# Role of Participatory Irrigation Management in Managing Surface Water Scarcity : A Special Reference to Canal Irrigation in Uttar Pradesh

## ABSTRACT OF THESIS

**Submitted to**
**Babasaheb Bhimrao Ambedkar University**
**(A Central University)**
**Lucknow**

BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY
LUCKNOW
प्रज्ञा शील करुणा
ESTABLISHED 1996

**For the Award of Degree of**

# Doctor of Philosophy

**In**

**ECONOMICS**


**Submitted By**

*Priti Jha*

**(Enrolment No. 1242/15)**

**Under the Supervision of**

*Prof. Sanatan Nayak*

**DEPARTMENT OF ECONOMICS**
**SCHOOL FOR AMBEDKAR STUDIES**
**BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY**
**(A CENTRAL UNIVERSITY)**
**Vidya Vihar, Raebareli Road, Lucknow-226025, (U.P.), India**


**2022**

# Abstract

India is an agriculture-based country. Irrigation can be considered significant a push factor for higher production of crops in agriculture sector. Agricultural development is recognized as an integral part of economic development. Since the productivity of agriculture is directly related to irrigation, therefore this depends on the availability of water for surface and groundwater irrigation. Among all sectors, agriculture is the only sector that uses natural resources in huge quantity especially soil and water. In the last fifty years, gross irrigated area (GIA) of India has been enhanced more than three-folds from 24 million to 81 million hectares.

In India, the sources for irrigation are categorised mainly in two methods such as ground water (tube-wells, pumps, wells etc.) and surface water (canals, rivers, tanks etc.). For the development and management of both source of irrigation, various programmes and schemes have been launched by the central as well as state governments in India since independence. As a result, the share of using ground water boomed in irrigation but share of canals' irrigation did not show any expected progress. After understanding that only public or Government authorities can not manage the functioning of canal irrigation by alone, the concept of involving the users specially farmers in form of irrigation reforms has been proposed in various states. The main purpose behind these steps was the decentralisation of the water resources management and empowerment of users by encouraging the farmers to form Water Users Associations (WUAs) for the distribution of water among users, collection of water rates and to take over the responsibility of operation and maintenance.

## Participation Irrigation Management

PIM refers to association of users, especially farmers, for a well management of irrigation structure. The Handbook on PIM defines Participatory Irrigation Management as the involvement of irrigation users in all aspects of irrigation management, and at all levels. PIM usually refers to the level, mode, or intensity of user participation that would increases farmer responsibility and authority in management process.

Participatory Irrigation Management (PIM) was introduced as an institutional reform by financing agencies like World Bank and Asian Development Bank (ADB) in the $80^{th}$. Participatory Irrigation Management can be defined as a procedure in which various stalkhoders including officials to farmers affect and share the control over the development and management initiatives and of decisions and resources that affect them. In earlier time before $80^{th}$, many countries like China, Mexico, Pakistan, Philippines, Sri Lanka and Indonesia etc. have initiated this approach with the objectives of turning 'vicious circle' to 'virtuous circle' in public managed large scale irrigation (LSI).

## Research Gap and Significance of the Study

Previous studies verifies that enactment of PIM amendment in several states of India in different time period, but the successful execution of this act is shown only in some states, and the level and performance of this act are also not satisfied. Specially, in Uttar Pradesh, no more relevant reports show any actual situation and results after 8 years of implementation of this act. Therefore, this study tries to identify the gaps in terms of finding the extent of successful execution PIM act in Uttar Pradesh.

Management may be a better option to acquire the balance between present and future requirement of water for agricultural as well as industrial and domestic purpose also. The significance of this study is to provide some better solutions for management of this valuable resource and improve the methods for making better conditions of the water users. The execution of PIM in proper way may be proved a substantial approach for water scarcity.

## Objective of the Study

**1.** To assess the pattern and trend of Irrigation development and Participatory Irrigation Management in India and Uttar Pradesh.

**2.** To assess the extent of farmers' participation in various activities of irrigation management in the study area and the factors determining the participation and non-participation of farmers in canal management.

**3.** To evaluate the extent, dimensions and factors determining willingness to pay (WTP) of farmers for the management of canal.

**4.** To assess the linkage of Participatory Irrigation Management and agriculture production and productivity in the study area.

## Hypothesis of the Study

**1.** There is a significant positive relationship between the participation of farmers and the management of canals

**2.** There is a significant impact of location of canal on willingness to pay of farmers

**3.** There is a positive impact of PIM on agricultural productivity in the study area

## Methodology

### Data Source, Sampling size, Study area, Statistical technique

The study is based on secondary as well as primary data. Secondary data were collected from various reports such as Ministry of Water Resources, Ministry of Agriculture, Irrigation Department and Central Water Commission. Literature obtained from various books, journals, and online data sources. Some reports are as Statistical Diary, Agricultural Census, Minor Census, District Handbook, World Bank reports etc.

**Sample Size:** In the study area, on the basis of purposive sampling, total sample size of the respondents was taken 240 farmers, by dividing them equally in both districts Raebareli (120) and Barabanki (120). In both districts, data was collected from the selected 10 canals, which were chosen based on information provided by Department of Irrigation Government of Uttar Pradesh. The selection of canals in the surveyed area was done by following the snow ball sampling method[1]. Each canal is divided into three sections as head, middle and tail villages, so equal number of respondents were chosen for the all the villages.

## Organisation of the Thesis

**Chapter 1** entitled '**Participatory Irrigation Management and Economic Development: The Linkage'** presents the scenario of Participatory Irrigation Management (PIM) and its significance in economic development. It presents the basic understanding and development of PIM at global as well as Indian perspective

[1] Snowball or chain-referral sapling is defined as a Non-Probability Sampling technique in which samples are not easy to find. This method involves a primary data source and is purely based on referrals because it is used here a population is unknown.

and presents the basic framework of the study. Describe review, gap, objectives and significance of the study.

**Chapter 2** entitled **'Theoretical, Conceptual and Approaches of Participatory Management of Natural Resources'** covers the theoretical and conceptual framework of participatory approach in the management of natural resources. Different theories regarding participatory management have been explained also by dividing the time period in terms of before 1960s and after 1960s.

**Chapter 3** entitled '**Analysis of Trend and Pattern of Irrigation and Participatory Irrigation Management in India'** is divided into two sections. In first section, dynamics of irrigation from the both sources in the state are presented. In second part, the scenario of Participatory Irrigation Management (PIM) and its development is discussed at the state level.

**Chapter 4** entitled **An Assessment of Farmers' Participation in the Study Area** presents social and economic status of farmers to show the scenario of sampled households in various dimensions of management of canal irrigation through farmers in the surveyed area. Also the various conflict issues as well as satisfaction among farmers regarding using of water from the canals in the study area.

**Chapter 5** entitled **'Farmers' Willingness to Pay for Canals Irrigation in Study Area'** this chapter presents several methods of environmental evaluation as contingent valuation method and estimates farmers' willingness to pay for the maintenance of canals in the study area.

**Chapter 6** entitled **'Analysis of Agriculture Production and Canals Sustainability: A Field Survey Scenario'** discuss about the scenario of agricultural production in the study area. The description of both crops wheat and rice has been analysed in terms of landholdings wise in both districts viz, Rae bareli and Barabnki.

The cost of cultivation of both crops in both districts has been analysed in terms of per acre.

**Chapter 7** entitled **Major Finding and Suggestions** covers the summary, conclusions, the policy implication, limitation, and future scope of the study.

## Major Findings of the Study

**Chapter 1** entitled '**Participatory Irrigation Management and Economic Development: The Linkage'** presents the scenario of Participatory Irrigation Management (PIM) and its significance in economic development. It presents the basic understanding and development of PIM at global as well as Indian perspective and presents the basic framework of the study. Describe review, gap objectives, hypothesis and significance of the study First, it presents the brief scenario of status of irrigation in India as well in Uttar Pradesh through both resources of irrigation such as ground and surface water irrigation. The decreasing level of both sources of water (ground and surface) would create a different type of pressure among countries. Second, it presents some issues regarding the surface water irrigation such as unequal distribution of water, wastage and pollution of water and climate changes etc. After it, some issues regarding the participatory irrigation management (PIM) and water users associations (WUAs) have been also discussed as shortage of budget allocation for canal repairing, lack of awareness about the PIM among farmers, lack of technical training among farmers and less communication among various stalkholders. Third, it presents the basic understanding and development of PIM at global as well as Indian perspective and presents the basic framework of the study. After it, this chapter include research gap, significance of the study, objectives, hypothesis and research methodology including statistical techniques.

**Chapter 2** entitled **'Theoretical, Conceptual and Approaches of Participatory Management of Natural Resources'** covers the theoretical and conceptual framework of participatory approach in the management of natural resources. Different theories regarding participatory management have been explained also by dividing the time period in terms of before 1960s and after 1960s.First, the linkage between participatory management and economic theories on development presents a base for a discussion about the evolution of stakeholders' involvement in conservation and management of natural resources through various approaches. Second, the conceptual framework of participatory irrigation management focus that the resource scarcity is continued from the era of classical economists, neoclassical and biophysical limits theories such as Adam Smith, Malthus, David Ricardo, J. S. Mill, Marshall to modern economists as Morse and Barnett and contemporary conventional views and now this issues are able to be discussed in other fields also. In sum, however, the economic theories and thoughts including classical to modern economists present a vast scenario about the participation of users and the management of different natural resources such as water, forests and air etc. Third, a conceptual framework given by Marothia gives a clear understandings about the formation and execution of participatory irrigation management (PIM) to understand the concept at the basic level.

**Chapter 3** entitled '**Analysis of Trend and Pattern of Irrigation and Participatory Irrigation Management in India'** presents a brief scenario about the irrigation development in India as well as Uttar Pradesh. Firstly, the main source of ground water is considered as tube-well, while rivers and canals are considered as main forms of surface irrigation. After the independence, to improve and boom the development of irrigation services, various irrigation projects were started at major as

well as minor level. Secondly, the financial management was shared between central and state government and implemented since first five years plans. Apart from this various programmes such as AIBP and CADWM were also started to improve the performance of irrigation schemes. AIBP provides the financial assistance in form of loan to those states who have completed or ongoing the irrigation project which cost around 1000 crores or more than it. CADWM focus on the development of field channels, land levelling, warabandi, and field drains etc.

**Chapter 4** entitled **An Assessment of Farmers' Participation in the Study Area',** this chapter presents social and economic status of farmers has been presented to show the scenario of sampled households in various dimensions various dimensions of management canal irrigation through farmers in the surveyed area. The data shows that the location of villages has been considered as an important role to get the water for irrigation. The farmers belong to head villages of canals have more chance to get water than those who live at tail area villages. If we see caste wise distribution of farmers, the biggest share of respondents has been categorized as SC category as 38.33% in Rae bareli and 35.83% in Barabanki. Location and caste wise the share of respondents belonging to SC category was found highest (40 %) at tail area in both districts, followed by head area villagers (37). Also the various conflict issues as well as satisfaction among farmers regarding using of water from the canals in the study area.

**Chapter 5** entitled **'Willingness to Pay for Management of the Canals in Study Area'** this chapter presents several methods of environmental evaluation as contingent valuation method and estimates farmers' willingness to pay for the maintenance of canals in the study area. Several methods of environmental evaluation

as contingent valuation method estimates farmers' willingness to pay. The method willingness to pay for conserving and management of natural resources such as water, air and forest has been used since long time. This method gives an idea about the scenario of interest of people in financial dimension regarding the usage and management of the resource by their own.

Another conclusion has been drawn upon the farmers' willingness to pay for maintenance of canal for their regular flow. Farmers belonging to head villages have been more interested to pay than tail area villages. But on the other hand, the unwillingness to pay among farmers also shows their lack of trust and interest towards Government support. Like this, farmers' participation for canal management also require a strong base and support from the Irrigation department.

**Chapter 6** entitled **'The Linkage between Participatory Irrigation Management and Agriculture Production in the Study Area'** discuss about the linkage between participatory irrigation management and agricultural productivity in the study area through the primary data collected data from the various villages of selected canals.

Firstly, in the study area, two crops, wheat and rice have been produced at vast level and almost farmers produce those crops in their fields. Result of the study shows that as the farmers' landholding was categorized into four sizes viz, marginal, small, medium and large, and the villages alongside the canals were classified into three sections such as Head, Middle and Tail villages. The area of wheat was found highest (81.9 acre) under the marginal landholding in tail area villages in both districts; Rae Bareli and Barabanki. But the highest production (118649 K.G.) of wheat was found in head area villages. Secondly, the cropping pattern was not so

different in both districts. The cultivation methods of crops were observed identical almost in using the quantity and price of inputs of agriculture such as seed, fertilizers, pesticides, manure and wages of laborers. The total cost of cultivation of wheat and rice including all landholding (marginal, small, medium and large) has been calculated in Rae bareli as Rs. 31,491 and Rs. 28,823.99 respectively. In Barabanki, the cost of cultivation of wheat and rice including all landholding (marginal, small, medium and large) has been calculated as Rs. 39,139.23 and Rs. 44,339.98 respectively.

**Chapter 7** entitled **Major Finding and Suggestions** covers the summary, conclusions, the policy implication, limitation, and future scope of the study.

## Policy Recommendations

1. On the basis of this study, this was observed that due to lack of financial support and budget allocation from the authorities, members of WUAs show very less interest in the management of canals. So for it, a suitable framework for budget allocation should be prepared and implemented at a micro level by including their support.
2. Having another sources as ground water for irrigation, farmers do not feel the importance of usage of water from canals. Since this leads to more exploitation of ground water and other related problems. This becomes necessary to aware the farmers about the disaster result of the using more groundwater.
3. A regular time-table should be prepared before releasing the water into canals and farmers should have knowledge about it so that they can arrange their schedule for irrigation according to the water supply.

4. To resolve the issues or conflicts at ground level regarding the differentiating the usage of ground water on the basis of caste system, a strong regulation should be made and applied to every villages to prohibit this problem by the members of WUAs.
5. The participation of female respondents has been seen very low in the surveyed area, as they were not aware about the any activities regarding the agriculture as well as PIM or formation of WUAs. This leads a gender disparity in participation of female farmers. So this become also important to include them in a main stream to make successful this scheme at ground level.

## Limitations of the study

Firstly, the secondary data regarding the financial as well as allotted budget assessment about the canal irrigation and WUAs was not available/ provided from the department. Secondly, due to lack of availability of or positive responses regarding the questionnaire from the side of WUAs members, they were not interviewed or asked about the functioning and problems of scheme in the study area. Thirdly, the participation of female respondents were negligible since they were not enough informed about the agricultural as well as PIM and WUAs scheme or activities in their villages

## Further Scope of the Study

1. The survey conducted in selected villages representing a small picture on the concerned problems. It becomes highly important to cover maximum number of farmers' participation in irrigation system management to improve irrigation

service and may lead to reducing government irrigation management costs and making the systems more sustainable.

2. By managing the irrigation services through farmers' participation gives a ground for more opportunities for enhancement of agricultural production. Besides of it, by modifying the situation of canal irrigation, agriculture production may not be changed in the short run, but in long run, the difference will be seen in form enhancing productivity of crops.

3. Primary data collection from the direct users of irrigation has been conducted in very places, but this problem of irrigation is widespread. Therefore, a wider survey, aiming to cover more issues and aspects regarding the canal irrigation management can be captured at macro level too.