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The evolution of minor irrigation schemes and farmer participation in agriculture

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ABSTRACT

This abstract explores the evolution of minor irrigation schemes and farmer participation in agriculture from 1986 to 2023. Beginning with the policies and frameworks established in 1986, which aimed to enhance water availability for agricultural purposes through minor irrigation projects, the study examines the progression of these schemes over nearly four decades. It analyses the changing dynamics of farmer involvement, from initial participation challenges to the development of community-based approaches and technological advancements. The abstract discusses key milestones, challenges faced, and the role of government policies and technological innovations in shaping the landscape of minor irrigation schemes. minor irrigation schemes implemented in different regions or states to provide an in-depth analysis of their impacts on agricultural productivity and farmer livelihoods. Compare these case studies to identify common trends and variations in scheme effectiveness and farmer participation This study is based on secondary data, quantitative data from official records, surveys, and MI Census reports, and statistical databases regarding the establishment, findings, and outcomes of minor irrigation schemes over the specified period. Quantitative (statistical analysis of trends and patterns in scheme implementation and outcomes) methods.

Tracing this transition, offers insights into the evolving relationship between irrigation infrastructure, agricultural productivity, and farmer engagement, highlighting the shifts in policy focus and their impacts on sustainable agricultural development. Synthesize findings from the literature review, and data analysis, to conclude the overall transition of minor irrigation schemes and farmer participation from 1986 to 2023. Farmer participation has been pivotal, facilitated by technological advancements and supportive government policies. Looking ahead, continued innovation and community engagement will be crucial for ensuring the resilience and productivity of agriculture amidst evolving environmental challenges.

Keywords: Economic impact, Community involvement, Farmer participation, Policy changes, Sustainability

INTRODUCTION

Minor irrigation schemes play a crucial role in the expanding irrigation sector across the country. These schemes, utilizing either groundwater or surface water, each serve a culturable command area of up to 2000 hectares and are classified into six main types: (1) Dug well, (2) Shallow tubewell, (3) Medium tubewell, (4) Deep tubewell, (5) Surface flow, and (6) Surface lift schemes. Minor irrigation is vital for the equitable, rapid, and effective growth of the agriculture sector, promoting sustainable development in the rural economy, especially in the uneven terrain of the Deccan Peninsula. The importance of minor irrigation for the rural economy was strongly emphasized by a high-level committee appointed by the Government of India to investigate the causes and impacts of the rising farmer suicides. The Jayati Ghosh Committee, tasked with investigating the factors creating adverse conditions for farmers, specifically highlighted the declining tank irrigation systems as a significant contributor to farmers' insecurities. The primary policy focus of the new minor irrigation strategy emphasized the integrated development of new tanks, harnessing groundwater potential to increase capacity in the coming years, and the revival and restoration of old tanks. The success of this strategy relies heavily on precise planning and effective implementation of the projects. This new approach to minor irrigation has broadened its scope beyond traditional engineering and civil works to include various activities for which the department lacks qualifications and experience. This paper underscores the necessity for a new implementation strategy and the establishment of an institutional framework to support a multidisciplinary integrated water management system.

Since the mid-1980s, minor irrigation schemes have played a crucial role in augmenting water availability for agricultural purposes across various regions worldwide. These schemes, designed to support small-scale farming operations, have evolved significantly over the past four decades, driven by changing policies, technological advancements, and shifting agricultural landscapes. Concurrently, the level of farmer participation in these schemes has also transformed, from initial challenges in stakeholder involvement to the development of more inclusive and community-driven approaches.

The period from 1986 to 2018 marks a dynamic phase in the history of minor irrigation schemes, characterized by diverse initiatives aimed at improving water access and irrigation efficiency for smallholder farmers. Policy frameworks established during this time have sought to address water scarcity issues, promote sustainable agricultural practices, and enhance rural livelihoods through targeted investments in irrigation infrastructure. Alongside policy changes, advancements in irrigation technologies, such as drip irrigation and solar-powered pumps, have contributed to more efficient water use and improved crop yields, thereby influencing the effectiveness and adoption of minor irrigation schemes.

REVIEW OF LITERATURE

Shukla and Gurjar (1991) They have examined the relationship in their book "Canal Irrigation Management Problem of Time and Use Relationship." in particular relation to the Indira Canal, between the availability of water and agricultural practices. Water supply has always had a special significance in the lives of the locals, and even now, the Indira Canal has contributed to the economic and social growth that has been observed in several areas of the study region. The impact of the availability of irrigation water is evident in the rise in population, literacy rate, percentage of people, number of cattle and other animals, emergence of new crop patterns, and modernization of agriculture. This indicates that irrigation through canals led to the discovery of agricultural diversification in the Indira canal area

Mishra, A. et al. (2010) The current pace of irrigation in Orissa, as evaluated by the author in her work "Irrigation and Economic Development," is insufficient for the upkeep of irrigation channels. Thus, the writer has attempted to determine the ideal irrigation rate that will benefit the government as well as the grower. A comparison of the cropping patterns in irrigated and non-irrigated zones has been conducted for this reason. The extra advantage obtained (zone-by-zone) as a result of irrigation has also been evaluated. After testing out several rate-fixing theories, the book recommends average cost pricing, also known as the No Profit, No Loss concept, and marginal cost pricing as a promotional tactic.

Gunawardena E. R.N. et al. (2021) This study aimed to identify the institutions and actors involved in managing minor irrigation systems and assess their responsibilities, based on the opinions of farmers who benefit from these systems. The findings highlight the necessity for a robust coordination mechanism among key institutions to address conflicting and overlapping responsibilities. To achieve this, a broader stakeholder consultation and potential reforms are needed. Additionally, it is crucial to enhance the capacity of Farmers' Organizations, positioning them as the primary institution for managing minor tanks, through targeted capacity-building programs.

Dharmasena P. B. (1996) Farmer participation in all planning efforts is essential; without it, these efforts would be futile, even if crop diversification is identified as the best technical solution. Therefore, it is crucial to engage farmers in participatory discussions to choose the most appropriate option rather than imposing crop diversification as the sole solution.

Shashank C. Bangi (2016) The primary goals of this project are to irrigate the Cultural Command Area (CCA) of approximately 508.5033 hectares and the silted area of the existing old tank, as well as to recharge the groundwater table. This paper presents a proposal for a new irrigation tank to be constructed upstream of the current tank, aiming to irrigate the land, particularly the silt-deposited area of the old tank. The study focuses on the area upstream of the Muchkandi minor irrigation tank near Bagalkot, Karnataka. Within this study, a new minor irrigation reservoir and tank have been proposed and designed.

Halefom A. et al. (2017) Their paper proposes a framework for assessing the performance of irrigation water management in minor irrigation canals, building on previous studies. It emphasizes the crucial role of farmer participation in achieving the planning objectives, which is essential for the sustainability of crop diversification. The paper provides a detailed discussion of these planning strategies.

Ambili G. K.et. al. (2020) The importance of initiating farmer participatory activities for managing and distributing the necessary amount of water for crops is clear, as it helps farmers shift away from excessive water use towards better water management. The study found that farmers involved in the Kanniparamba and Vellannur minor irrigation schemes market their produce (mainly bananas and vegetables) through farmers' associations. This is facilitated by the presence of a government-run institution, the Vegetable and Fruit Promotion Council Kerala (VFPCK), which operates in the areas covered by these two irrigation schemes.

OBJECTIVE

1. Document the historical progression of minor irrigation schemes.
2. Assess the level of farmer involvement in minor irrigation initiatives.
3. Analyse the impact of these schemes on agricultural productivity and sustainability.

METHODOLOGY

The paper has been prepared based on secondary sources of information. 6th rounds of the MI census, data when used from other sources agricultural census. Statistical analysis is the examination of temporal trends and patterns between the Minor Irrigation scheme and farmer participation and the evaluation of the strength and directional relationship between various agriculture practices and sustainable growth indicators.

ANALYSIS AND DISCUSSION

Government initiative of Minor Irrigation Scheme.

As the nation’s use of water resources and its environmental impact grows, it has become increasingly clear that groundwater and surface water should be considered as a single resource. Issues such as water supply, water quality, and the degradation of aquatic environments are frequently reported. The interaction between groundwater and surface water is a significant concern in many of these issues. For instance, contaminated aquifers that discharge into streams can cause long-term surface water contamination, while streams can also be a major source of contamination for aquifers. Surface water is often hydraulically connected to groundwater, but this interaction is challenging to observe and measure and has often been overlooked in water management policies. Various natural processes and human activities influence the interaction between groundwater and surface water. This report aims to present our current understanding of these processes and activities, as well as the limitations in our knowledge and ability to characterize them.

Emphasis on sustainable and efficient water use, and integration of modern irrigation technologies like drip and sprinkler systems. Policies to promote water conservation and enhance the participation of farmers in irrigation management. This historical development illustrated the evolution of minor irrigation schemes from traditional community management systems to more organized and technologically advanced practices, with increasing emphasis on sustainability and farmers' participation.

The period from 1986 to 2018 marks a dynamic phase in the history of minor irrigation schemes, characterized by diverse initiatives aimed at improving water access and irrigation efficiency for smallholder farmers. Policy frameworks established during this time have sought to address water scarcity issues, promote sustainable agricultural practices, and enhance rural livelihoods through targeted investments in irrigation infrastructure. Alongside policy changes, advancements in irrigation technologies, such as drip irrigation and solar-powered pumps, have contributed to more efficient water use and improved crop yields, thereby influencing the effectiveness and adoption of minor irrigation schemes.

Furthermore, the role of farmers in the planning, implementation, and management of these schemes has evolved from passive recipients of government interventions to active participants and stakeholders. Community-based approaches have gained evolution and reflect broader trends towards participatory development paradigms, where farmers' knowledge, preferences, and needs are increasingly integrated into decision-making processes concerning water management and agricultural development.

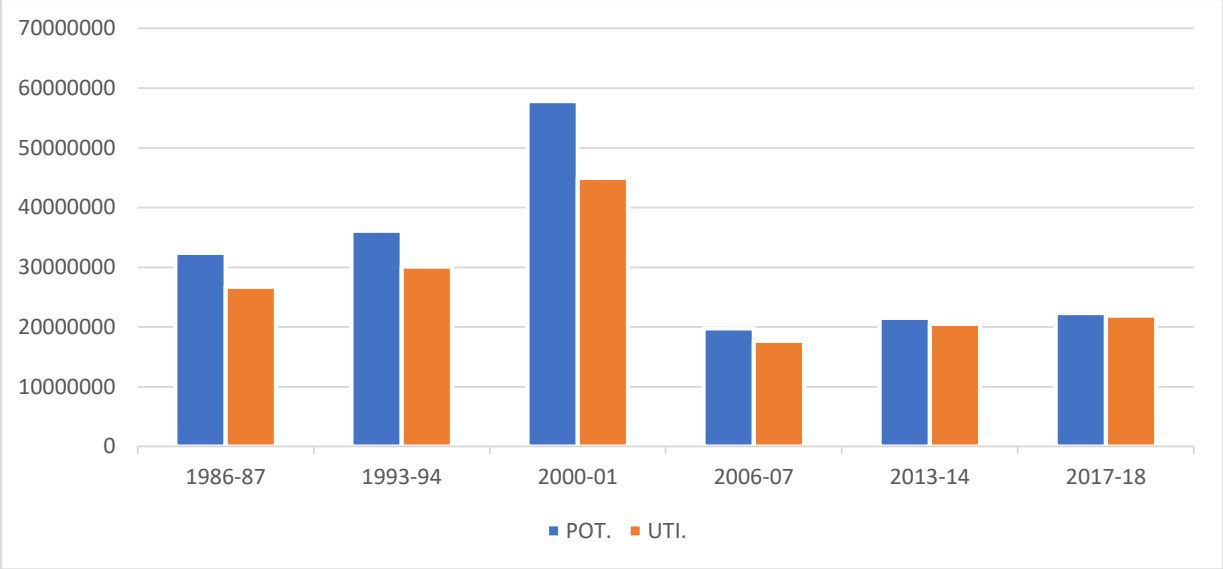
Potential creation and Utilisation of MI scheme

Table. 1.1 (Total Minor Irrigation Scheme Potentially Created and Utilised over 20 years)

TOTAL MI SCHEME		
Year	POT.	UTI.
1986-87	32421677	26713922
1993-94	36126397	30133579
2000-01	57829611	44982227
2006-07	19757820	17657806
2013-14	21505432	20521884
2017-18	22354678	21931924

This Table shows the stage for a detailed exploration of the transition of minor irrigation schemes and farmer participation from 1986 to 2018. By examining the historical context, policy frameworks, technological innovations, and evolving roles of farmers, this study aims to provide insights into the factors shaping the trajectory of Minor irrigation schemes and their impact on agricultural productivity and rural development over the past decades.

Figure 1.1 (Minor irrigation scheme Potential created and Utilised



(Source: Computed by author using Excel)

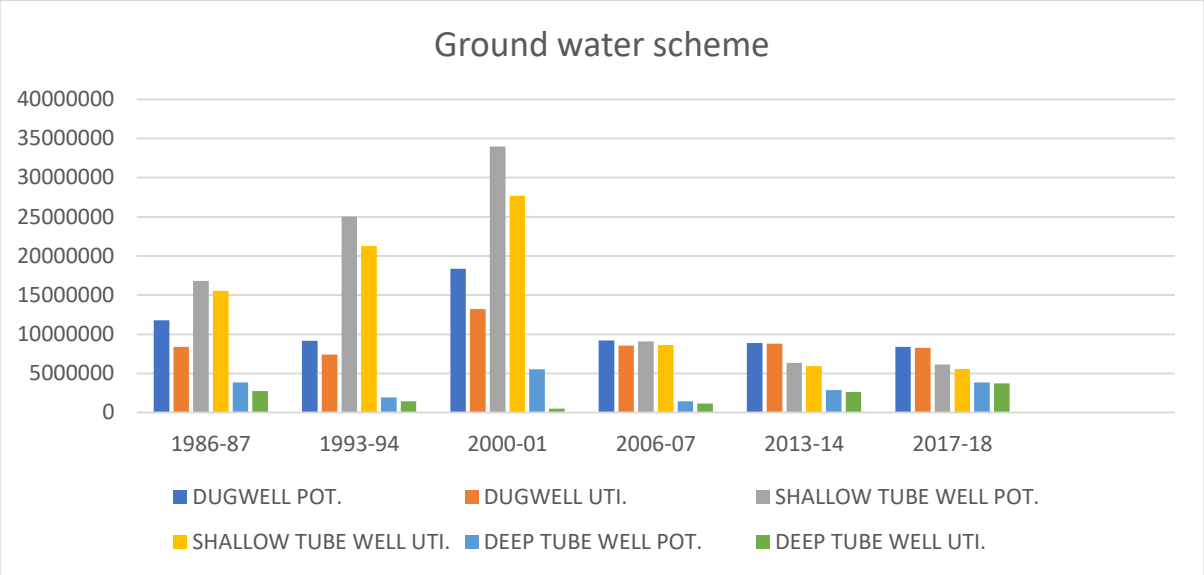
The above histogram represents the various types of Minor irrigation schemes that are potentially created by the Government for agricultural purposes. The above diagram reflects that various MI schemes were potentially created and potentially utilized by farmers from the year 1986 to 2017. We can see that from 1986 -87 to 2000-01 the gap between the created MI scheme and the utilised MI scheme more. Percentage of Created MI scheme is More than Utilised. But after 2000 to 2007 it slowly decreased the gap between created and utilized MI schemes. Utilisation MI scheme increased because of Farmer's participation rate increased they know that the government provided such type of scheme for them and because of education they are aware of this scheme. Both groundwater and surface water MI schemes are going to be created and utilized properly but less utilized and created than previous 10 years.

Table 1.2 (Groundwater Minor Irrigation Scheme from 1986 to 2018)

Groundwater scheme						
	DUGWELL		SHALLOW TUBE WELL		DEEP TUBE WELL	
Year	POT.	UTI.	POT.	UTI.	POT.	UTI.
1986-87	11764699	8401384	16801807	15551397	3855171	2761141
1993-94	9160695	7427681	25018781	21278027	1946921	1427871
2000-01	18357648	13223215	33955773	27672989	5516190	496023
2006-07	9200191	8543870	9104665	8646350	1452964	1146348
2013-14	8864532	8785599	6358603	5940701	2865402	2618792
2017-18	8375642	8278425	6154686	5585106	3867542	3750247

Table, 1.2. shows how the ground water mi scheme, transition from 1986 to 2018. In year 1986-87 the percentage of creation of shallow tube well is more than other two scheme. The percentage of creation and utilisation of ground water scheme is decreases after some years. But the farmers engagement and govt scheme are nearly equal so that have helped for increased agriculture activities.

Figure: 1.2



(Source: Computed by author using Excel)

Above figure 1.2 represent that creation and utilisation of various ground water scheme in different year starting from first MI census 1986-87 to 6th MI census 2018. In the first MI census the percentage of shallow tube well is more than other two scheme. But the use of deep tubewell is very less in percentage from starting to till. Dug well is created and utilised properly from beginning to till.

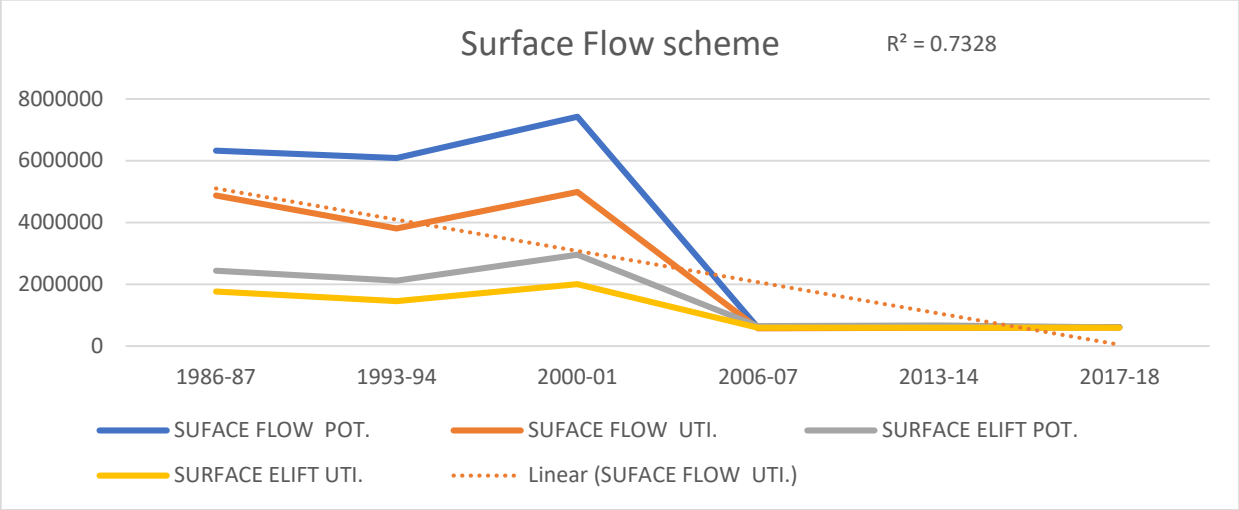
Table:1.3 (Surface water scheme)

	SURFACE FLOW		SURFACE LIFT	
Year	POT.	UTI.	POT.	UTI.
1986-87	6323075	4873659	2444007	1766808
1993-94	6083163	3809049	2114098	1455944
2000-01	7415307	4985278	2959038	2002429
2006-07	601115	578960	647738	598760
2013-14	603421	592156	664531	600093
2017-18	613425	611059	605643	596981

The above table shows the various surface water schemes e.g.- (surface flow, surface lift). In the above table the potential creation and potential utilization of different surface water schemes in various years from the 1st MI census to the 6th MI census. We can see on the table that the number of potentially created surface flow schemes was high but with the transition of years, it declined utilization of this flow scheme was low the first time but after the transition of years it rose. Because of the active participation of farmers. In another surface lift scheme, the number of potential creations was high but utilization was low because of

land-related issues, lack of knowledge of technology, and lack of proper education with increased years potential creation is going to be down, but the utilization of this scheme is increased.

Figure: 1.3 (Surface water scheme)



The above line shows the various schemes from surface water schemes such as surface flow, and surface lift. At the time of the 1st MI census, both surface flow and surface lift potential creation were high, and the utilization was just less. But in the 3rd MI census each scheme was created high and utilization was also high, but after some years like in 2017-18 in the 6th MI census both schemes decreased their potential creation, and utilisation both get declined. But the rate of creation and utilisation are almost equal quantity. On the above diagram trend line shows the decline in percentage of both creation and utilization of surface water scheme.

CONCLUSION

In conclusion, the evolution of minor irrigation schemes has played a crucial role in enhancing farmers' participation in agriculture, leading to increased productivity and sustainability from traditional methods to modern technologies, minor irrigation schemes have been adopted to address the changing needs of farmers and the environment. The gradual shift from individual to collective ownership and management of irrigation systems has not only improved water use efficiency but also fostered a sense of community and cooperation among farmers. As a result, farmers' participation in agriculture has increased, leading to improved crop yields, enhanced livelihood, and reduced vulnerability to climate change. The integration of minor irrigation schemes with modern agricultural practices has transformed the agriculture landscape, ensuring food security and sustainable agriculture for future generations. Continued investment in minor irrigation schemes and farmer-led initiatives will be critical in addressing emerging challenges and ensuring a resilient agriculture sector

The data on the Total Minor Irrigation (MI) Scheme from 1986-87 to 2017-18 shows notable trends and patterns in both potential and utilization over the years. The potential of MI schemes increased from 32,421,677 in 1986-87 to 57,829,611 in 2000-01, representing a substantial growth. After 2000-01, there was a significant drop in potential to 19,757,820 in 2006-07, followed by a gradual increase in the subsequent years, reaching 22,354,678 in 2017-18. The utilization figures show an initial increase from

26,713,922 in 1986-87 to 44,982,227 in 2000-01. Post-2000-01, similar to the potential, there was a reduction in utilization to 17,657,806 in 2006-07. From 2006-07 onwards, the utilization figures steadily increased, reaching 21,931,924 in 2017-18. The utilization as a proportion of potential also improved significantly. For instance, in 1986-87, utilization was approximately 82.39% of the potential.

This efficiency saw some fluctuation but improved markedly in later years, peaking at around 98.11% in 2017-18, indicating better management and use of the irrigation potential. The data exhibits periods of rapid growth, significant declines, and gradual recovery in both potential and utilization. The major drop observed in 2006-07 suggests possible external factors such as policy changes, funding constraints, or environmental issues impacting the MI schemes. The post-2006 recovery and increase in both potential and utilization highlight efforts in improving infrastructure and efficiency in MI schemes. Overall, the data reflects a dynamic scenario of MI scheme development and utilization, with improvements in efficiency over the years despite some fluctuations. This indicates a progressive approach toward optimizing irrigation resources and enhancing agricultural productivity.

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