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Performance Evaluation of Bhabour Sahib Medium Irrigation Project

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ABSTRACT: India is amongst the largest irrigator countries in the world today. There is however, increasing concern about some of the irrigation potential created not brought into the functional use. System performance monitoring evaluation and diagnostic analysis are keys to appreciate the improvement or inefficiency in our irrigation projects. Therefore, exercise of performance evaluation of an irrigation system, whether a minor irrigation system or a medium/major irrigation project, requires proper understanding of the problems and potentials of that project. The potential utilization of Lift Irrigation Project Barbour Sahib is less than the average of District Una and even that of State of Himachal Pradesh.

Keywords: Lift irrigation project, main stakeholders, cultivable command area and NPSHA.

INTRODUCTION

Water as an input to agriculture is critical for sustaining food security. India faces the daunting task of increasing its food grain production by over 50 % in the next two decades (Kumar, 1998). At present India is the largest irrigation country in the world (Field, 1990). Since 1950 India has direct public investment of Rs 88100 crore with an irrigation potential of 92 Mha. India water vision estimated the gross water demand for multiple uses to double in 25 years from now (India Water Vision 2025). The current annual expansion in irrigation is one third less than maximum growth achieved in past (Rao, 1994).

Unlike other development projects, viability of irrigation projects is adjusted by way of cost benefit ratios and internal rate of return (IRR). The benefits are in form of increased crop production and cost is taken as interest on capital investment together with annual maintenance cost for running of irrigation projects. The yield of all crops from a field gets increased if the needs of irrigation are fully met. The increased agricultural production in turn takes the cultivators to higher rungs of economic development. The potential performance of an irrigation project rarely attains its optimum level. Irrigation system in many parts of the world is known to performing well below their potential. The overall performance of irrigation investments has too often short of expectations of planners, governments and financial institutions.

India's agricultural development population has been increasing over the last few decades. Genesis of the instant study is that in Himachal Pradesh the percentage of agricultural dependent population to the total population of the state has increased from 65.35% during 1991 to 74.55% during 2001 (Census of India, 2001) and instead of increasing the performance of irrigation schemes there is wide gap between the potential created and its utilization.

In Himachal Pradesh a little part of arable land is under irrigation mainly due to topography rugged terrains and hostile climate condition and non techno economic viability of the exploitation of water resource for irrigation. The conventional method of irrigation is flow irrigation method through kuhls. However with the passage of time some tube wells as well lift irrigation schemes has come up in the state.

A study by Dr. Y.S. Parmar University Solan has that productivity of agro landscapes in Himachal Pradesh has increased by 2.3 times (Randev, 2005)

Irrigation development in the hilly state of Himachal Pradesh was restricted to minor project in the preplan period, during the plan development. 5 major and medium projects and a number of minor projects were undertaken in the state. The Bhabour sahib Lift irrigation project is one of such schemes. So for (up to March 2009) total irrigation potential of 2.29 Lacs ha. has been created against the ultimate potential of 3.35 Lacs hectare. Out of the net sown area of 5, 83,000 hectare in the state. However at present average potential utilization is only 34.04% (IPH, 2009).

The gap between irrigation potential created and utilized of lift irrigation project Bhabour Sahib is more than that of state as a whole. This paper examines the various issues related to the gap between the irrigation potential created and utilized and suggest measures for reducing the gap.

MATERIAL AND METHODS

The case study method of research was followed to achieve the objectives of study. We purposively selected the lift irrigation project Bhabour Sahib for conducting the study as it is one of the medium irrigation. Both primary and secondary data was collected from various sources through Rapid Rural Appraisal Techniques. Secondary data in the form of official statistics and official reports in collected from project authority and analyzed. The field work was conduct in two rounds. The opinion & suggestions of farmers, PRIs and field functionaries of irrigation department were sought and assessed.

Location and description of project: The command area of the project falls between latitude 31° 26' 30" S N to 31° 23' 20" N and longitude 76° 17' 31" E to 76°23'20"E in the vicinity of Mehtpur industrial town and about 12km from Una district head Quarter.

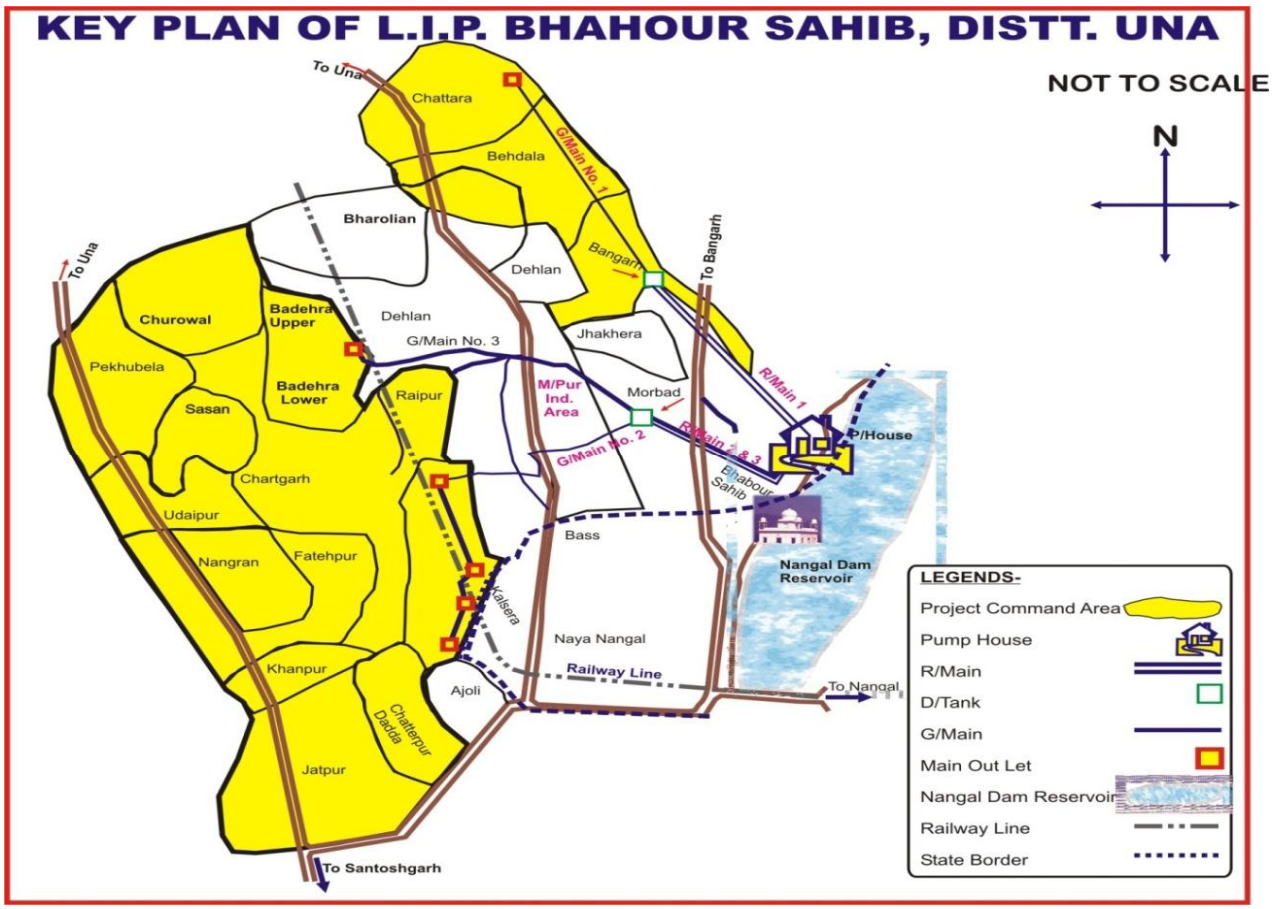

Figure 1: Lay out Plan of Lift Irrigation Project Bhabour Sahib

Salient Features of the Project:

a) Lift irrigation project, here after called the project, is a medium irrigation project conceived, designed constructed and being maintained by irrigation and public health Department of Himachal Pradesh government. As envisaged in the project, the water is lifted from balancing reservoir of Bhakra Nangal Canal by constructing a pump house on its right bank adjoining to historical Bhabour Sahib Gurudwara. The command area soan river basin, which is a tributary to river Satluj. The command area of the project lies on a plateau with elevation raining from 330 m, to 406m, above mean sea level. The average slope of the command area is 0.3%. The total cultivable command area (CCA) out of the project is 2640 hectare falling under 19 villages of Tehsil Una which are situated on both sides of main Una-Nangal road. The proposed intensity of irrigation envisaged at the time of planning of project is 155%.

b) The total demand of water is being lifted through three rising mains to the two delivery tanks situated at village Bangarh and Morbad as shown in Figure 2.

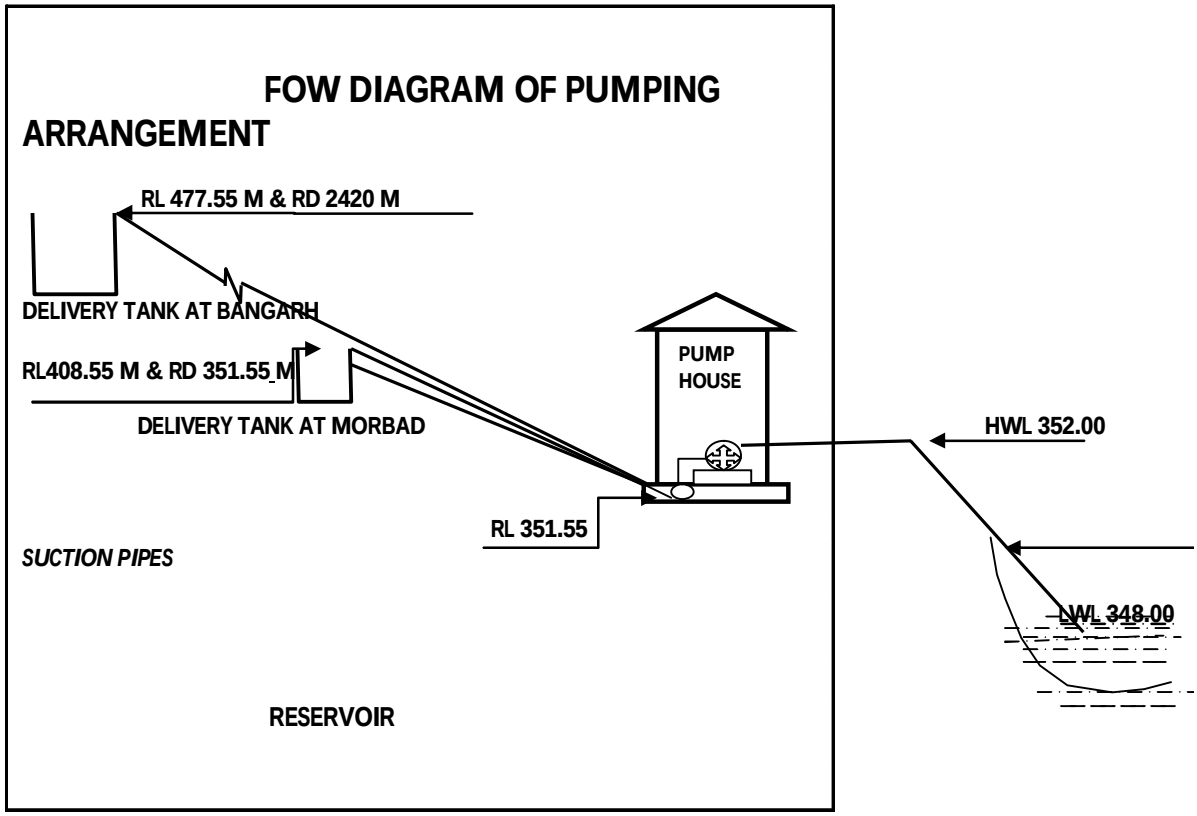

Figure 2: Flow Diagram of Pumping System.

c) **Main Delivery Tank at Bangarh:** Rising main of mild steel pipes of 600 mm diameter–2420 m length, fitted with 5#230 H.P. pump sets of water lifting capacity of 398.00 liter per second to cover the CCA of 928 hectare falling under 5 villages. The total length of pipe network is 40.00 km for distribution of water through 158 outlets. There are 11 registered Krishak Vikas Sangh (KVS) to manage the distribution of water to farmers.

d) **Main delivery tank at Morbad :** Two parallel lines of M. S. pipes 600mm dia. # 1415m each fitted with 4 # 280 H.P. pump sets of total water lifting capacity lps to irrigate the CCA of 14 villages through – gravity main II of 4570 m length,455ha CCA and 1257 hectare CCA under gravity III of 4410 m length. There are 310 outlets to distribute water through 87.30 km conveyance pipe network

of various sizes. There are 9 registered Krishak Vikas Sangh (KVS) to manage the distribution of water to farmers.

The climate of Una district varies from sub tropical to temperate because the terrain varies from plains to mid hills. The mean annual rainfall of Una for the period (2000-2009) is about 980.80mm (H.P. Govt.), a major portion of which (about 75%) is received during monsoon period from June to September. The soil in the command area is mixture of sandy & loamy soil with good water holding capacity and is very fertile & suitable for growing a variety of crops. The soil is well drained.

It has been observed that out of gross command area of 5450 ha of 19 villages, the total cultivated area is only 2640 hectare, which is 48.44% of the gross area. Out of this an area of 207 hectare has further been diverted from cultivation to brick kiln industry from the command of Gravity Main II of the project due to lucrative prices offered to the farmers by the brick kiln owners.

Challenges of Lift Irrigation Project Bhabour Sahib:

The Lift Irrigation Project Bhabour Sahib has the following major challenges:

a) Shift in economy; there is marked sway from agrarian economy to service sector economy due to availability of other attractive sources of income like jobs in public and private sector.

b) Might is right principle; in absence of stringent legal measures and due to weak or non-existence of community management framework (KVS), the influential farmers in the head reaches of the project divert water to their fields even out of their turn and practice over irrigation. The over irrigation has two fronged effects; one deprivation of the tail end farmers from timely irrigation, hampers their crop's yield and on the other hand over irrigation in the head reaches affects the crop's yield adversely.

c) Little dissemination of the information to the farmers on the judicious use of water for irrigation with perceptible change in the cropping pattern comprising of water saving crops. And non-switching over to new cropping pattern due to little extension services by nodal Departments.

The small size of the land holdings (as about 95% land owners fall in the category of small and marginal farmers) and low reliability of water for irrigation at the critical times of crop's water requirement, prohibiting the farmers to practice intensive farming and use High Yield Varieties (HYV) of crops and adopt the modern techniques of farming.

RESULTS AND DISCUSSION

The topography of the area necessitate to lift the water through pumping units to suitable level (Delivery tanks) and from there distributes the same to the fields by different conveyance systems viz. pipe networks, open channels and outlet etc. it has been observed that out of the total 2640 hectare of CCA, only 444.38 ha during rabi and 26.21 ha during kharif season (2009) has been irrigated, which is only 17.83% of the irrigation potential created. The low performance can be attributed to the following factors:

a) Non involvement of main stakeholders (farmers) at the stage of planning & construction and in operation & maintenance of project has infested a feeling of non ownership among them.

b) It has been observed that there is wide gap between the potential created under Lift Irrigation Project Bhabour Sahib and that is being utilized. At present the potential utilization is only 17.83% which is far below the Una District's average of 50.84% and even less than State's average of 34.04%. After analyzing the data of potential created and its utilization of various irrigation schemes, it is observed that percentage of potential in case of minor irrigation schemes is more than that of medium irrigation project i.e. Lift Irrigation Project Bhabour Sahib (IHP, 2009).

c) It has been observed that there is fluctuation in water level of Nangal Dam reservoir from 352.00 to 347.00 above MSL due operation of control gates of diversion weir (Nangal Dam). The situation is server during winter (December to February) when there is lean flow in river Satluj and peak demand of irrigation. High draw down in the reservoir level results in less pumping of water from head works of the project. When water level in the reservoir goes down below 349.00 (above MSL) the Net Positive Suction Head Available (NPSHA) becomes less than Net Positive Suction Head Required

(NPSHR) for the pumps which amplify the fluctuations of hydraulic conditions for water lifting pumps resulting in dismissal performance of the project (Buhagiar 2005).

d) There is a wide gap between the cropping pattern planned at the time of conceptualization of project and that being practiced by farmers even after many years of construction of the project. It can be attributed due inadequate extension services and training to the farmers.

e) It has been found at site that the farmers at the tail-end of project receive water during the rainy season only, when it is least needed. The head Enders are by definition in a more powerful position, as the water first has to pass their area. The layout of the gravity mains, distribution network, outlets and the sub-outlets even add to the advantage of the head Enders.

f) There is lack of coordination among the various field functionaries viz. Irrigation & Public Health Department, Agriculture Department, Horticulture and Forest Department who carry out farm related activities independently resulting in overlapping in some areas and leaving behind untouched the other areas of the project.

g) Non supply of irrigation water at the time of crop's requirement has not only eroded the confidence of farmers due to failure of water lifting pumps but also prohibit them to use high yield variety seeds. In the electro-mechanical irrigation projects, to rule out the chances of occasional failures, a suitable provision of stand by pumping units of at least 25% of total installed capacity would have enhanced the level of performance of the project.

h) Policies and programmes in several other developmental sectors have an adverse impact on irrigation system. These sectors include urbanization, industrialization, drinking water supply, changes in land uses, road construction etc.

i) Due to industrialization of the area, there is shift from agrarian economy to services & industrial economy resulting into change in land use pattern e.g. construction of industrial units, brick kiln industries and large number of houses due to immigration of people from adjoining areas of the Distt. Una as well as from other districts. This has resulted into lack of adequate stakeholder's involvement in distribution and management of water. This has seriously undermined the performance of the project.

j) It was observed that the Bangarh area is situated near the forest and is highly prone to crop damage by wild animals. The crop yield losses were high for maize, beans, potato and vegetables. Five wild species monkeys, bush pigs, blue bull (Neelgaai), wild boar porcupine and deer accounted for 85% of the crop damage. Although most of the crop damage by wildlife is restricted to a narrow band of famers living near the forests edge but risk perception among these farmers has been farmers has been amplified by legal prohibitions on killing wild animal and there by farmers are not growing crops in the area. So necessary steps e.g. sterilization of monkeys and other species need to taken.

CONCLUSION

Based on literature review, interactions with farmers, officials, experts and field staff, and analysis of both secondary and primary data collected during the present case study, the following conclusions are drawn as below:

- The Net Positive Suction Head Available for the pumps installed at Medium Lift Irrigation Project Bhabour Sahib reduces to such an extent that it becomes less than Net Positive Suction Head Required (NPSHR) for the pumps. This happens during rabi crop which results in low utilization of irrigation potential. And for successful operation of these centrifugal pumps it is essential that the NPSHA exceeds the NPSHR by a safety margin of vapour pressure of water i.e. 0.33 metre.
- None participation of farmers (Kisan Vikas Sangh) in planning, management, operation and maintenance of the project and consequently sole involvement of project authorities (Irrigation and Public Health Department) has given rise the sense of protectionism and patroness among the farmers of project area. The very approach of implementing irrigation projects is the top-down approach, making farmers see irrigation as government project thus giving them no sense of responsibility and ownership.

- The agricultural extension services too are inadequate to educate the farmers about potential benefits of the new agricultural practices. The actual cropping pattern being followed is different from the planned / anticipated cropping pattern. To attain the objectives, Agriculture Department needs to be impressed upon to motivate the farmers to utilize the potential benefits of adopting multiple crops as envisaged in the project report of Bhabour Sahib Lift Irrigation Project.
- That there is lack of enthusiasm amongst the farmers to work towards intensive agriculture and utilize the irrigation facility provided by the Bhabour Sahib Lift Irrigation Project, as they have an easy access to alternative source of their livelihood due to setting up of large number of industries in the vicinity of the project.
- The capacity building of personnel of Irrigation and Public Health Department and farmers is imperative to bridge the gap between irrigation potential created and potential utilized. It can be achieved through various training programmes at dedicated State level training institutions e.g. Water And Land Management Institute (WALMI). And it is recommended that every irrigation personnel should undergo training for a total minimum period of 3% of his/her total length of service.
- The industrialization in and around the cultivable command area of the Bhabour Sahib Lift Irrigation Project has inadvertently or opportunistically caused a huge destruction/encroachment of CCA. The loss of 207 hectare CCA under gravity No. I has been caused by brick kilns and other industries. This is one of the major factors responsible for poor utilization of irrigation potential created.
- The sustainability and success of PIM depends on mutual accountability between the Water Users' Association (Krishak Vikas Sanghs), the Irrigation and Public Health Department. Therefore, implementation of Participatory Irrigation Management (PIM) by enactment of suitable act is the need for sustainable management of Bhabour Sahib Lift Irrigation Project. There is urgent need to promote PIM more vigorously, as currently less than 30% of the cultivable command area of the project is covered.
- The farmer organizations such as Krishak Vikas Sanghs need to be empowered to assess the irrigation coverage, revise water charges, raise water rate demand and collect receipts.
- For better repair and maintenance of the water conveyance, outlet and open channels, possibility of convergence of O & M of the project with Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) beyond main delivery tanks may be evolved.

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