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Study on Different Type of Irrigation System Suitable for South Region of Maharashtra

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Abstract: ***To study on different type of irrigation system suitable for south region of Maharashtra. We are attempting to find an irrigation system which would require less water and will be economical with higher yield of the crops for which it is installed. Irrigation is the artificial application of water to the soil through various systems of tubes, pumps, and sprays. Irrigation is usually used in areas where rainfall is irregular or dry times or drought is expected. There are many types of irrigation systems, in which water is supplied to the entire field uniformly***

Study of various types of irrigation method's such as surface irrigation, subsurface irrigation, drip irrigation and smart irrigation. We discussed about the different types of irrigation systems, there are several types of irrigation systems such as surface irrigation, sub-surface irrigation, drip irrigation, IOT, smart irrigation, sensor based irrigation in combination of traditional and modern type of irrigation.

From above study we came to know the difference between automated irrigation system and manual irrigation system. We will know that automated irrigation system gives higher yield of crops using less amount of water as compared to manual irrigation system in accordance to automated and manual. Our study is to compare our system with other irrigation systems in terms of economy and optimum water usage to provide maximum results.

Keywords: Surface irrigation, Drip irrigation, Manual Irrigation system, automated irrigation system

I. INTRODUCTION

The Irrigation Engineering and associated sciences are all the while engaged in finding better solutions to overcome the deficiencies listed above. On this background, it is interested to understand the innovative measures adopted in the command of few irrigation projects in Maharashtra. They replaced the open channel water distribution network with innovative specially designed gravity flow PVC pipe water distribution network to resolve the above problems. On the other hand, their system has inbuilt effective and simple water management. They have brought revolution in irrigation sector. A light is thrown over such innovative Case studies situated in different parts of Maharashtra State.

1) Simple, low maintenance, low cost, long lasting and adoptable system
2) High water use efficiency
3) No land is wasted. No land acquisition.
4) Built in transparency. No scope for malpractice in the water distribution.
5) Equitable water distribution.
6) Built faith of the system.
7) Helps to ensures water rights.
8) Minimum conflicts.
9) No one can draw water out of turn.
10) Any individual farmer can exchange his share with the adjacent needy farmer.
11) Tail Enders water right is assured.
12) Manageable turnout discharge
13) Construction of pipe network is much easier, cheaper and quicker than the open channel water distribution network
14) Induces Crop diversification and adoption of high yielding crops.
15) Conjunctive use of surface and Ground water is possible
16) No water logging

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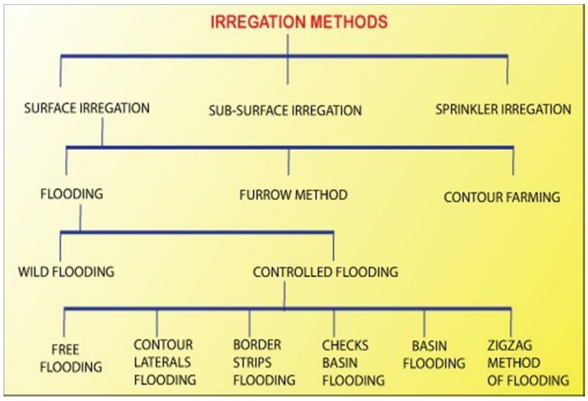
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A. General Introduction

Irrigation is a vital input in the agricultural productivity and agricultural growth. More than 80% of available water resources worldwide as well as in India are being presently utilized for irrigation purposes. However, in India, the average water use efficiency of Irrigation Projects is assessed to be only of the order of 30-35%. There is no doubt that modernization of irrigation system like concrete lining to the inner surface of the open channel; canal automation etc. will save water significantly. But these techniques require huge capital investment, hence uneasy to adopt. On this background it is appropriate to know the innovative, simple, low cost, easy to adopt, water conveyance techniques used in the command of few irrigation projects in Maharashtra. The paper discusses the need to increase the Water Use Efficiencies of existing Irrigation Projects and new projects and the success case studies in detail. The findings show that such pioneering techniques shall be implemented in the command areas of other irrigation projects as and where found techno economically feasible to achieve improvement in crop yield and good water management with high water use efficiency.

B. Type of Irrigation Technique in India

In India, the irrigated area consists of about 36 per cent of the net sown area. There are various techniques of irrigation practices in different parts of India. These methods of irrigation differ in how the water obtained from the source is distributed within the field. In general, the goal of irrigation is to supply the entire field homogeneously with water, so that each plant has the amount of water it needs, neither too much nor too little. Irrigation in India is done through wells, tanks, canals, perennial canal, and multipurpose river valley projects.



C. Problem Definition

India has made tremendous progress in development of its irrigation potential. However, only about two-third of the created irrigation potential is actually being utilized and overall project irrigation efficiencies are very poor. In this thesis examine various issues related to irrigation potential creation, its utilization, gross and net irrigated areas in south Maharashtra region.

D. Need for Construction

"The main idea behind irrigation systems is to assist in the growth of agricultural crops and plants by maintaining with the minimum amount of water required, suppressing weed growth in grain fields, preventing soil consolidation etc**."**

E. Aims and Objectives

"To Study on different type of irrigation system suitable for south region of Maharashtra. Provide possible solution to decrease the water consumption and increment in fertilizing of crop."

1) *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 in south Maharashtra region.

More specifically, the objectives are:

- To identify the gap between irrigation currently used in south Maharashtra region and provide possible solution to increase fertility rate
- To Study existing irrigation system in south region of Maharashtra

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II. LITERATURE REVIEW

International Conference on Water Resources, Coastal and Ocean Engineering (ICWRCOE 2015), Science Direct, "Case Studies of Innovative Irrigation Management Techniques Pradeep Bhalagea, BB Jadiab, S T Sangale

The paper discusses the need to increase the Water Use Efficiencies of existing Irrigation Projects and new projects and the success case studies in detail. The findings show that such pioneering techniques shall be implemented in the command areas of other irrigation projects as and where found techno economically feasible to achieve improvement in crop yield and
good water management with high water use efficiency

A. *MINOR IRRIGATION PROGRAMME-MAHARASHTRA, MINOR IRRIGATION PROGRAMME - MAHARASHTRA Effective Irrigation Programme through Farmers Participation*

The Government of Maharashtra (GoM) has constructed a large number of Major, Medium and Minor Irrigation Projects to ensure the regular supply of water to the agricultural sector. The operation and maintenance (O&M) of the irrigation infrastructure remained the responsibility of the Government. In order to improve the management of the existing irrigation schemes, including the supply of irrigation water in a timely and equitable manner, the Government developed a policy and issued various guidelines to involve water users in the O&M of existing irrigation (sub-) systems. For this purpose, irrigation water is supplied on volumetric basis to Water Users Associations (WUAs), which gets back 20% of the collected water charges as management subsidy for the O&M of the distribution system in their respective command areas. The Government remains responsible for the management of the head works and main canals as well as for the collection of the due water charges.

B. *Irrigation in India: Status, challenges and options§ RAJNI JAIN, PRABHAT KISHORE and DHIRENDRA KUMAR SINGH, Journal of Soil and Water Conservation 18(4): 0-0, October-December 2019*

Agriculture sector, which provide 54.6% of total employment to growing population, alone consumes more than 90% of total groundwater draft in irrigation. Over the years, groundwater has become dominant source of irrigation due to its independent access and timely availability of water. This outrageous dependency on groundwater has led to depletion of water table in 64% district of the country between TE2002 and TE2016. With collective efforts of government at various levels, utilized irrigated potential including both surface and ground water has increased to 87 Mha while ultimate irrigation potential touched 140 Mha. In context of rapid depletion of water resources, there is need to increase water use efficiency. Efficient method, like micro-irrigation, can play pivotal role in management of irrigation water demand.

C. *Spread and Economics of Micro-irrigation in India: Evidence from Nine States, K Palanisami, Kadiri Mohan, K R Kakumanu, S Raman, June 25, 2011*

The adoption of micro-irrigation projects has resulted in water saving, yield and income enhancement at the farm level. However, the overall impression is that they are capital-intensive and suited to large farms. In this context, a study was undertaken in nine states, mainly to examine the actual area covered compared to the potential area and to understand the adoption level of mi as well as to analyse the cost and returns under different farm categories. The results indicated that only about 9% of the mi potential is covered in the country. Key suggestions include reduction in capital cost of the system, provision of technical support for operation after installation, relaxation of farm size limitation in providing subsidies and the establishment of a single state level agency for implementation of the programme.

D. *Performance Evaluation of a Minor Irrigation Scheme P.M. Ingle, S.E.Shinde, M.S. Mane, R.T. Thokal and Ayare B.L, Research Journal of Recent Sciences, 2015*

The study was conducted to assess the performance of Kalwande Minor Irrigation Scheme (KMIS) in Chiplun, Ratnagiri district of Maharashtra using various indicators such as output per unit cropped area and water consumed, related to production with land and water. Relative water supply (RWS), irrigation supply (RIS) and water delivery capacity (WDC), related to water supply from the system with crop water demand and financial self-sufficiency (FSS) related with collection of fees from water users in the command area. In this study, the performance indicators in Minor Irrigation Scheme were determined for year 2013-14; the results were discussed and evaluated. The analysis of agricultural performance indicators showed that the production value of different crops grown in command area were lower than that of the recommended package of practices. The analysis of water use indicators showed that RWS and RIS were calculated as 2.49 and 1.27 respectively indicating the condition of water abundance.

The value RWS and RIS was more than one represents that the total water supply is enough to meet the crop demand. The WDC for whole command was calculated as represents the canal capacity was sufficient to meet the peak consumptive requirement. The analysis of economic or financial indicators showed that the scheme had a serious problem about the collection of water fees i.e. revenue or irrigation charges collected from scheme were less than that of total operation and maintenance expenditures.

E. *International conference on water resources, coastal and ocean engineering, Sathish Sathasivam, K. Rasheed, R.S.Kankara, Manikandan Muthusamy, Arockiaraj Samykannu, Rajan Boopati, "SSC Analysis Of South Maharashtra Coast: A Case Study From Vengurla Coastal Region, 2019*

The SSC is an important role in the transportation, distribution and its budgeting of coastal waters, especially beach erosion and accretion is concerned. In order to conclude, the surface waters of the study area, SSC concentration in most of the stations are less than 15mg/l, which indicate the clarity of coastal waters and also during the study period, erosion is meager in these areas. The bottom area, SSC is high in most of the stations. SSC is compared with OCM and OBS data. The surface and subsurface waters SSC are matching with OBS profiles, but bottom water values are deviating, this may be due to coastal oceanographic processes like currents and waves which create turbulence in the coatal bottom or due to the churning action of sediments during OBS observations.

F. *Case Studies of Innovative Irrigation Management Techniques Pradeep Bhalagea*, BB Jadiab, S T Sangale, International Conference on Water Resources, Coastal and Ocean Engineering, 2015*

It is concluded that specially designed closed pipe water distribution network improves the crop yield significantly. It saves considerable amount of water with trouble-free irrigation management. Land acquisition being the major hurdle in development of irrigation potential can be avoided which helps to maximize the utilization of created irrigation potential.

G. *A Study On Identification Of Submarine Groundwater Discharge In Northern East Coast Of India Gopal Krishana *, M. Someshwar Raoa , C.P. Kumara , Sudhir Kumara , M. Ravi Anand Rao, INTERNATIONAL CONFERENCE ON WATER RESOURCES, COASTAL AND OCEAN ENGINEERING, Sciencedirect2015*

The study has been conducted in the coastal areas of 24 South Pargana and East Medinipur districts of West Bengal, India. These districts are located in the developed tract of Gangetic delta in lower Ganga basin. The districts are characterized by the hot and humid climate and the rainfall is received from north-east and south-west monsoons which starts by the second half of June and stops by October-November. The main source drinking water in these two districts is groundwater.

The variation in Radon and EC corresponds to discharge of fresh groundwater to the sea. The SGD is generally a combination of fresh groundwater and re-circulated seawater which is controlled by hydraulic gradient in the adjacent aquifer, and varying tidal conditions in the coastal waters. The study indicates the possibility of identifying groundwater discharge through long coastline in India. The SGD can be harnessed for meeting human needs wherever required.

H. *Irrigation in India: Status, challenges and options§ RAJNI JAIN, PRABHAT KISHORE and DHIRENDRA KUMAR SINGH, Journal of Soil and Water Conservation 18(4): 0-0, October-December 2019*

In India, groundwater has become dominant source of Irrigation. On the other hand, there is large gap between the ultimate and utilized surface water potential.

With continual diminishing per capita water availability coupled with groundwater exploitation, it has become imperative to switch to efficient water saving technologies and alternative source of irrigation like canal water, rainwater harvesting. Rapid depletion of water table, low irrigation efficiency, and frequent droughts indicate towards water crisis in near future if existing water use pattern is not rectified. Irrigation infrastructure needs to be further improved to harvest rainwater and increase storage capacity in order to utilize runoff water.

Micro irrigation has scope for improving irrigation efficiency up to 90 per cent. Further, micro irrigation and optimum crop plan will play decisive role in conservation of water resources and food security of the nation. Virtual water trade should be balanced instead of orienting it towards export. Farmers should be made aware of the various government schemes to utilize their utmost potential which is lacking in some states.

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I. *Addressing Urban–Rural Water Conflicts in Nagpur through Benefit Sharing Vibhas Sukhwani, Kamakshi Thap, Rajib Shaw, Sameer Deshkar, Bijon Kumer Mitra and Wanglin Yan, MDPI 23 October 2020*

Urban and rural areas often meet their water demands from a shared stock of finite water resources. Against the changing climate, the rising water demands in fast-growing urban areas are leading to increasing water-use conflicts with the co-dependent rural areas. Although poor water governance is frequently cited as the key reason for such urban–rural conflicts, it is also recognized as a potential pathway to resolve them. In the case of Nagpur Region in Central India, water stress has today become a subject of serious concern. The water demands in Nagpur City are primarily met through the multipurpose Pench Dam on priority, but the recently declining water availability has raised undue concerns for irrigation in the Pench command areas. To substantiate the limited understanding of on-going water conflicts in the wider Nagpur Metropolitan Area, this study analyzes a specific set of secondary data related to the history of the Pench Project and its water utilization trends. By uncovering the periodic decline in irrigated area and the increasing groundwater use for irrigation, the cross-sectoral and trans-boundary implications of increasing water transfer to Nagpur City are revealed. To address these concerns, this study then suggests feasible governance strategies based on benefit sharing and multistakeholder engagement.

III. METHODOLOGY

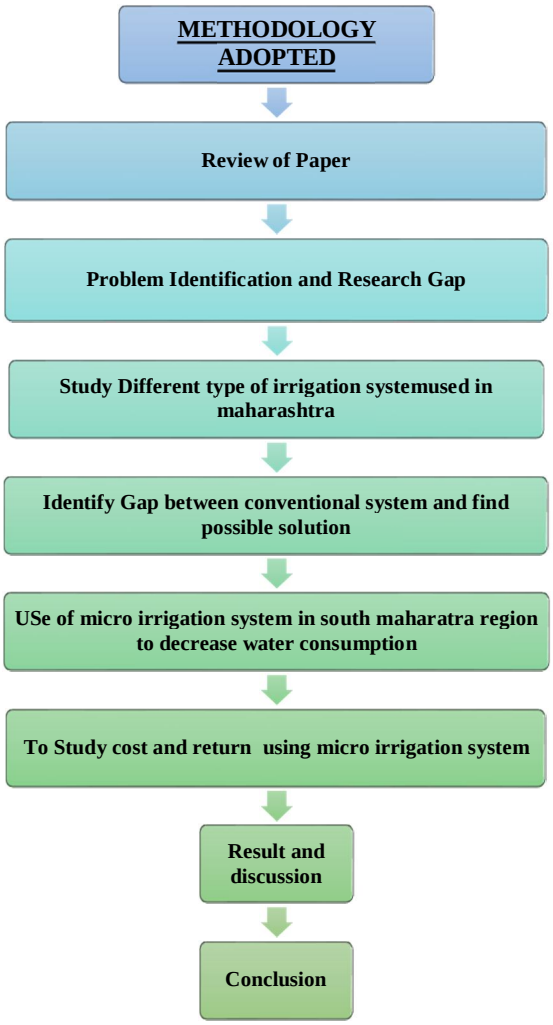


Figure: Methodology chart

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IV. DATA COLLECTION & ANALYSIS

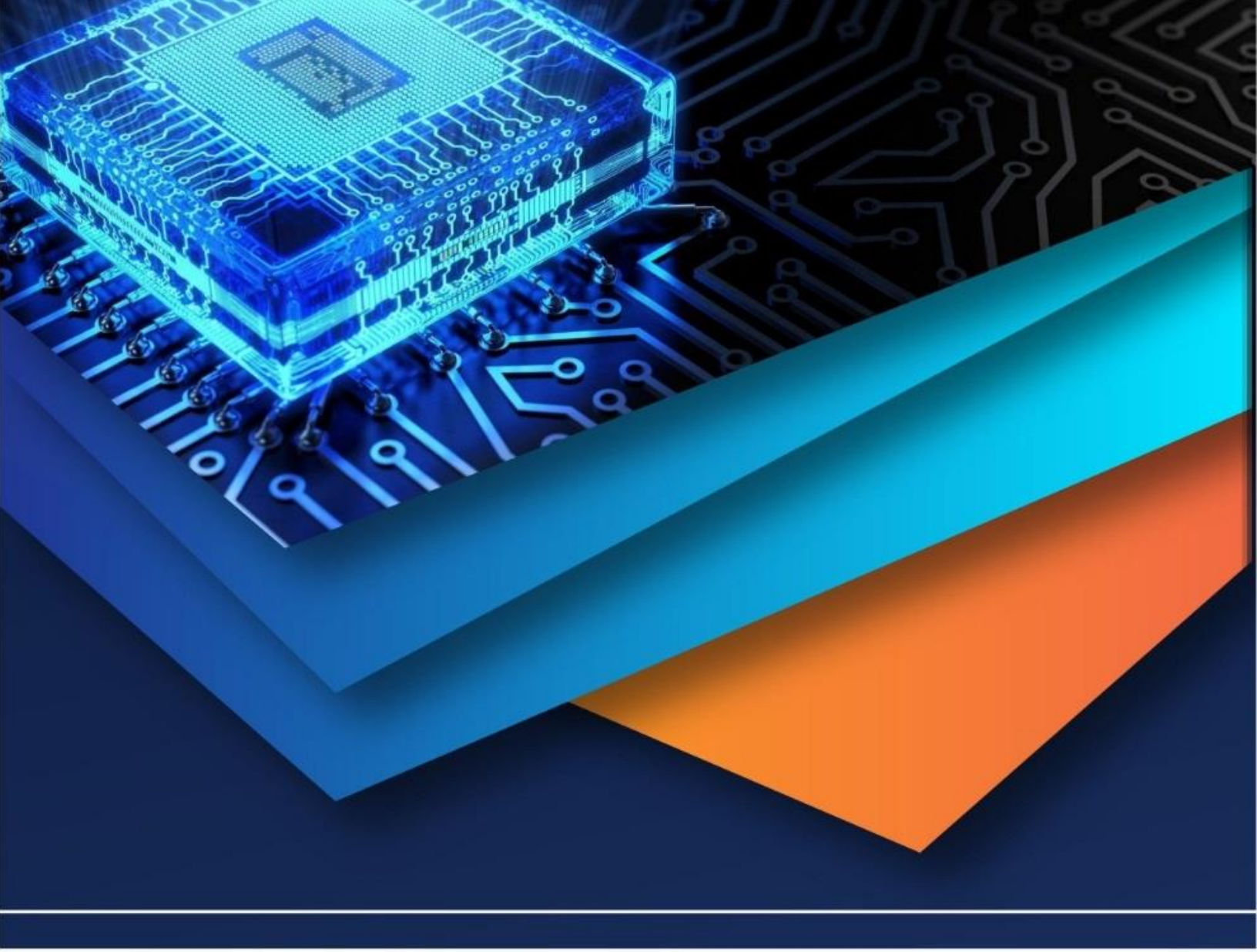
A. Materials and Methods

The study was conducted in Malshiras tehsil of Maharashtra state. The ten villages were selected from Malshiras tahsil considering the availability of drip irrigation sets. List of villages and farmers having drip irrigation sets in working condition were obtained from the office of Malshiras Panchayat Samiti and from declares. All the farmers considered for study. Randomly ten villages and hundred respondents were selected. A specially designed interview schedule was used as an instrument of data collection in personal interview with respondents. In order to get an overall picture of adoption of recommended management and maintenance practices of drip irrigation system by the farmers, the adoption score was calculated. For measuring the level of adoption aspects developed for measurement of knowledge was used. The respondents asked to state whether they adopted the same or otherwise score two for the 'full adoption' of the practice, score one for 'partial adoption' and score zero was assigned for 'non-adoption' of the practice. The maximum possible score was 50 and minimum score was zero. The data were subjected to statistical tests such as frequencies, percentages, coefficient of correlation and multiple regressions for drawing inferences.

Many irrigation projects were constructed in India postIndependence 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 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.

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