"TAIL TO HEAD" A TECHNIQUE IN IMPROVING WATER USER EFFICIENCY AND PRODUCTIVITY OF SRIRAM SAGAR PROJECT TELANGANA STATE (INDIA)

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ABSTRACT

The growing concern and periodic warnings in era of water scarcity, with increasing demand for food and competing use within water sector, the pressure is on irrigation professionals to manage water efficiently. The main objective of this study is to address current issue encountered in Irrigation project command areas in Telangana State. The problems in the irrigation canal network after practical approach are identified as limited amounts of water available at water source and high water consumption in head reaches which result in water shortages at tail end of the Project. Moreover farmers at the head reach cultivate high water intensive crops like paddy.Sriramsagar project, which is a major irrigation project in Telangana state is designed for ID Crops but farmers have become habitual incultivating paddy which raised major concerns for equitable distribution of irrigation water. To overcome this situation Government of Telangana in the year 2016-17 Rabi decided to adopt "TAIL to HEAD" method for distribution of water. The localized ayacut in the tail-end is given water first and the ayacut in the beginning given at the last. The implementing methodology, the ground hurdles and the solutions for implementation, analysis of the water productivity before and after the introduction of the scheme are presented in the paper

Keywords: Tail to Head, Water use Efficiency technique,water regulation, water release in irrigation canal, Sriramasagar Project,Change in agriculture pattern, High water consumption in head reach.

1. INTRODUCTION

Water Management is important since it helps to determine future Irrigation expectations. As we approach a new millennium, there are growing concerns and periodic warnings, that we are moving into an era of water scarcity. Water is locally available resource, no global solutions for governments need to work on better used efficiency (Catalogue of World economic forum 2012)With increasing demand for food and competing use within the water sector, the pressure is on irrigation professionals to manage water efficiently. The planners assume certain cropping pattern and water requirement for different seasons. The problems in the irrigation canal network include limited amounts of wateravailable at water source, high water consumption in head reaches results in water shortages as the canal proceeds As farmers in Head reaches irrigate more area, increases shortage of water as canal proceeds(Kalpana et. al. 2009). Change in cropping pattern to that designed demands morewater. Demand is more than the carrying capacity of the system. Farmers in headreach draw out all water they need for water intensive crops, farmers at middle and tail end get affected. Violent numerous agitations like blocking the road traffic by tail end farmers and protest at the irrigation offices used to happen regularly and became a

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law and order problem for the district administration.The reasons for Tail end deprivation and Shortfall of water at tail-end ayacut is listed as Lack of timely maintenance, Conveyance and seepage along canal path, Siltation&plant growth.

Wrong planning at the design stage may create perpetual problems. The farmer's knowledge of the local terrain needs to be utilized during the design of system at local level.Water is available in the distributory, but the conveyance system is not capable of taking it into the farms through the minors, sub minors and outlets.Field channels are also not well maintained and this has often caused deprivation.illegal manipulation of canals and structures The minorhas got breached in many places and farmers draw water from the breach.The Department was not in position to enforce discipline on those farmers taking more than their share. Year after year the farmers at the tail end were not getting water.Toovercome this the young State of Telangana has initiated many programmes to make it as Bangaru Telangana as its first steps towards Reinventing Telangana by correction through a conscious process of reorientation and reformulation.

To supply the water to the deprived tail end ayacut the state Government iniated a novel concept to adopt "tail-to-head" method in irrigation on experimental basis for one project and directed the engineers towards implementation of Tail to Head irrigation method.

2. PROFILE OF THE SRIRAMASAGAR PROJECT (SRSP)

Sriramasagar Project (SRSP) is a multipurpose river valley project constructed during 1964 across river Godavari at Pochampadu (v), Balakonda (M) of Nizamabad district. It is a composite (Earthern and Masonry) dam and Power is being produced by T.S.Genco at S.R.S.P. Dam site for 27MW @ (3 X 9MW).The water passes through the power blocks and enters into the Kakatiya canal. The Co-ordinates of the dam are as follows:

Latitude : 18°-58'N
Longitude : 78°- 20'N

SRSP has three Canal Systems, Saraswathi Canal (The Godavari North Canal), Kakatiya Canal (The Godavari South Canal), Laxmi Canal (High Level Canal). The Kakatiya Main canal Takesoff from the dam after traversing for about 146 Kms outfalls in to Lower Manair Dam (L.M.D.) a blancing reservoir built across the river Manair in Karimnagar District and situated 3 Kms from the district head quartersKarimnagar. The Stage-I of SRSP is from Km 0.0 - Km 284.0 of Kakatiya Main Canal it is envisaged to irrigate a total ayacut area of 391,994.7Hectares and the Stage-II of SRSP i.e. from Km. 284.00- Km. 346.00 is to irrigate an ayacut of 178061.6Hectares.

The Stage- I of SRSP has a total of 148 Distributories(94 no of Distributoriesupto LMD and 54 Distributories beyond LMD)

3. STUDY AREA (DISTRIBUTORY D86)

D-86 is a Distributory of Kakatiya canal located at Km.122.450.it has a design discharge of 1132 c/sto supply the water to an extent of 34932.4Hectares covering 6 Mandals in the erst while karimnagaar District of Telangana State. Total length of the canal is 54.20 KM having a total number of 60 Minors and 102 DPs covering a total length of 518Km. The Total number of villages benefitted are 144Nos. The District

Administration and Irrigation officials took the imitative and marked out the problems and issues to implement the Tail to Head.

4. METHODOLOGY

How to build the confidence among farmers of head reach?Here no head reach farmer agrees to let the water go first to the Tail End.To build the confidence and belief,maintenance of canals were taken up on war footing basis by clearing jungle,desiiting, gravelling of inspection paths and restoration of field channels.The entire canal network was made ready for smooth flow of water. The fast track progress of the work and the efforts made by the engineers gained confidence and respectof the Head reach farmers since from many years the canal network was not maintained.

From the friendly approach gained by the canal maintenance, Gramasabhas were conducted and explained to the farmers that Sriramsagar project designed for ID Crops and most of the farmers are cultivating paddy resulting in water scarcity at the tail end ayacut. To overcome the situation Government of Telangana in year 2016-17 has decided to adopt “TAIL to HEAD” method to supply the equitable distribution of water. The localized ayacut in the tail-end is given water first and the ayacut in the beginning at the last. The rotation schedule in water management has been practiced for several years. Water is released for a specified quantum andduration, which is counted as number of watering. Usually the number of days the water is provided ranges from 8 to 9 days depending on the number of waterings given and the area under cultivation. Pros and Cons of Tail to Head discussed in the Gramasabhas also touched the humanity aspect that ‘How tail enders are deprived and impact of this deprivation like farmers suicides etc .The concluded word of the respective Gramasabhas are “LIVE AND LET LIVE”.

Figure 1. Jungle clearance activities taken up along the length of the Distributary

Figure 2. Desiltation works taken up along the Distributory

Figure 3. Conducting Village level Gramasabha and Demonstrations.

With the above exercises farmers got confident of assurance given by the administration that supply the equitable distribution of water and succeeded in positive frame of MINDSET in farmers.

4.1 Cropping Pattern

The Agricultural Department directed the tail end farmers to go for ID Crops like maize,Cottonetc as the Sriramsagar project designed for ID Crops and supplied the sufficient seeds to on subsidy basis.It is effective in both saving water and raising the growth. The main advantage for ON and OFF is to grow paddy in soil with no continuously standing water. The rice plant during its growth stage only needs to have soil that is moist, but not saturated. Indeed, the field should occasionally be dried even to the point of cracking and which gives more yield.
Initiatives of rotation (on and off) and tail to head:

- Bridging gap between irrigation potential created and utilized
- Equitable Efficient Distribution of water for command area
- Increased efficiency through reduced time.
- Improving water productivity “MORE CROP AND MORE YEILD.

4.2 Operation and Monitoring

The District administration took the initative to implement the tail to head, Simply by replacing lazy management of canal irrigation by a proactive, vigorous and result-oriented approach to irrigation management. The irrigation officials took the help of Agricultural, Revenue, Police employees for strict monitoring by closing all the Minors of head reaches of D86 to supply the water to the tail end. Revenue and Irrigation personnel deployed all along the canal sluices on shift basis and convinced the farmers of head reach who feel insecure of closing their sluice gates.The approach of convincing head reach farmers is friendly and given confidence that they get their enough share of water after reaching the Tail End. Mobile police party patrolling all along the canal to convince the farmers with the ‘Friendly Police approach” behaved well with farmers as the farmers issue is sensitive in the biggest democratic country like India.The key factors played a vital role to success of Tail to Head are the Chief Minister’s and Irrigation Minister’s unstinted support, uplifting staff morale, focus on reaching water to the tail-ends, and relentless monitoring and follow up.

5. RESULTS AND DISCUSSION

When out sluices open condition (free flow)

The water did not reach the Tail end even at the release of full discharge when all OT Sluices were in open condition due to following factors:

i. Conveyance and Evaporation losses
ii. Excess discharge drawn out from the head reach OT Sluices due to its high velocity.
iii. Lifting of water through motors.
iv. Head reach sluices gates operated fully by farmers (excess drawl more than its designated discharge).
v. 40% of length of canal with full capacity,Half of the capacity for the 10% ofcanal length ,one fourth of the capacity for another 10% of canal length.This is mainly due to head reach farmers irrigates Paddy crops and theayacut also increased and the high banks cultivated with paddy by lifting water through motors which does not come under localized ayacut and thecanal designed capacity for ID Crops.
vi. For the 8 days turn system it makes minimum 3 days for the water to reach upto 60% of length and the quantum of water available also less.

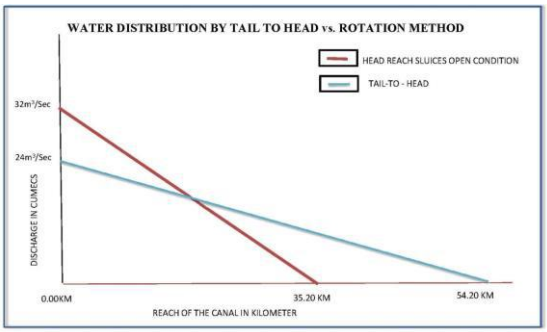


Figure 4. Tail to head Concept – Optimal Distribution

Table 1. Canal Discharges and rach of water

CANALDISCHARGES	Length of the Canal	% of canal flow
FULL CAPACITY	21.00 Km	40%
Half capacity	6.00 Km	10%
¼ capacity	8.00 Km	10%
No Flow	19.00KM	40%
TOTAL	54.00km	100%

The main advantages of Tail to Head system are:

i. Minimize the transmission and evaporation losses due o its full capacity in canal prism
ii. Controlling of lifting of water through pumping when water is supplied to tail end.
iii. Water reached to the tail end with 75% of its design capacity so that cansave the water.
iv. Avoid wastage of water by proper pondings in canal prism by providing necessary cross regulators.
v. Water can be saved and Irrigated Area increased by integration of surface and ground water ,. Most of the farmers own open and borewells.

Table 2. Water saving during tail to head concept

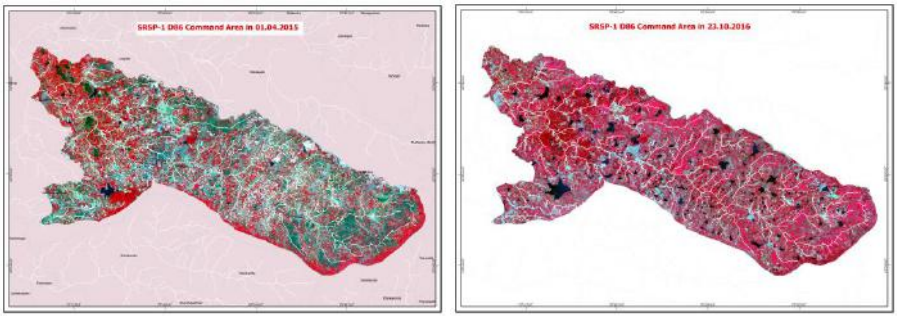
AREA IRRIGATED UNDER TAIL TO HEAD SYSTEM	QUANTUM OF WATER REQUIRED	QUANTUM OF WATER UTILISED	% of saving
32464Hectares (23653WET+8811 ID)	3634.62cumecs	1874.66cumecs	48.40%

Table 3. Percent area increased during tail to head concept

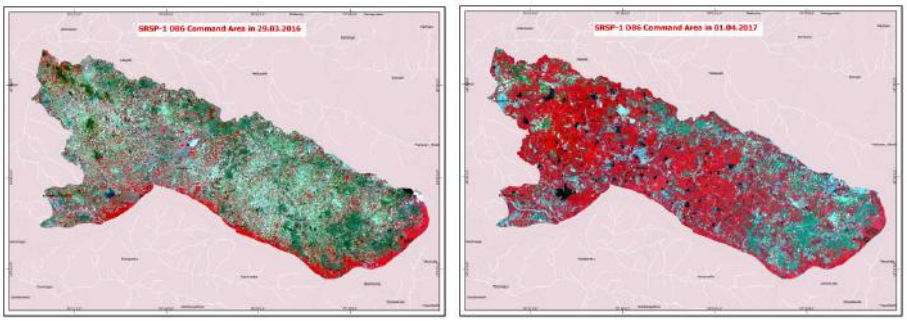
AREA IRRIGATED BEFORE TAIL TO HEAD SYSTEM	AREA IRRIGATED AFTER TAIL TO HEAD	% of increase
22033Hectares	32464Hectares	46.48%

5.1 Production and Yeild

Satellite images of the Distributory-86 Ayacut depicting the crops (in red) before adopting TAIL TO HEAD Technique (i.e. 2015) and after adopting TAIL TO HEAD Technique (i.e 2016).



Before T2H khariff-Year 2015-16 After T2H Khariff Year 2016-17



Before T2H Rabhi-Year 2015-16 After T2H RabhiYear 2016-17

Figure 5. Satellite images of the Distributory-86 Ayacut before and after treatment

Remote sensing data is the basic data source for mapping the cropping system of the region. Kharif& Rabi for the Water Year 2015-16 & 2016-17 LANDSAT8 data Path/Row 143/47 was analyzed for detrmining cropping pattern. The Multi-date satellite data is used for different seasons.Vector layers were prepared in QGIS software.The command area boundaries of D86 were delineated. Remote Sensing & GIS tools were employed for the cropping pattern analysis above. Resourcesat LISS 3 and LANDSAT-8 data is arragned to identify for each command the spatial extent of crop.

Karimnagar/Peddapalli: For the first time in the history of the State, the highest quantity of the paddy have arrived in the market. About 60 lakh metric tonnes of the crop has been produced in both Kharif and Rabi seasons, which is the highest yield in last 15 years.

Announcing this to media on Friday, Civil Supplies Department Commissioner CV Anand said during the meeting with joint collectors that they had presumed that about 37 lakh metric tonne paddy would arrive in the market, but it might touch 43 lakh metric tonnes. In the Kharif season, they had procured 17 lakh metric tonnes.

It will be a record production since the paddy production never crossed 24 lakh metric tonnes in the past, he informed.(Telnagana Today 26 th May 2017).

According to the data provided by the Agriculture Department, Peddapalli and Nizamabad districts are expected to get highest paddy production in the State. The farmers in the State this time were expressing happiness over the record yields. Some farmers claim to have harvested 50 bags of paddy per acre. “Per acre crop yield increased considerably this time and the credit goes to the timely availability of irrigation water and uninterrupted power besides having fertilizers and pesticides,” said K Lingam of Kurmapally village of ChintapallyMandal of Nalgonda distri.(Telnagana Today 29 th April 2017)

5.2 Farmer’s Speak

The farmers from Tail End expressed happiness seeing the full capacity of canal water and they are not in position believe that water is entering into the felids also came out of mental block of not getting water to the tail ends.

5.3 Engineer’s Speak

Earlier to the introduction of this system during canal inspection engineers felt uncomfortablewhen interacting with farmers of tail end. Now engineering community feel proud of being of part of supplying water to most deprived tail enders.

Figure 6. Tail end farmer expressing his happiness when water reached him (News coverage in NamastheTelangana daily)

6. CONCLUSION

Tail to Head irrigation system is big boon to the deprived tail end farmer community and its benefits include Water Entitlement, Assured supply of water, Efficient use of water, Ensure proper use of surface and ground water, Freedom of cropping Sustainable management of water resources. Conjunctive use.The only way to equitable distribution of water to the entire canal network is to build confidence through frequent interaction with head reach farmers that their share of water will be distributed at the right time with right amount. This Tail to head success is dedicated to the Head and middle reach farmers of Distributory D86 for their confidence on District administration and irrigation Engineers The slogan for supply of water to deprived tail enders is "LIVE AND LET LIVE".

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