IMPACT ASSESSMENT OF KALAKHO IRRIGATION PROJECT IN RAJASTHAN

by

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CERTIFICATE

It is certified that the thesis entitled **IMPACT ASSESSMENT OF KALAKHO IRRIGATION PROJECT IN RAJASTHAN** being submitted by **BABULAL MEENA**, to the Indian Institute of Technology, Delhi for the award of the degree of **Doctor of Philosophy** is a record of the bonafide research work carried out by him. Babulal Meena has worked under our guidance and supervision in conformity with the rules and regulations of Indian Institute of Technology, Delhi.

The results contained in the thesis have not been submitted in part or full to any other university or institute for the award of any degree or diploma.

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ABSTRACT

Agriculture is the principal sector of the Indian Economy that contributes over one-third of the national income, provides livelihood to nearly three-fourth of the population, and supplies bulk of the wage goods and raw materials to the non-agricultural sector. Further, more attention on agriculture is required to cater the demand of increased population and also to uplift the living standard of rural people. Therefore, agricultural production needs to be encouraged steadily in the years to come. This objective can be accomplished mainly by providing assured irrigation facilities to the farmers and by protecting the crops from the frequent droughts. Timely irrigation with desired quality and quantity is very essential for crops to yield at potential level. Keeping these viewpoints, irrigation has been accorded a high priority in the national development plans.

A huge amount of public money is being invested in the construction and maintenance of various irrigation projects, but many of our existing medium and major irrigation projects are presently operating below their potential. It has been seen that in the past, efforts have mostly been made to create irrigation potential and no attention has been given towards its efficient utilization, lack of effective water distribution method, construction of lined canal system, development of under delivery system below the outlet and on-farm water management have been found to be main causes for immense loss of

water besides seepage field application, excess irrigation etc. have resulted into reduced availability of water and coverage of area under irrigation (Anonymous, 1983 and 1987).

The primary aim of the present project is to study the impact assessment of Kalakho irrigation project in Rajasthan. To fulfill the primary aim specific objectives have been enumerated as (1) Diagnostic analysis of the Kalakho irrigation project to evaluate the project performance. (2) To assess the environmental impact of the Kalakho irrigation project in the command area. (3) To study the socio-economic conditions in the command area. (4) To suggest appropriate measures for the improvement of the project performance.

Kalakho irrigation project is a medium project with CCA of 3039 ha, which was completed in 1953. An analysis of the project has been carried out to assess the economic feasibility of the modernization, which was done though lining of canal and minors. Results of the analysis indicate that the project was found to yield the desired performance. But in the present situation, it has been observed that the project is not performing as envisaged under the project report.

Kalakho Irrigation Project is a medium project on the Kharandi river, a tributary of Banganga river. It is located in Dausa district, of Rajasthan and the dam is about 17 km from the district headquarter. The storage dam was constructed to store the water during monsoon flows. The gross capacity of the dam is 13.28 MCM with the dead storage capacity of 2.47 MCM. Thus, live storage capacity of the dam is 10.81 MCM. The project

benefits for the area are worked out on the basis of this storage. The dam has live storage capacity of 10.8 MCM (Million Cubic Metres) of water and was designed to serve CCA (Culturable Command Area) of 3079 ha with an irrigation intensity of 59 %.

A contour canal was designed for a discharge of 1.62 cumecs to cater the irrigation demand for *Rabbi* crops. The total length of canal is 23.2 km. There are eight minors drawn from the main canal namely, Bhojpura, Girdharpura, Bindrawara, Raipura, Basera, Sikandra, Bamanpada and Leekly. These minors are taking off at different locations to cover a total of 1825 ha ICA (Irrigated Command Area) in its command (Anonymous, 1988, 1995, 2000). Out of total length of canal and minors (45.28 km), about 50 percent is lined and rest is unlined. There are 83 outlets in the canal system, 27 outlets direct from main canal and 56 from the minors.

The impact assessment methodology of Kalakho irrigation project has been conceptualized to consist of performance evaluations for water availability, water delivery, environmental consequences, agricultural production and economic return, and socio-economic conditions in the command. The approach utilized for analyzing different aspects of performance indicators necessitates the collection and analysis of hydraulic, hydrologic and agricultural data, field data measurements and statistical analysis of surveyed data pertaining to socio-economic attributes.

The study reveals that main causes behind the poor performance of the project are inadequate capacity of many minors, non-existence of suitable water distribution system, unauthorized water use, lack of farmer's participation in water management and lack of proper method of irrigation by the farmers. Besides, there is applicable seepage loss and evaporation loss. There is large scope for further increasing the crop productivity by using improved seed varieties and improved water management practices. However, some minors need expansion of its capacity. Adopting proper remedial measures can increase the performance of irrigation project. It is very necessary to control the water losses and proper water management to improve the project performance. The study of environmental aspects of this project shows that there are both positive and negative impacts on the environment of the command area. The submergence of the large agriculture and forest area by the reservoir is very serious concern if indirect benefits are overlooked. However, better water management practices will justify the project as it has more potential as ICA. There is no severe threat of salinity and sodicity of soil, however ground water salinity is serious concern in most areas. It appears that leaching of salt is one of the main sources for salinity in groundwater. Except few patches, water logging is not posing problem at all. The positive point is that it has controlled the floods and also problem of soil erosion has come down. The project has also resulted into better socio-economic conditions in the command.

The socio-economic analysis of the project reveals that there are considerable changes in social structures and their economic levels. The project has a definite impact on the cropping pattern as the wheat and gram became the major crops for beneficiary farms.

The yields of major crops like wheat and gram from irrigated area have become doubled in comparison to that of unirrigated area. The yield has increased three times as compared to the yield of command area in 1985. This resulted into increased farmers income.

The literacy has also gone up by 26% in beneficiary area as compared to the non-beneficiary area. The change in structure of family is observed significantly. There is an increase in number of small size families and a consequent decrease in the large families. The project has generated some small employment avenues like fishing, regrettable farming and many small-scale income-generating jobs, which are helpful to remove unemployment program and to fulfill the basic needs.

The results and recommendations reported in this thesis will be helpful in developing augmentation and management plans for significantly improving the Kalakho irrigation project performance and also rehabilitating the groundwater.

ABBREVIATIONS

GCA	-	Gross command area
CCA	-	Culturable command area
ICA	-	Irrigated command area
MCM	-	Million cubic meter
cumec	-	Cubic meter per second
km	-	Kilometer
cm	-	Centimeter
mm	-	Millimeters
m	-	Meter
SHE	-	System Hydrologique European
EC	-	Electrical conductivity
SAR	-	Sodium absorption ratio
ha	-	Hectares
qtl	-	Quintals
RSC	-	Residual sodium carbonate
kg	-	Kilogram
ST	-	Schedule caste
SC	-	Schedule caste
OBC	-	Other backward caste
ASCE	-	American Society of Civil Engineering

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