

CHAPTER - 5

CONCLUSIONS

5.1 GENERAL

Studies conducted earlier on the Upper Ganga Canal to analyse water use efficiency, productivity per unit volume of irrigation water & its comparison with other systems of northern India or within various tracts of U.G.C. sub system have been reviewed. These studies had been undertaken since the beginning of 20th century. Comparison of such studies can be drawn by studies almost a century later as depicted at Annex 4.6 & 4.6.1. The results show that even after stabilisation of irrigation over the culturable command area & modernised conveyance network, the vagaries of weather, gap between demand & supply and importantly the diversified cropping pattern and the traditional water application practices tending to over-use rather than optimise have instead of improving, given a setback to the field efficiency.

Vastly variable delta for a set of four continuous crop seasons on some major distributary systems irrespective of head reach or tail reach offtakes (eg. Jewer disty. system), show inequity in distribution and lack of proper application in use.

Studies carried out under U.P. Consolidated Irrigation Project (U.P.C.I.P.) & formulation of modernisation projects adopt certain losses on the lined main canal, branch canal, distributaries & field application. These have been compared with studies conducted now on the above components of conveyance & distribution system. But inspite of modernisation of system, no significant improvement in WUE is reflected because of diverse and water intensive cropping pattern.

Planning Commission entrusted WAPCOS with pilot study on water-use efficiency of the Upper Ganga Canal. Analysis of field data, observations, discharge tables on releases, deliveries at various control points, achievements of irrigation, has been done. A comparison has been drawn between various studies, empirical formula and scope of improvement. This has been accomplished by analysis of losses on the conveyance & distribution network on a number of sub-systems of Upper Ganga Canal & an average drawn. Analysis has also been carried out for area receiving irrigation water both from U.G.C. & W.J.C. on the Agra canal system.

5.2 ABSTRACT OF LOSS & WATER USE EFFICIENCY

Average losses in the conveyance system of UGC and field application losses on field channels & commands of outlets have been abstracted as under & shown in Annex 4.1. Water use efficiency has been worked out at the end of conveyance & distribution system up to head of outlet as well as below the outlet. Studies on unlined watercourses & unlined system of distribution and minor network have also been incorporated. The findings are as under : -

- Losses upto end of upper main line of UGC :
Range : 0.5 to 2.6 %
Average 1.55 %
- Losses between Main canal & its cardinal control point for distribution on UGC
Range : 2.8 % to 8.23 %
Average 6.54 %
- Losses on branches & distributaries
Average ignoring irrational data
study 1 : Range 8.31% to 15% 12.0 %
study 2 : Range 3.56 % to 18% 12.5 %
Average 12.25 %

- Losses on unlined water course
Range : 12.5 to 16.2%,
Average ignoring irrational data = 15%
- Losses on lined water course,
Range : 9 to 11 %
Average ignoring irrational data 10.5 %
- Losses on field application :
Range : 15 to 22 %
Average ignoring irrational data 18.5 %
- Plant root zone application & loss.
Range : 25%

Overall Losses

- i) As per existing status of conveyance system & lined water courses
(nominal area covered) = 46 to 49%
- ii) Same as above for unlined water courses = 48 to 52%

Thus overall water use efficiency varies between 33-38%.

5.3 FACTORS AFFECTING WATER USE EFFICIENCY

Field visits to expansive network of U.G.C. and discussions with the officers of Upper Ganga Canal System both in the field as well as their offices located at Meerut, Muzaffernagar, Haridwar, Jewer, Aligarh, Mathura, Palwal, Okhla & Hindon revealed complexity of area specific features, problems and constraints needing attention to bring about improvement in the overall water-use efficiency. Factors closely related to water use efficiency and generally applicable on the system network are being outlined for taking ameliorative measures.

a) Structural Defects & Avoidable Inequities

1. The regulation mechanism at head regulators needs to be upgraded by installation of gates & gearing to implement & reduce time lag in demand & implementation in control of releases.
The present practice of regulation through wooden needles is time consuming; resulting in easy tampering & leakage even when head of channel is supposed to remain closed.
2. The automation of gates & gearing and replacement of old regulation practices is needed even on crucial points of regulation & offtakes of distributaries from branches, cross regulators etc.
3. There is urgent need to revise discharge tables being operated at various control points. Some of these have not been revised for years. The silting and scouring tendency and resultant condition of maintenance of channel thus causes overdrawal & under drawal resulting in inequity & excessive losses.
4. The practices of allowing pipe outlets on every channel based on area despite evolution of versatile modules like APM has no logic to continue. Pipe outlets installed at various settings from bed to little above, same size in fluctuating full supply levels, in head reach as well as tail reach obviously does not deliver a fixed discharge. The drawl also relate to difference in water level of parent channel & water courses & even field being irrigated. This not only causes inequity but is also easy to tamper with. Heading up by cross bunds below such outlets was common on channels like Jewer disty.
5. Osrabandi like warabandi on WJC; is practiced on UGC, but incorporation of transit losses for only some of the divisions, allocation of shares & type of outlets only encourage inequity of irrigation & lean supplies in tail divisions.
6. The discharge of offtakes plus losses or that of direct outlets; command area on outlets & irrigation figures achieved showed huge variation. There is urgent need to

- i) Switchover to modular outlets
 - ii) Frequent revision of discharge tables
 - iii) Revision of Water Allowances - rationally by working out irrigation water requirement
 - iv) Equity in distribution based on CCA on each minor / command
7. UGC has better availability of supplies & with control on cropping pattern, considerable coverage can be achieved without extensive rotational programmes. The rotational programmes notified in various circle show that many of the minors are described as "not likely to be fed upto tail or likely to be fed upto certain mileage length". The channels are included in the programme of releases as per its entitlement of C.C.A. & in designed head discharge; why then only head reach or middle reach farmers allowed irrigation water and tail-enders denied ? This appears contrary to canal act provision. Equity in distribution as enshrined in the canal act, Osrabandi & Chakbandi requires proportionate distribution amongst all the shareholders if supply is less. Installation of pipe outlets is the first draw back resulting in automatic inequity.

b) Operative Aspects on WUE

8. There is need to rationalize and revise the water allowance. The water allowance has to be based on soil characteristics of command area, Sub-soil water level conditions and cropping pattern. It is not necessary to have the same allowance for head reach offtakes of U.G.C. as the tail reach. It has already been brought out that head reach farmers have better canal water availability and high fresh water table whereas tail-enders are short of canal water deliveries and ground water is deep & inadequate.

This becomes necessary as augmentation of supplies through Madhya Ganga & canal linkages have altered the scenario on ground.

9. There is urgent need to install metre flumes for monitoring of the full supply levels & discharge at intermediate points, installation of gauges on piers, wingwalls of bridges & face wall of outlet & construction of tail clusters for easy appraisal by inspecting officers.
10. The efficiency diagram of outlets, channels & performance level of Irrigation Division as to their productivity or non-productivity being done earlier has become obsolete. This needs to be revived.
11. The value of water & its economics shall go home if water-rates (Abiana) are revised & upgraded. There is need to charge according to water-volume consumption. The user must pay for the quantity used & polluter must pay for cost of redemption. There is immediate need to curb entry of polluted effluents into water bodies. The visits showed such illegal practices into Hindon cut, Agra canal, offtakes and channels passing through urban & industrial areas.

5.4 INEQUITY IN DISTRIBUTION & UNAUTHORISED PRACTICES

There is high incidence of unauthorized drawal reported as a system malady in some of the divisions as mentioned & at places confessed, lamented but not controlled. There needs to be a mechanism to account for every cumec of water delivered at head. The discharges released & accounted for in offtakes do not reconcile at many places.

Unauthorised drawal was resorted to by cutting of distributary bank, construction of frequent bed bars & bunds across bed width downstream of outlets, fixing pipe outlets indiscriminately at bed levels, etc. Leakages from head regulators of closed channels, encroachment of canal banks, silting & shoaling of bed, non-maintenance of internal section of canal to design parameter was also vitiating hydraulics. Field Officers attributed this to paucity of funds for maintenance.

5.5 FINANCIAL REPERCUSSIONS OF MEASURES TO IMPROVE THE WATER-USE EFFICIENCY

(A) Measures

1. Replacement of existing regulation arrangement from wooden needles to gates & gearing to arrest avoidable leakage, loss of time & damage.
2. Construction of meter-flumes and installation of enamelled gauges.
3. Modernizing communication system with wireless; computer based communication network to control supplies, avoid wastage, mishaps and for better utilistion of available deliveries
4. Remodeling of head regulators; section of channels for drawl of authorized discharge; drawal of proportionate silt load & upkeep of hydraulic parameters at intervening sections.
5. Change over to modular outlets & open flume tail clusters and outlets
6. Balancing & rationalising water rates of flow irrigation & energy charges to optimise conjunctive use of ground water & surface waters.
7. Integrating water management practices to encourage area specific water application practices on the farm & introducing of micro irrigation practices

8. Surveillance of unauthorized irrigation & empowerment of field functionaries.
9. Lining of water courses, minors & distributaries etc.

(B) COST ESTIMATE / FINANCIAL REPURCUSSIONS

- a) Items at serial no. 1,2,3, & 9 can be covered in the ongoing project of modernization of UGC System. What is required is prioritising items & these 5 items should be kept in first phase.
- b) Item at Sl. No. 5 should be taken up under canal act for equity in distribution by each division & funds to the tune of Rs. 50 Lakhs per Circle can be provided for changeover additionally to the existing O&M funds.
- c) Items 6,7, & 8 do not require funds for implementation of existing instruction; upgrading flow rates & balancing energy charges; taking advantage of subsidy for micro-irrigation practices & huge incentives under CAD & other programmes to achieve the objective.

Thus there are no financial repercussions involved in adopting measures to improve the WUE of UGC system. The entire work can be carried out under existing schemes by prioritizing various measures.