Study of Gap between Irrigation Potential Created and its Utilisation

Bagwan Zeba Aslam1, Hene Shubhada Uttarshevkar2, Yelgatte Pratiksha Nagnath3, Kolpuka Dnyaneshwari Gorakhnath4, Sayed Afreen Yaseen5, Waghmare. A. B6

BE Student1, 2, 3, 4, 5, Professor6

Department of Civil
Sandipani Technical Campus, Latur, Maharashtra, India

Abstract:
Many irrigation projects were constructed in India post-Independence period spending huge resources. However, there is a gap between irrigation potential created (IPC) and irrigation potential utilized (IPU). This report argues that the reasons lie in problems of delay in construction of distribution networks, more diversion of water for domestic or industrial water supply, miscalculations, design problems, poor maintenance of irrigation systems, problem of water tax collection and power interruption, non-availability of required infrastructure, violation of cropping pattern, seepage losses, unequal distribution of water, inadequate resources to improve design problems, poor maintenance of irrigation systems, problem of water tax collection and power interruption, non-availability of delay in construction of distribution networks, more diversion of water for domestic or industrial water supply, miscalculations, design problems, poor maintenance of irrigation systems, problem of water tax collection and power interruption, non-availability of required infrastructure, violation of cropping pattern, seepage losses, unequal distribution of water, inadequate resources to improve irrigation efficiency. This report suggests that the periodical reassessment of the IPC & creation of proper distribution system avoids seepage loss, lining of canal, implementation of rotational water supply system & water harvesting. This information is useful for taking remedial measures to achieve full I.P. utilization.

Keywords: irrigation potential created, irrigation potential utilised, study of gap between IPC and IPU.

I. INTRODUCTION

In our country there is a huge difference between irrigation potential created and utilized. Irrigation potential created is the total area which can be irrigated from a project on its full utilization. This implies that before an area is to be reported under “potential created”, it is to be ensured that: Water is available for the area to be irrigated in each season during a complete irrigation year. Conveyance system is available to carry water up to where it is needed. The projected cropping pattern of the region is satisfactorily adhered to. This implies that irrigation potential created denotes full utilization. If the area actually irrigated is smaller than the potential created, it denotes under-utilization. Thus, irrigation utilization is percentages of actual irrigated area to potential created. We note here that the irrigate potential ‘created’ figures are generally inflated figures and they are declared without paying attention to construction network. Sometimes, even if water is available, it cannot be taken to the farm where it is actually need; but potential created is shown in papers.

II. OBJECTIVES

The broad objective of the study is to examine various issues related to irrigation potential creation, its utilization, gross and net irrigated areas, including definition, reporting practices and consistencies in estimates.

More specifically, the objectives are:

- To identify the gap between irrigation potential created and utilized from the point of view of potential that a) has never been utilized, b) has not been utilized regularly and c) has gone into disuse due to various reasons
- To find reasons for the gap, both from the supply and demand sides
- To suggest measures for minimizing the gap
- To reconcile differences in the estimates of gaps as reported by different agencies and.
- To suggest a procedure for collection of data that can be applied uniformly throughout the country for the estimation of gap.

III. LITERATURE REVIEW

The paper addressing the gap between irrigation potential created and utilised are limited. However, there are studies addressing the problems of effectiveness of irrigation that focus on utilisation of irrigation. Early studies recognise the larger problems of land and water management as complex and multilayered (price 1971). The influences of physical labour on water control (Conklin 1973), and environmental factors (conklin 1973; netting 1974) on irrigation in terms of (a) localised and regular maintenance and (b) fair share of water are emphasised in these studies as determining factors for the existing IPC-IPU gap. Wade and Chambers (1980) and Palanisami and Easter (1983) argue that over emphasis on construction and ignorance of water management also results in the existing IPC-IPU gap.

IV. METHODOLOGY

The gap between the IPC and IPU is to be estimated as follows:
1. The actual area under crops in the command area (as envisaged in the project proposal) is the IPU
2. The difference between estimated water inflow into the reservoir as per the original project proposal and actual inflow for the particular year is to be calculated. The area that could have been irrigated based on the actual cropping pattern followed in the command area in that particular year is to be
calculated (using the consumptive use of water for the crops). This is the Gap attributable to shortfall in water inflow.

3. The area to be irrigated for the actual inflow of water in the particular year based on the cropping pattern as originally envisaged in the project proposal is to be calculated. The difference between this area so calculated and the actual area irrigated based on the actual cropping pattern is the Gap attributable to deviations in the cropping pattern.

4. The quantity of water released into each distributory is to be measured at the off-take point of the distributory every year. The proportion of water that is originally envisaged to be released into each distributory as per the project proposal is to be calculated. This proportion is to be compared with the actual proportion for the specific year. If the actual proportion is less than the original proportion, then the gap is to be calculated using the cropping pattern as explained in Para 2 above. This gap is attributable to administrative lacuna in providing equitable distribution of water.

5. The water released into each canal and distributory is to be measured at the off-take point. The short fall of water, if any, at the off-take point as well as at the end of the canal/distributory is to be measured. This shortfall, after accounting for the gap as explained in pars 2 to 4, is to be converted into acreage as explained in Para 2. This gap is attributable to poor maintenance of the distribution system. Data was collected, through a structured and pretested questionnaire, from a total of 500 farmers, covering Major, Medium and Minor irrigation schemes in Maharashtra. To make the sample representative, to the extent possible, of the entire state, a total of 14 districts were covered under the survey. Totally 58 villages were covered across the three types of irrigation schemes. Special efforts were made, while selecting the villages, to provide adequate representation to the farmers in the head reach, mid reach and tail reach. The details of sample selected under major, medium and minor projects and comprehensive analysis of primary survey data analysis. The ideal method for estimating the gap between the irrigation potential created and utilized would be to calculate the difference between the total area localized for irrigation at the time of commissioning the irrigation project and the actual area that is under irrigated crops in each year. The variation between area localized and actual area irrigated is expected because of various reasons.

GAP BETWEEN IRRIGATION POTENTIAL CREATED AND UTILISATION

Reasons for the gap between IPC and IPU
1. Completion of dam/head works ahead of canals: There are many examples of dams/head works being constructed much ahead of canals. Thus part of the command area gets developed in the head reaches where farmers overuse the available waters by either growing cash crops or applying larger than needed doses of water to crops like paddy.

2. Dilapidated irrigation systems: The Task Force on Efficient Utilization of Water Resources has estimated that 20 to 25 Mha. of surface water irrigation systems need extensive repairs. This situation arises mainly due to the poor maintenance by State Governments resulting from inadequate allocation for Operation & Maintenance (O&M).

3. Unlined Canal Systems: From cost considerations, canal systems were not lined in the past. This causes excessive seepage specially in sandy loamy soils. Groundwater recharge is often cited as a benefit of canal seepage.

4. Lack of field channels: Field channels are required for conveying water from outlet to each individual field. Lack of field channels leads to poor water management as flood irrigation has to be resorted to (as in delta irrigation systems). Field channels construction is taken up as a separate programme under Command Area Development (CAD)

5. Lack of canal communication network: Canal water gets wasted through canal escapes if there is sudden rainfall in command area when demand for irrigation water falls. An efficient canal communication system will keep the head works control room promptly informed of the weather conditions so that water not unnecessarily released into the canals. Most irrigation systems do not have desired communication facilities.
6. Lack of field drainage: While expansion of the irrigation system has received lot of attention in terms of funding, due attention has not been paid to drainage, especially field drainage. The main and intermediate drains, which have to carry off field drainage water, are mostly in a bad shape choked by weed growth.

7. Improper field leveling: Farmers sometimes apply excess water to ensure that water reaches plants situated on higher ground.

8. Absence of volumetric supply: Irrigation water charges are based practically in all states on the basis of area and type of crop and has no reference to the volume of water used. The actual realization of water charges as a percentage of the demand is also very low in most states due to inefficient collection system, loop - holes in irrigation acts and remissions announced on account of drought.

9. Inadequate extension services: Farmers need to be continuously educated on cropping pattern suited to soil and agro climatic conditions, periodicity of water application, fertilizer, weedicide, pesticide uses, etc. The extension services in most states are weak and do not cater to all the above areas.

10. Siting of reservoirs: There are large number of major and medium projects constructed and under operation in the country. Recent capacity surveys of some of the major reservoirs have revealed that the rate of silting was more than what was assumed originally and the dead storage provided to accommodate the silt flow into the reservoirs. The problem of soil erosion in the catchments is also a cause of concern to control the sedimentation rate. In recent years rigorous procedure for environmental impact assessment has been introduced and project proposals are required to be clear from the Ministry of Environment and Forests of GOI from environmental and forest angle.

11. Raising User Charges: Raising water charges at least to cover the costs of operation and maintenance is critical if the capacity created is not to degrade. It is also important to charge for water on a volumetric basis to encourage efficient use of water. In fact raising water rates beyond that can help generate a revenue stream that can be used to finance investment to expand irrigation facilities. Such a positive revenue stream may also make it possible to attract private investors through public - private partnership.

12. Beneficiary Contributions: The benefiting community may be required to contribute a part of the project cost (varying from 20 - 40% of the total cost) and the remaining cost may borne by the State Government with bulk of the States eligible share being supported by institutional loan. The contribution of the community could either be through ‘sweat equity’ at the delivery stage, or through capitalizing and underwriting operation and maintenance costs, thereby improving the efficiency and economic life of the investment.

13. Public - Private Partnership: Resource generation for irrigation projects through PPP is one of the options which needs to be explored. The Govt. should devise a mechanism for offering either an annuity or viability gap funding (VGF) upfront as in the case of National Highways Project where the VGF is up to 40%. The main constraints in implementing projects under PPP mode is the long gestation periods of the irrigation projects, problems and delays in land acquisition and statutory clearances, and the complete uncertainty on return on investment. Adequate pricing of irrigation water and a model for its recovery needs to be developed, may be with the intervention of Water Regulatory Authority, for ensuring returns on investment. Only then can PPP become a viable option. If PPP is not feasible, the only option is for the Centre and State Governments to raise resources. Even for PPP, government has to raise resources for annuity payment or viability gap funding.

14. Raising Taxes: If irrigation is to be financed by the government, raising income tax is the best solution. In the real world, however, irrigation would have to compete with other demands on government funds and the allocation may not be optimal. Raising taxes results in less consumption of water and that may reduce the irrigation utilisation.

Remedial measures for reducing gap between IPC and IPU

The following remedial measures are suggested below to minimize the gap:
1. The information on the expected rainfall and the quantity of inflows has to be estimated well before the cropping season. These estimates will be less accurate for the Kharif season, but highly accurate for the Rabi season.
2. Taking into account, the expected inflow of water the irrigation department and agriculture department should prepare the best possible cropping pattern for the season in the command area in order to maximize the potential utilized. If necessary, optimization techniques such as linear programming need to be used.
3. Based on the above cropping pattern the expected schedule for water release at each pipe command level needs to be finalized and announced. This information should all the farmers in the command area.
4. The farmers in each pipe command area are to be encouraged to follow the above cropping pattern.
5. Any deviation from the cropping pattern will be penalized in the form of lower water supply and higher penal rates for water.
6. The support of the water users’ associations and elected representatives of the local bodies have to be enrolled in the implementation of the above cropping pattern in each season.
7. The facilities provided by other departments such as agriculture department in terms of supply of high yielding variety seeds, concessional credit, agro processing facilities should be leveraged to make sure that the farmers follow the suggested cropping pattern.
8. The unauthorized utilization of the irrigation water outside the command area has to be controlled.
9. In case it is not possible to control this unauthorized use, the departments need to redefine the boundaries of the command area and recalculate the IPU taking this unauthorized use into account.
10. It is found that the budgetary allocation for maintenance works is very low and inadequate. Consequently, the required maintenance is not being carried to the desired extent. There is an urgent need to revise the maintenance budgets upwards.
11. Separate circles/divisions have to be created exclusively for maintenance and these circles/divisions need to be delinked from construction activities.
12. Maintenance can be done only when the canals are closed, which usually falls in the months of April, May and June. Because of the budgetary practices followed, the release of funds to the department takes place only after May-June. This leaves very little time to take up maintenance works. Hence it is
suggested that a non-lapsable fund needs to be created exclusively for maintenance activities.

14. It was found that the portion of the water rates retained with the water-users' associations is insufficient for maintenance works. It was found that the water users associations do not collect the water rates due to a variety of reasons affecting the maintenance. Thus there is a need to augment the funds for maintenance activities with other resources.

15. Faster completion of irrigation project work would reduce the possibilities of farmers getting used to lot of water.

16. Volumetric supply and prizing of water this is an important tool to avoid wastage of water and improve water use efficiency. Appropriate technical and administrative interventions by the state governments are necessary to introduce the practice of volumetric supply and prizing of water.

17. Awareness among the farmers about the water crises.

18. Prevention of losses, such as reservoir, canal, sedimentation of reservoir, etc.

V. CONCLUSION

The story shows local and multiple issues that creates the gap between IPC & IPU. A policy that incorporates local variation is needed for an effective utilization of the potentials already available. A part from correcting measurement errors and fixing definitional issues, a serious attempt to renovate the existing schemes up to the last outlet with proper distribution system is needed. The authors feel that measurement of IPC & IPU should be based on volume, and not on the basis of area. Regular update of IPC & IPU should be practiced. Before initiating a new scheme, effective interactions between different stake holders and concerned departments are necessary. The local Governments should be involved in planning and decision making as they can provide knowledge inputs in the absence of water user associations. Proper needs assessment feasibility estimation should be practiced. Decentralization and encouragement of user participation to the management is needed. This can ensure regular collection of water tax, proper operation and maintenance, proper distribution of irrigation water, judicious and rational use of the water, reduction of illegal water usage, better conflict resolution, minimization of water politics, improvement of the co-operation, and better interaction between the stake holders.

VI. REFERENCE

[1]. www.google.com

[2]. ISSN 0972-2661 Review of development and change volume XVII Number 2 July-December 2013


[4]. www.economicsdiscussion.net


[6]. Study related to gap between the irrigation potential created and utilized by Indian Institute of Management Bangalore (IIMB) December 2008

[7]. Study gap between irrigation potential created and utilized in India by Indian Institute of Management Vastrapur, Ahmedabad November 2008

[8]. Emerging water crisis in India, Key issues and forward article in Indian Journal of Economics January 2018

[9]. www.mahasb.maharashtra.gov.in

[10]. ecoursesonline.iasri.res.in


[12]. JilhawarPustika 2017 Latur District