper quantity of Gypsum.

Conclusion

After foregoing discussion it is concluded that the Indira Gandhi Canal Project has proved itself as a boon of hot desert climatic land on one hand and curse in bringing its adverse ecological impact on other, which are of long duration could be seen in the form of the depletion of productivity of the landforms due to water logging, increasing salinity / alkalinity hazards of the region due to high evapotranspiration, siltation of canal by sand, soil erosion, seepage of canal water, increasing ground water level, various unforeseen diseases etc.

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