

EFFICIENCY OF IRRIGATION IN SOME RIVER VALLEY

PROJECT IN INDIA

by

Dr. S.K. MAZUMDER, PROFESSOR OF CIVIL ENGG.

DELHI COLLEGE OF ENGINEERING, DELHI-110 006

INDIA

(For Presentation in the International Seminar  
on Water Management in Arid and Semiarid Zones)

## ABSTRACT

After independence, Govt. of India and The State Govts. have constructed a number of river-valley Projects to meet multiple objectives e.g. irrigation, flood control, hydro-electricity etc. Major part of the live storage is, however, earmarked for irrigation. Objective of this Paper is to examine the efficiency of irrigation in such projects. Project efficiencies of three major river valley schemes in West-Bengal indicate that the present state of water utilization is not at all satisfactory, since 70 to 80% of water released from reservoirs go waste. Various steps necessary to arrest wastage and improve project efficiencies have been outlined in the paper.

## EFFICIENCY OF IRRIGATION

Various types of efficiencies have been defined in order to assess the different objectives of water supply for irrigation purpose. If the efficiencies are high, the objectives are nearly fulfilled; but when they are low, the objectives are far from the goal. For example, low conveyance efficiency indicates that the conveyance system is poor resulting in substantial loss of water during transport from head reach to the tail end of the conveyors. Similarly, low value of application efficiency results from wastage of water in the agricultural farms due to a number of reasons e.g. (i) Use of improper and inefficient method of application of irrigation water (ii) lack of water courses and field channels (iii) inadequate grading of land (iv) unscientific scheduling and poor system of supply etc., resulting in colossal wastage of water through deep percolation, evaporation and surface run-off. Definition of various forms of efficiencies and their significance are discussed at length in reference no.2.

### PROJECT EFFICIENCY

Project efficiency indicates the effective use of the irrigation water source in crop production. For river valley projects, it may be defined as the ratio of water consumptively used by plants to the amount of water released from reservoir for irrigation purpose. Consumptive requirement of plants can be found by computing PET-values by any standard method and then adjusting it with crop index depending on species as well as stage of growth of the plant. Adjustment is also done against effective rainfall to determine the net irrigation requirement (NIR) as follows:-

$$\text{NIR} = (\text{Consumptive Requirement} - \text{Effective rainfall}).$$

The amount of water released from reservoir can be found from flow records available at the headworks. Project efficiency ( $\eta_p$ ) reveals what fraction of water released has actually been utilised by the Plants for growth and maturity. Thus, if  $\eta_p$  is 40%, it means 60 units out of every 100 units released is wasted at various stages during conveyance, application and storage in soil.

### PROJECT EFFICIENCIES FOR THREE MAJOR RIVER VALLEY PROJECTS IN WEST BENGAL.

Project efficiencies for three major river valley projects in West Bengal, namely, DVC, Mayurakshmi and Kangsabati Projects, computed by Thornthwaite method, are given in table -1 in the appendix, yearwise, separately for kharif and rabi crops. Details of computation are given in reference no.3. It may be observed that the efficiencies have improved with time. This is due to the fact that initially field channels did not exist; but with time, water courses and field channels were excavated in some parts of the Projects. It may also be noticed that the project efficiency is very poor in rabi season. This may be due to lack of intensive agriculture for rabi crops coupled with the fact that wild flooding method of irrigation from outlet in the distributory is still prevalent due to want of adequate field channels. Under such situation, huge amount of water is wasted due to flooding of lands which are not under cultivation. In both Mayurakshi & Kangsabati Projects, water is picked up by the main canal from some intermediate rivers at crossing points, in addition to the flow released from Main dams. Since

no records of these intermediate contributions were available, project efficiencies, calculated on the basis of release from main dams alone, appear to be higher in comparison with DVC. Obviously, the actual efficiencies of these projects too would have been far less, had the contributions of intermediate streams been taken into consideration. Perhaps, the project efficiencies of all the three projects would have been almost similar - say on an average 20 to 30% for kharif crops and 10 to 30% for rabi crops, approximately. This means 75% to 80% of water, conserved, conveyed and distributed at a great cost is being wasted due to poor system and still poorer management at farm level. Almost similar results are reported from the parts of the country where major river valley projects have been built for surface irrigation by extensive networks of main, branch and distributory canals. Extensive irrigation where a limited quantity of water is spread over a large area through long canal networks should not be encouraged, since such systems are unmanagable and there is considerable waste of water due to poor control, excessive seepage & evaporation, improper maintenance etc. Even the utilisation of potential created is reported to be poor.

#### STEPS FOR IMPROVING PROJECT EFFICIENCY

Improvement in project efficiency is badly needed not only to save water but also for avoiding waterlogging, salinity and alkalinity problems. Large tracts of lands in most of the commands under major river valley projects have been rendered unproductive due to waterlogging and salt problems. Various measures to improve project efficiency and avoid wastage are recommended below:-

- i) Lining of canals or conveying water through closed conduits, wherever feasible.
- ii) Choice of Proper method of irrigation application.
- iii) Land consolidation, land grading and sizing of land; Partitioning of land with partition in family must be avoided.
- iv) Preparing schedule of irrigation scientifically.
- v) Construction of adequate field channels with Provision for at least one outlet for every 5 to 8 ha of agricultural land.
- vi) Irrigation by rotation should be planned and executed.
- vii) Water rates should be charged on volumetric basis. Differential rating system as in electricity consumption should be encouraged.
- viii) Proper maintenance of canals, with all control & cross-drainage structures.
- ix) Irrigation should be encouraged during night in summer season.
- x) Construction of service reservoirs in different blocks for temporary storage of inflow (say for 36 hrs.), in case there is rain or to store during holidays etc.

- xi) Adequate drainage for disposal of seepage flow and surface run-off. Re-use of drainage flow wherever feasible.
- xii) Selection of crops and high yielding varieties of seeds having shorter crop period.
- xiii) Training of farmers in efficient use of water and encouraging Co-operative farming.
- xiv) Forecast of rainfall and determining effective rainfall.
- xv) Co-ordination amongst various agencies free from red tape and corruption.

#### ACKNOWLEDGEMENT

Author acknowledges with thanks the help received from Project authorities in collection of data needed for computing efficiency. The financial assistance received from Deptt. of Science & Technology for research scheme is gratefully acknowledged. Thanks are due to Delhi University authorities for sponsoring the author as a delegate of the university and the college authorities for permitting to attend the seminar.

#### REFERENCES

1. Institution of Engineers (India), Roorkee Local Centre, Seminar on "Irrigation Water Management", Jan. 12-13, 1985.
2. Israelsen, O.W. and Hansen, V.E., "Irrigation Principles and Practices", John Wiley & Sons, 3rd Ed., 1962.
3. Mazumder, S.K., "Efficiency of Irrigation in the command areas of DVC, Mayurakshi & Kangsabati Projects in West Bengal- A case Study", National Seminar on Water Resources Management for rural development, Oct. 18-19, 1984, held at KNIT, Sultanpur, U.P.
4. Ministry of Irrigation, CAD & WM Division, Govt. of India "Compendium of important circulars on the command area Development Programme", New Delhi, Dec., 1984.
5. Zimmerman, J.D., "IRRIGATION", John Wiley & Sons, 1966.

## APPENDIX

TABLE -1

PERCENTAGE PROJECT EFFICIENCIES FOR THREE MAJOR RIVER VALLEY PROJECTS IN WEST BENGAL

YEARS	DVC PROJECT		MAYURAKSHI PROJECT		KANGSABATI PROJECT		REMARKS
	Kharif	Rabi	Kharif	Rabi	Kharif	Rabi	
1964	22.8	11.5	-	-	-	-	
1965	20.6	11.3	-	-	-	-	DVC PROJECT
1966	23.2	13.4	-	-	-	-	WAS COMPLE-
1967	28.2	15.8	-	-	-	-	TED IN 1960
1968	25.0	33.8	32.2	-	-	-	MAYURAKSHI
1969	22.1	22.2	32.5	67.0	-	-	IN 1956 and
1970	28.8	36.5	32.7	44.2	-	-	KANGSABATI
1971	39.6	43.5	32.8	36.4	37.0	-	in 1973.
1972	-	-	33.1	34.8	43.5	-	
1973	-	-	-	-	61.0	18.6	

NOTE: No data beyond 1973 is available since author left West Bengal in 1975.