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Environmental implications of Indira Gandhi Canal in Thar Desert, India

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A B S T R A C T

The Indira Gandhi Nahar Project (IGNP) is a multi-purpose project which was built to provide fresh water to semi-arid regions of Western Rajasthan and to rejuvenate the Thar region, and it has many positive socioeconomic impacts. IGNP irrigation project has been a boon for economic upliftment of the people in the area and has turned drought affected area into a green bowl. However, the environmental impacts of this new canal water supply have mainly been negative. The economic boon gave rise to many environmental implications such as water logging, deterioration in quality, soil salinity, siltation of canal by sand, water born diseases. The xeric biodiversity of the region is also under threat, to the point of extinction of some species. Occurrence of water logging conditions in command areas and emerging scenario of ground water drought conditions in other parts, calls for judicious management of available water resources. With time, the floral and faunal composition of the region has also changed. Thus the steps taken to improve the economic condition have become the cause of environmental destruction. To overcome these environmental issues use of surface and groundwater in effective proportions using latest techniques is essential.

K E Y W O R D S

IGNP | Biodiversity | Socio-economic conditions | Environmental implication

C I T A T I O N

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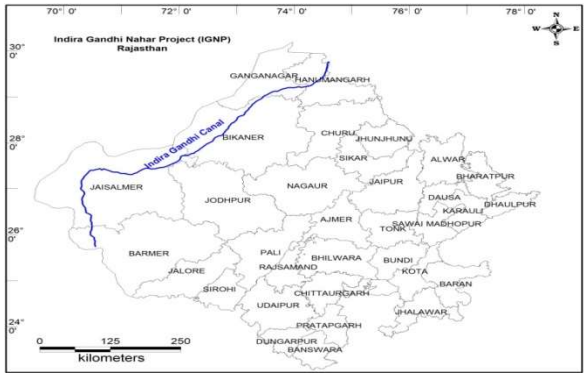
Introduction

The Thar Desert or the Great Indian Desert is located in western India and southeast Pakistan. In India, most of the desert is found in the State of Rajasthan, extending into southern portions of Haryana and Punjab and northern portions of Gujarat State. About 60% of the Indian part of the Thar Desert lies in Rajasthan State. The Thar Desert is bounded to the northwest by the Sutlej River, to the east by the Aravalli Mountains, to the south by the salt marshes of Rann of Kachch, and to the west by the Indus River. Indira Gandhi Canal is the largest canal of India. It starts from the Harike , a few kilometres downstream the confluence of the Satluj and Beas rivers in the state of Punjab and terminates in the Thar Desert in the north west of Rajasthan state.

In Rajasthan, canal serves Sriganganagar, Hanumangarh, Bikaner, Churu, Jaisalmer, Jodhpur and Barmer districts (Fig 1 and 1a).



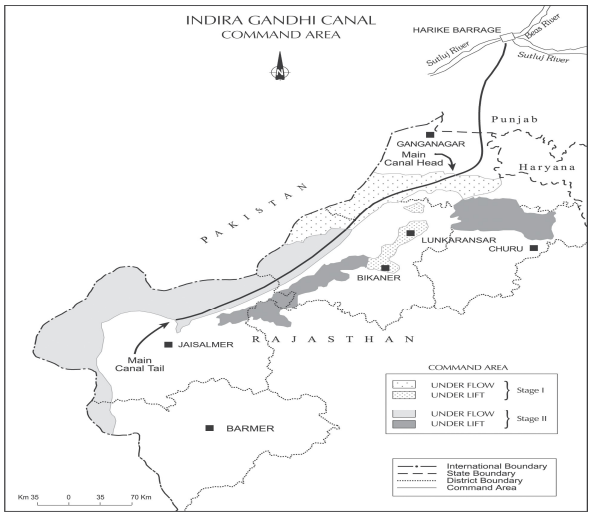


Figure 1 and 1a: IGNP, Rajasthan (Planning and Sustainable Development in Indian Context, 2020)

Indira Gandhi Canal is divided in two stages, Stage I covers 189 km long main canal from Masitawali head to Pugal head and 3400 km long distribution system. The total Canal Command Area (CCA) is 5.53 lac ha. The envisaged intensity of irrigation is 110%. Major distributaries of IGNP Stage -I include Rawatsar, Naurangdesar, Anoopgarh, Suratgarh and Pugal. Stage -II covers 256 km long main canal starting from Pugal head to tail end near Mohangarh and 5780 km long distribution system. The total CCA is 14.10 lac ha at 80% of irrigation intensity in flow command and 60% intensity under lift system. The major branches / distributaries are Dattor, Birsalpur, Charanwala, Nachna, Sagarmal Gopa and Gadra Road (CGWB, 2001). 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.

The Thar is one of the most heavily populated desert areas of the world and due to its climatic conditions the economical opportunities for the people of this region are limited. The network of IGNP spreads over six districts (Ganganagar, Hanumgarh, Bikaner, Jaisalmer, Jodhpur and Barmer) of Western Rajasthan. The major crops of this region are Bajra, Pulses, Jowar, and Groundnuts etc. Economy of this region revolves around livestock like cows, buffalos, sheep, goat, camels etc. After inception of Indira Gandhi Canal, production of crops and crop diversity has increased, which lead to establishment of new industries. The Thar is an important ecological region of India with home of different species of lizard and snakes and several of them are endemic to this region. Apart from this, the Thar is heaven for more than 100 species of birds including migratory and resident. But the biodiversity has badly affected due to Indira Gandhi Canal. The groundwater condition is also changing especially in command area where water is emerged as major problem due to leakage from canal and over

irrigation. The present communication is an endeavour to prepare a checklist of the environmental impacts due to canal irrigation in the Thar Desert, and also to analyse the socioeconomic changes of the area. This paper is a synthesis of field observation, data and also surveys carried out by Central ground Water Board (CGWB) and various agencies and other researchers.

Data base and Methodology

The present research work is an outcome of the data collected from primary and secondary sources. Apart from the work carried out by Central Ground Water Board, the information were also obtained from the secondary sources such as the Annual Progress Report of IGNP (Published by IGNP Head Office), Jaipur; Command Area Development, Rajasthan; Ministry of Irrigation, New Delhi; Department of Irrigation, Rajasthan, Jaipur; Forest Department, Rajasthan; District Census Handbook, Jaipur, etc. The study incorporates Stage-I and Stage-II of the canal command area. In order to examine the impact of IGNP on environment, subsequent ecological changes were studied at macro level.

Results and Discussion

Adverse Environmental Impacts: The introduction of IGNP in the barren and hot climatic land of Western Rajasthan is bound to have a profound influence on the ecosystem. The irrigation facility provided by IGNP has a great influence on the eco-system. The IGNP is both glory and sorrow of Rajasthan. The IGNP was planned to run parallel along the India and Pakistan border. But now it appears that this strategic and political compulsion led to the ecological and socio-economic problems that emerge with the IGNP.

Water logging and Salinity are the major problem developed due to the presence of hard-pan (gypsum/clay/silt) at shallow depth (Fig. 2).

Fig. 2: Water Logged Area, Ganganangar, Rajasthan

The canal is lined to minimize seepage but due to low/inadequate maintenance, seepage takes place and availability of cheaper surface water resulted not only in over use for irrigation but also unavailability at tail end. The effect of all these have led to a gradual rise in water level, even in areas where there is no hard-pan close to the surface. The main factors responsible for rapid rise of water level are liberal use of canal waters for irrigation particularly in Stage-1 command area and ground water recharge due to Ghaggar flood inflow, Seepage of canal water due to poor lining of canal, over-irrigation by cultivators and absence of natural drainage and out-fall in the area (CGWB, 2001).

In order to check the adverse environmental impact of the canal irrigation in Western Rajasthan, the following suitable measures are suggested (a) Proper lining of Canal and minor channels should be done to check the seepage of water losses, rise of water level and development of salinity. (b) The water level should be maintained 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 used for irrigation to higher reaches and to recharge the adjoining aquifers. (c) The indiscriminate use of water for irrigation particularly in light texture permeable sandy soil should be avoided to check the development of salinity and water logging hazards. (d) Use of micro-irrigation technique

such as drip and sprinkler system should be encouraged.

The Thar Desert is a significant ecological region of India; due to its unique physical conditions, it plays an important role in biodiversity. This is the region where varied species of lizard and snakes are found and many of them are endemic to this region, more than 141 migratory and resident birds are found in this region. The Great Indian Desert is home for the thorny forest in India. Change in ecosystem of Thar is taking place over time. Due to the Indira Gandhi Canal, the physical condition of Thar has changed at large scale which ultimately results into disturbance of biodiversity of the region. The xeric biodiversity of the region is under threat; some species are at the point of extinction. With time, the floral and faunal composition of the region is also changing. To conserve xeric biodiversity in the Thar, continuous ecological monitoring of the desert is absolutely necessary so that these ecological impacts are assessed and remedial measures taken.

Socio-economic impact: Rajasthan's economy is based on agriculture and mainly on animal husbandry. There are many pragmatic changes due to canal irrigation such as (1) Availability of water for drinking and other domestic uses. (2) Crop diversification with high yield crop and development of agricultural infrastructure coupled with micro-irrigation technique. (3) Rapid rise in population and change in life style of people resulting in greater urge for education and raise in mobility and communication. (4) A sizeable number of agro-based industries have also come up with the service activities like opening of banks, insurance, warehouses, chilling plants and co-operative banks, indicating development and growing employment opportunities, but on other hand several families became homeless and landless. Increase in settlements and agricultural land is badly affected as the irrigation raises the salt content of the ground water in large acreage of fertile land in Barmer, Hanumangarh, Bikaner, Ganganagar and Jodhpur districts. These lands have been degraded or turned into waste land due to continuous use of mineralized ground water. An increase in population (both of human and livestock) had led to an increasing demand of fuel wood, resulting in an over exploitation of natural vegetation which is responsible for the environmental degradation. The rate of settlements in the Stage-II is low due to lack of proper water facilities, difficult terrain and remoteness. The distribution system gets chocked with sand unless water flows continuously and blown sand is removed from time to time. The incidence of malaria and other water born diseases are also the major adverse impact of IGNP in Western Rajasthan (NCAER).

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 environmental impact on other. Economic development and environmental problems are two aspects of the same coin. This is also seen in Indira Gandhi Canal Project. This Project was implemented to solve the problems of people in desert region like low agricultural production due to water scarcity, low industrialization, scarcity of drinking water and frequently occurring drought. This project is successful in addressing all economic and social problems to a great extant but simultaneously environmental problems have increased. Biodiversity of this region was worst effected and at this stage, problem of water logging, imbalance in ground water level and groundwater quality needs to be addressed effectively, else this will result 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, reduction in flow due to siltation in canal, soil erosion, seepage of canal

water, increasing ground water level, various unforeseen diseases *etc*.

Further to conclude framing of suitable policy to combat water logging problems i.e., to promote conjunctive use of surface and ground water, management of water logging in Ghaggar depressions, effective use of micro-irrigation practices, provide subsidy for the development for the ground water so that socio-economic and ecological problems could be addressed for all small and large stakeholders of society.

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