P: ISSN NO.: 2321-290X RNI : UPBIL/2013/55327 VOL-5* ISSUE-6* February- 2018
E: ISSN NO.: 2349-980X **Shrinkhla Ek Shodhparak Vaicharik Patrika**

Dimension of Water Released for Irrigation from Mayurakshi Irrigation Project (1985-2013), Eastern India

Abstract

Independent India has experienced emergence of many irrigation projects to control the river water with regulatory measures i.e. dam, barrage, embankment, canal etc. These irrigation projects were regarded as tools of development and it was thought that they will take the economy of the respective region to a higher level. Against this backdrop, the Mayurakshi Irrigation Project was initiated in 1948 with Mayurakshi as principal river and its four main tributaries namely Brahmani, Dwarka, Bakreswar and Kopai. This project aimed to supply water for irrigation to the agricultural field of the command area at the time of requirement and assured irrigation was the main agenda of this project's commencement. In this paper the author has tried to find out the current status of the timely irrigation water supply which was the main purpose of initiation of this project.

Keywords: Irrigation Projects, Regulatory Measures, Command Area, Assured Irrigation.

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Introduction

In the post-independence period, India has shown accelerating trend in growth of irrigation projects. Following USA and other advanced economies of the time, independent India encouraged irrigation projects to ensure assured irrigation, flood control, generation of hydroelectricity. Then Prime Minister Jawhar Lal Neheru entitled the dams as temples of modern India.

Mayurakshi Irrigation Project (MIP) was one of them and was launched in 1948 to serve water to the thirsty agricultural lands of one of the driest district of West Bengal i.e. Birbhum. The irrigation command area of this project spread over the states of then Bihar and present Jharkhand and West Bengal of eastern India. Dumka district of Jharkhand and Birbhum, Burdwan (now Purba Burdwan) & Murshidabad are part of this project area.

The MIP embraces the principal Mayurakshi river along its four main tributaries viz. Dwarka and Brahmani river on the left bank and Bakreswar and Kopai river on the right bank. The water of these five rivers has been controlled by modern regulatory measures.

The major components of this large scale river regulation are written below.

1. One dam and its related reservoir at Massanjore in Jharkhand in the upstream section of the Mayurakshi river
2. Barrage at 30 km. downstream from Massanjore in Tilapara on the Mayurakshi river
3. barrages at Deocha, Baidara, Kadisala and Kultore on viz. Dwarka, Brahmani, Bakreswar and Kopai rivers
4. Main canal networks are Brahmani North Main Canal, Dwarka-Brahmani Main Canal, Mayurakshi-Dwarka Main Canal, Mayurakshi-Brakeswar Main Canal, Bakreswar-Kopai Main Canal and Kopai South Main Canal

The above regulatory measures were made with commitment to supply irrigation water in both monsoon and lean period (November to May) and Kharif and Rabi cropping seasons.

Objectives of the Study

The objective of this paper is to find out the current status of supplying irrigation water from the MIP to the beneficiary areas of the project.

Review of Literature

Henry Olivier (1990) stated that Irrigation is an ancient practice dating back to before the dawn of history. Egypt claims to have the oldest dam built over 5000 years ago to store drinking water and for irrigation, the 'Wadi Garawi', about 125 kilometres south of Cairo (Third or Fourth Dynasty 2686-2160 BC). Indications are that sophisticated irrigation schemes existed in the lower Euphrates Valley 4-6000 years ago.

In case of Columbia Basin Project, USA After 15 years every economic indicator for the irrigated area had grown substantially in contrast with the nominal growth of the rain-fed area, and a measure of the yeast or impact factor of irrigation is seen in the fact that the ratio of activity in the irrigated area was generally of the order of 17 times that in the rain-fed area.

Rydzewski (1990) stated that once the need for additional water is estimated in space and time, engineers turn their attention to various possible technical solutions to the problem. The importance and scale of irrigated agriculture varies enormously for different regions of the world.

Rockstrom et al. (2010) stated that the water requirements in terms of vapor flows are quantified, potential water sources are identified, and impacts on agricultural land expansion and water tradeoffs with ecosystems are analyzed. This article quantifies the relative contribution from infiltrated rainwater/green water in rain fed agriculture, and liquid water/blue water from irrigation. Irrigation will continue to play an important role in feeding the world and opportunities for expansion still remain, particularly in sub-Saharan Africa where >95% of the agriculture is rain fed. In this analysis we have adopted an optimistic outlook and expect an irrigation expansion beyond 2015 at the same pace as population growth in each country. Projections of future water withdrawals for irrigation have been downscaled over the past decades as a result of an observed decline in irrigation expansion and growing concerns over social impacts of large reservoir projects and needs to safeguard environmental water flows. The analysis considers improvements in irrigation efficiency [the ratio (%) of consumed to withdrawn water] to separate withdrawals from actual consumptive use when estimating the contribution of irrigated agriculture to produce food. A distinction is further made between irrigation efficiency at the system level and efficiency as we understand it here, i.e., the proportion of irrigation water withdrawals that is consumed on the cropped land (the percentage of water supply contributing to crop growth).

Stockle stated that irrigation represents an alteration of the natural conditions of the landscape by extracting water from an available source, adding water to fields where there was none or little before, and introducing man-made structures and features to extract, transfer and dispose of water. In many nations, big dams and reservoirs were originally considered vital for national security, economic prosperity and agricultural survival. Until the late 1970s and early 1980s, few people took into account the environmental consequences of these massive projects. Today, however, the results are clear: dams have destroyed the ecosystems in and around countless rivers, lakes and streams. Irrigated agriculture depends on supplies from surface or ground water. The environmental impact of irrigation systems depends on the nature of the water source, the quality of the water, and how water is delivered to the irrigated land. Withdrawing ground-water may cause the land to subside, aquifers to become saline, or may accelerate other types of ground-water pollution. Withdrawing surface water implies changes to the natural hydrology of rivers and water streams, changes to water temperature, and other alterations to the natural conditions, sometimes deeply affecting the aquatic ecosystems associated with these water bodies. An excessive withdrawal of water for irrigation is clearly impacting the environment in some areas. For example, the Colorado river often contains essentially no water by the time it crosses the border into Mexico, owing to both urban and agricultural withdrawals. In addition to problems of waterlogging, salinization, and erosion that affect irrigated areas, the problem of downstream degradation of water quality by salts, agrochemicals and toxic leachates is a serious environmental problem. Salinization of water resources is possibly a greater concern to the sustainability of irrigation than is that of salinization of soils, per se. The management of water application systems as well as the suitability of related agronomic practices has a dramatic influence on the environmental impact of irrigated agriculture. Constraints in the water delivery systems (e.g., continuous versus on-demand water supply), extremely low water quality of the irrigation water supply, and limitations to investment on improved technologies exacerbate the environmental damage derived from irrigation and limit the options available to farmers for mitigating the problem. Regardless of the nature of the problem, improved management and technologies are the main tools available to ensure the sustainability and productivity of irrigated lands. managing existing irrigation projects so as to minimize their environmental impact is a requirement for long-term sustainability of irrigated agriculture. Both, improved water use efficiency and environmental stewardship are indeed complementary goals.

Pimentel et al. (2004) Water is essential for maintaining an adequate food supply and a productive environment for the human population and for other animals, plant and microbes worldwide. Increase in human population and economies leads to increase in fresh water demand. This result in threating human food supply, reduce biodiversity, water pollution and diminishing water quality. In this article, water use by individuals, specially by agricultural systems, the interrelationships that exist among population growth water use and distribution, status of biodiversity, natural environment and impacts of waterborne human disease have been analyzed. When managing water resources, the total agricultural, societal and environmental system must be considered. Population growth, increased agricultural irrigation and other water uses are mining ground water resources. Water logging, sanitation, soil erosion are the problems associated with irrigation.

Reddy (2003) stated that Andhra Pradesh is emerging as the first among equals as far as agri-culture sector reforms are con-cerned. The state's experiments with watershed and irrigation development programmes are among the most ambi-tious in the country. Irrigation expenditure is the single largest expenditure item (about 10 per cent) in the state budget (1999-2000). However, this huge expenditure does not seem to reflect in the effective area irrigated. In other words, at the moment the economic returns to irrigation do not appear to be attractive due to long gestation periods and time overruns.

Narasimhan & Gaur (2010) have expressed their views on the India's water policy. With the increasing demand for water from industrial, agricultural operations and domestic sectors a water policy for India must be decided and the policy must follow democratic ideals to achieve equitable sharing of this vital resource among all segments of society. The authors have made opinion in this regard and according to them every citizen has full right to get clean water for drinking and hygiene so water allocation must be made keeping this in mind and distribution of water in different sectors such as industry, agriculture etc. should be done according to their priority.

Pandey (2013) focused on the importance of irrigation to increase agricultural productivity and their environmental impacts with respect to Uttar Pradesh. During the period of green revolution in 1970s various irrigation techniques were introduced and canal irrigation were very much part of it. The intensive irrigation, need of green revolution agriculture, came with its advantages and disadvantages. In this paper the author has emphasized on major disadvantages of perennial irrigation through canals such as water logging, salinity increase.

Shah (2013) in his article said about the limitations of large scale irrigation projects along with their inefficacy to provide timely irrigation. And these disadvantages are leading to huge ground water extraction to irrigate thirsty agricultural field. Under this situation the author said about the need of of paradigm shift in water management strategies and he has made few suggestion in this regard such as reforming large scale irrigation projects, breaking the groundwater-energy nexus etc.

Study Area

Here the irrigation command area under the MIP has been studied. The command area includes parts of Dumka district of Jharkhand and parts of Birbhum, Murshidabad and Burdwan (now Purba Burdwan) districts of West Bengal.

Research Design

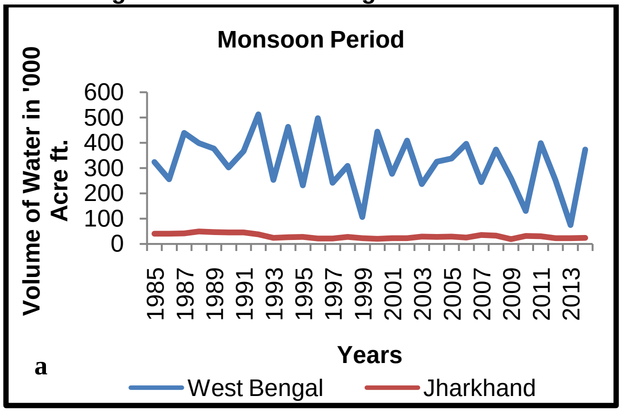
To fulfill the objectives secondary database for the period of 1985-2013, has been used accessed from District Irrigation office, Suri, Birhum District. The collected data has been analyzed through diagrams using Ms.Excel

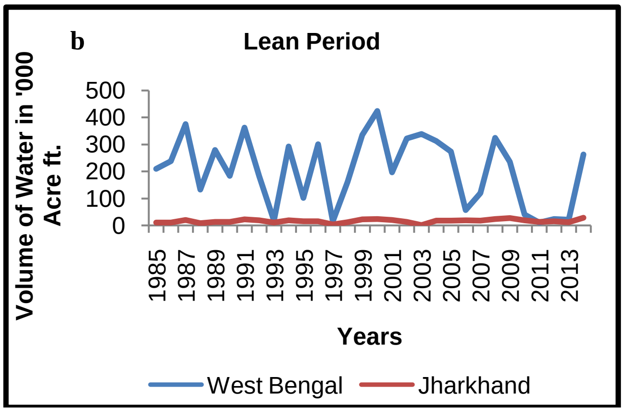
Findings

Annual Release of Irrigation Water for West Bengal and Jharkhand from Massanjore Dam

The availability of irrigation water and its distribution pattern over the Mayurakshi Irrigation Project (MIP) area during the monsoon (June to October) and lean period (November to May) is analysed below.

Fig. 1: Pattern of Released Irrigation Water for West Bengal and Jharkhand Irrigation





Note: West Bengal means principally Birbhum District and Jharkhand means principally Dumka District, Jharkhand.

Data Source District Irrigation Office, Suri, Birbhum

From the above figure (Fig. 1) it is seen that in comparison to volume of irrigation water released for West Bengal, it is very negligible for Jharkhand. Fluctuation in volume of released water is also less for MLBC in contrast to West Bengal in both observation periods.

In these two beneficiary regions the amount of released water is quite higher in monsoon season compared to lean period when it is mostly needed. Therefore the principal aim of planned irrigation in the water scarce season stands defeated at the first instance. Keeping this in mind, it becomes imperative to relate the release of irrigation water with the amount of rainfall received in the region in the monsoon and lean periods. This is done in the following section.

So in the time of necessity of irrigation the water is not available in sufficient volume.

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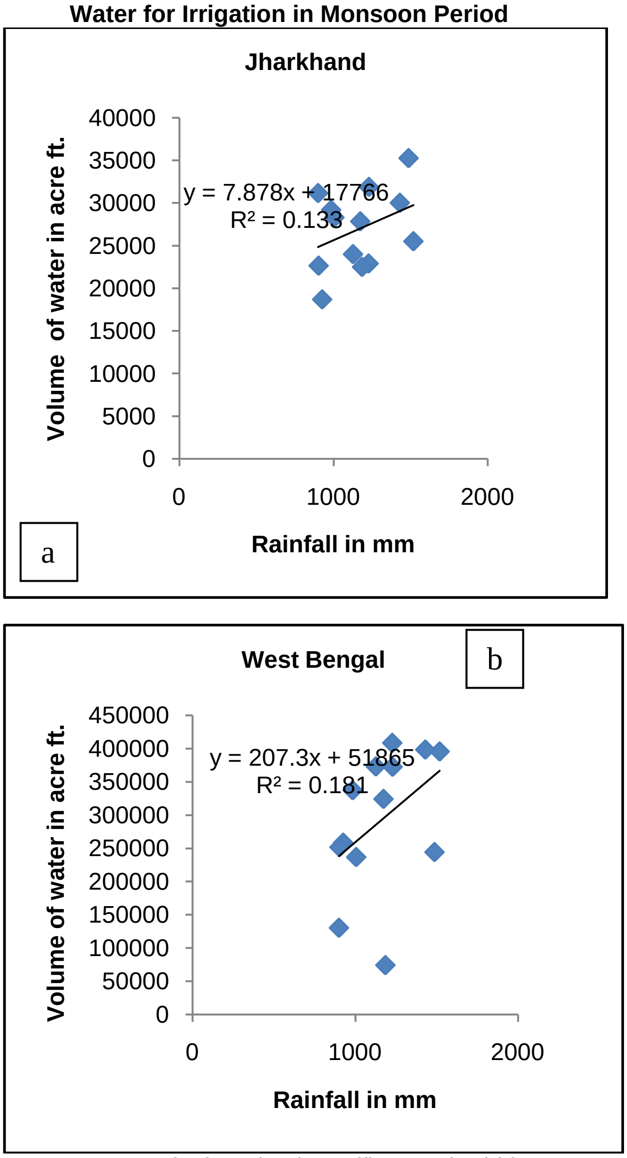
Co-relation between Rainfall & Release of Water for Irrigation in Monsoon Period

Fig. 2: Relation between Rainfall & Release of Water for Irrigation in Monsoon Period



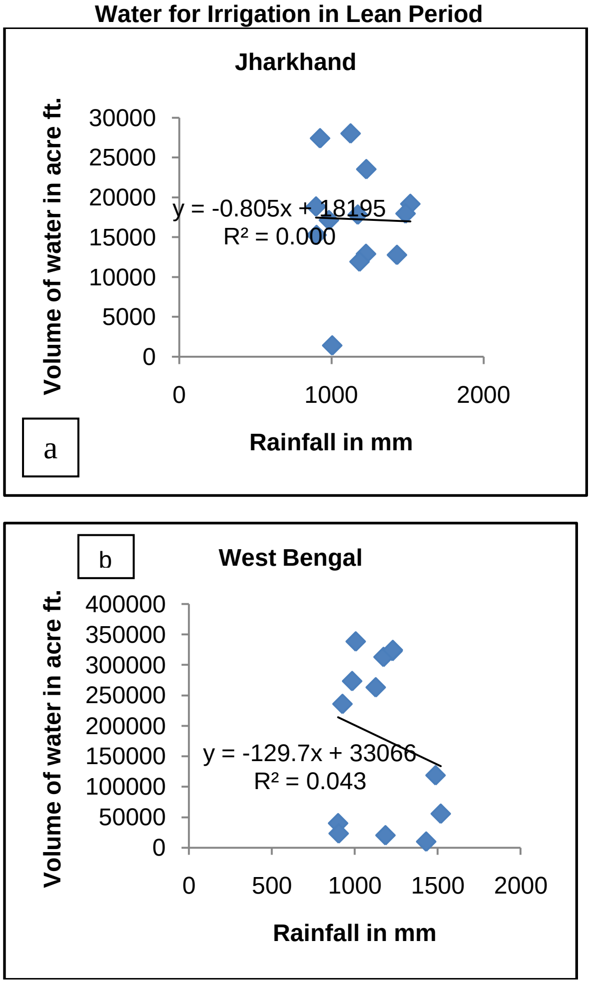
Data Source: District Irrigation Office, Suri, Birbhum

Fig. 2 shows a direct positive relation between rainfall and volume of irrigation water released in both the command areas during monsoon. The relation between rainfall and volume of water released is stronger in case of West Bengal in comparison to Jharkhand; the co-relation values being 0.13 for Jharkhand and 0.18 for West Bengal.

Volume of irrigation water released for Bengal is more dependent on seasonal rainfall than the other one. Higher the rainfall, higher is the released water for irrigation.

Co-relation between Rainfall & Release of Water for Irrigation in Lean Period

Fig 3: Relation between Rainfall & Release of Water for Irrigation in Lean Period



Data Source: District Irrigation Office, Suri, Birbhum

Fig 3 shows two different kinds of relations in the two regions in lean period.

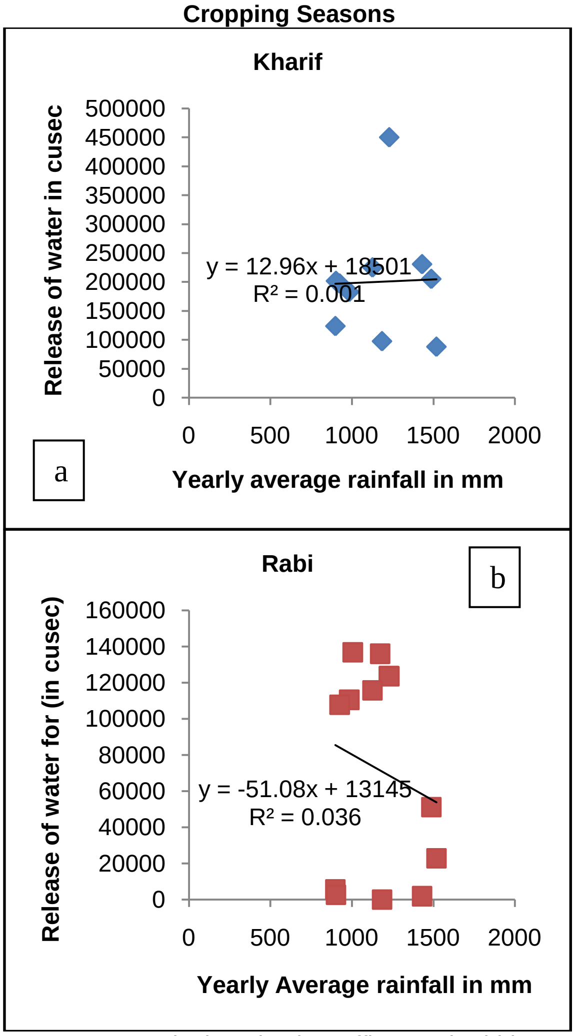
The relation between release of irrigation water and amount of rainfall is insignificant in case of Jharkhand, the co-relation value being 0.00, whereas in West Bengal a negative co-relation between the two variables is observed. Hence it can be said that surplus or normal rainfall does not assure timely and adequate irrigation in lean season for which mainly irrigation project was launched.

The aim of the project therefore stands defeated here.

Relationship between Rainfall & Release of Irrigation Water from Massanjore Dam and Tilpara Barrage in different Cropping Seasons

The Massanjore dam stores the water while Tilpara barrage regulates the supply of irrigation water canal network associated with the Mayurakshi project. The relationship between Rainfall & Release of Irrigation Water from Massanjore and Tilpara in different Cropping Seasons is shown in Fig. 4 below.

Fig 4: Relationship between Rainfall & Release of Irrigation Water from Massanjore and Tilpara in Cropping Seasons



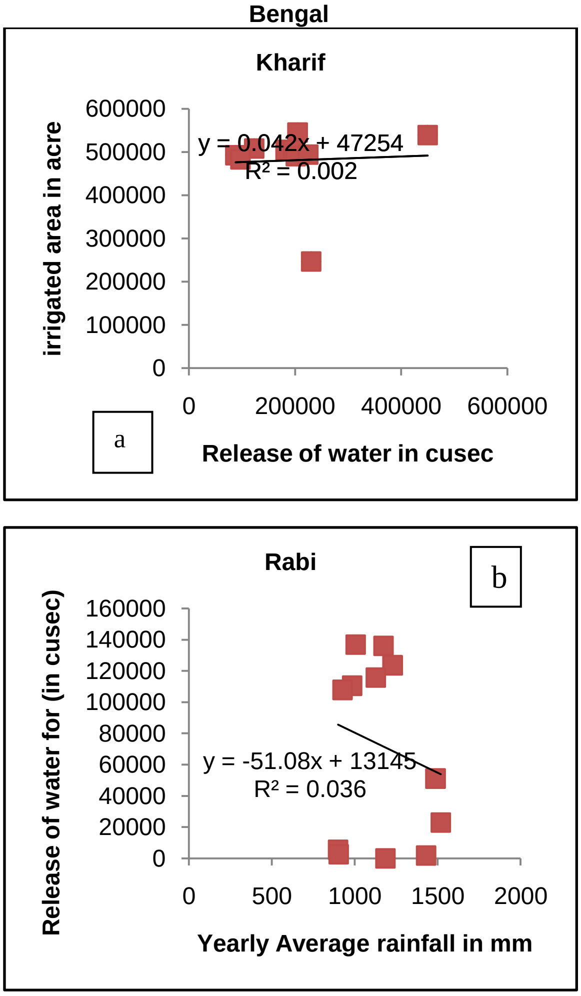
Data Source: District Irrigation Office, Suri, Birbhum

The diagrams of two cropping seasons depict two different conditions. In rainy season that is Kharif variability in rainfall does not influence the release of water for irrigation from the reservoir and barrage. But in Rabi season when irrigation is mostly needed negative relation pertains between rainfall & volume of water released for irrigation. So the rainfall occurs in rainy season is not stored in the reservoirs for later use the purpose for which water management schemes was conceived. This may be attributed to the deficiency/flaw in the topographic positioning of the dam because the riparian portion of the dam covers only 16 % of the catchment of the basin. Therefore the water available for storage in the Massanjore dam is miniscule portion of the total amount of rainfall received in the basin. It may be pointed out here that 84% of the area of the basin is located in the downstream portion of the dam.

Relationship between Release of Water from Mayurakshi Irrigation Project and Irrigated Area in different Cropping Seasons

After seeing the pattern of irrigated area in the agricultural seasons (Kharif, Rabi & Boro), it has become imperative to examine the pattern of irrigated area with the volume of water released for irrigation. The irrigation department maintains the record of released water for irrigation for Kharif and Rabi seasons as supplying water in these seasons was part of this planned irrigation project while water supply for Boro came into frame due to increasing demand from the farmers side.

Fig 5: Co-relation between Release of Water and Irrigated Area in Cropping Seasons of West Bengal



For Kharif season cultivators are not dependent on canal irrigation as this cropping season coincides with the rainy season. In Rabi season supply of irrigation water through canals decidedly determines the irrigated area coverage. Unfortunately water release for Rabi crops has been discontinued since 1994 till date.

Conclusion

From the above discussion the inefficacy of the Mayurakshi Irrigation Project (MIP) has been established. Water is regularly supplied for irrigation in Kharif season which coincide with the monsoon period whereas for cultivation of Rabi crops farmers are not getting water at all. From the year 1993-94 Rabi irrigation has been discontinued due to lack of adequate water from the irrigation department end. Therefore the purpose of planned irrigation to maintain the smooth functioning of agricultural pursuits has not been achieved through the MIP. The failure of the timely supply of adequate water to the agricultural fields has compelled the farmers to go for minor irrigation schemes with dominance of ground water schemes.

In Kharif season which coincides with rainy season (water surplus) the supply of irrigation water is regular in years. But in Rabi (lean season) when irrigation is mostly needed, it is not supplied. There for the purpose of planned irrigation to maintain the smooth functioning of agricultural pursuits has not been achieved through the MIP. Mayurakshi irrigation project is questionable considering the not so expected results. The secondary data on the yearly irrigated area since its initiation prove the unsuccessfulness of this project. The benefits as it was promised by the planners, have not reached out to neither the farmers nor the villagers residing within the project command area.

Suggestion

From the above study it can be said that the major irrigation projects on India need to be evaluated in today's context with their professed benefits.

Acknowledgement

I would like to thank my supervisor Dr. Manjari Bhattacharji, Associate Professor, Dept. of Geography, Visva-Bharati for her guidance in preparation of the paper.

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