GEOGRAPHICAL ANALYSIS

RESEARCH ARTICLE

Examining Disparities in the Utilization of Water Resources: A Case Study of Mandya District

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Abstract

Water resource utilisation is an important aspect of sustainable development, but disparities persist across regions, making equitable distribution difficult. This study focuses on the Mandya District in South India, with the goal of thoroughly investigating existing disparities in water resource utilisation. The study investigates access, allocation, and consumption patterns while taking into account historical context, stakeholders, policies, and the implications for sustainable water management. The study examines the irrigation scenario in Mandya, highlighting the importance of canals, wells, and tanks. It looks at how irrigation methods have changed over time, addressing drought issues and the rise of micro-irrigation systems. The findings highlight the importance of targeted interventions and equitable policies in addressing Mandya's water resource disparities. The study contributes to ongoing debates on water resource management by recognising the interconnectedness of water disparities with socioeconomic issues, providing insights for developing holistic strategies. The study advocates for infrastructure improvements, community-based water management, and educational programmes to ensure a just and resilient water distribution system, thereby fostering sustainable development in the Mandya District and other regions around the world.

Keywords: Mandya District; Water resource utilization; Disparities; Irrigation; Canals; Wells; Tanks; Sustainable development

Introduction

Water, as a vital resource, plays a critical role in sustaining ecosystems, supporting agriculture, and ensuring community well-being. However, equitable distribution and utilisation continue to be challenges, with disparities frequently emerging across geographical regions. This study delves into the complex dynamics of water resource utilisation, using Mandya District as a case study.

The overarching goal of this study is to meticulously examine the existing disparities in water resource utilisation within the Mandya District. We seek to uncover the multifaceted factors contributing to these inequities by scrutinising patterns of access, allocation, and consumption. Understanding the nuances of water resource utilisation in Mandya is critical not only for local stakeholders, but also has global implications for sustainable water management practices.

In the following sections of this research paper, we will look at the historical context of water management in Mandya, the various stakeholders involved, existing policies and their impact, and recommendations to address the identified disparities. We hope to contribute valuable insights that can inform evidence-based strategies for fostering equitable and sustainable water resource management not only in Mandya District, but also in analogous regions facing similar challenges around the world, through this comprehensive examination.

Study Area

Mandya District is located in the South Indian Peninsula on the Mysore plateau, between 76° 19' and 77° 20' East Longitude and 12° 13' and 13° 04' North Latitude. It is bounded to the north by Hassan and Tumkur districts, to the east by Tumkur and Bangalore districts, to the south by Mysore district, and to the west by Hassan and Mysore districts.

Mandya is the 19th largest district in Karnataka, covering a total area of 191,976 square kilometres. Nagamangala, K.R. Pet, Mandya, Malavalli, Maddur, Pandavapura, and Srirangapatanna are the district's seven taluks. Notably, Nagamangala has the largest geographical area at 1,044.7 square kilometres, accounting for approximately 21% of Mandya's total area.

Despite having a higher population density, Mandya taluk ranks fourth in terms of area, covering 699.06 square kilometres. Srirangapatna, on the other hand, has the smallest area, accounting for only 6.9% of the district's total area.

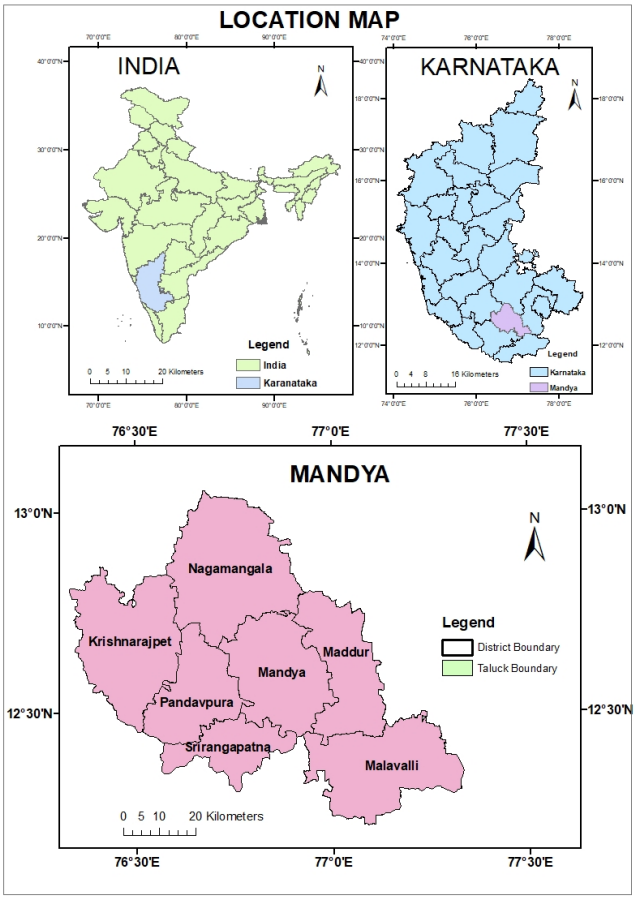

Fig. 1. Location map of study area

Objectives

- To know the Irrigation Scenario in Mandya District.

Methodology

In order to conduct a thorough investigation, I reviewed a large body of existing literature on water resource utilisation, irrigation methods, and disparities within comparable geographic regions. My focus was on the Mandya District in South India, a region chosen for its importance in terms of water resource imbalances and diverse irrigation practices. I traced the evolution of water management in Mandya District using historical documents, research papers, and governmental reports.

Supplementary data was obtained from the Government of Karnataka's Directorate of Economics and Statistics, which provided critical historical records of irrigation sources and trends. I assessed changes in net irrigated area using statistical analyses for the years 1991, 2001, and 2017, using percentages to identify shifts in the dominance of specific irrigation methods. I investigated specific instances of water resource utilisation within Mandya District using a case study approach, delving into local contexts, socioeconomic factors, and infrastructure development nuances. The findings were systematically compared to historical data, revealing insights into changes in irrigation methods, areas covered, and the overall landscape of water resource utilisation in the Mandya District.

Irrigation Scenario in Mandya District

Wells, tanks, canals, and other traditional irrigation sources are used in the study area. The various modes of irrigation are distinguished by changes in their ranking order. Well irrigation and canal irrigation predominate in the Mandya district, irrigating a large area. Despite the fact that the region is prone to drought, micro-irrigation systems such as drip irrigation have recently been introduced, holding the key to agro-based development.

Mandya district, located in southern Karnataka, relies heavily on canals and wells for irrigation, accounting for 90.9% of total irrigation in 1991. Both are, unfortunately, vulnerable to monsoon rains. In the Mandya district, efforts

are being made to connect tanks with the Cauvery canals, particularly in the Maddur and Malavalli Taluks. The shift in farmers' attitudes towards water management is critical for the district's agro-economic development, as discussed later in this investigation.

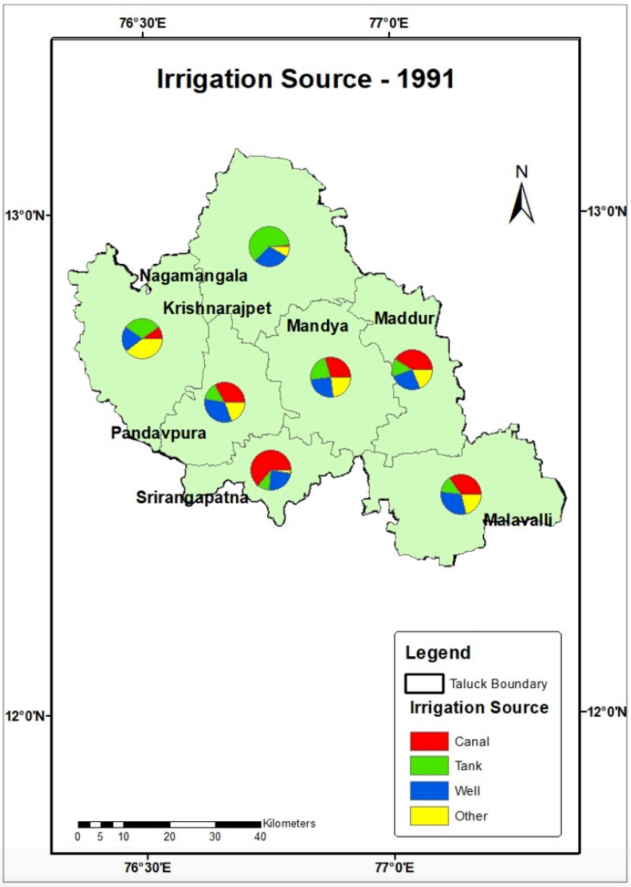

Fig. 2. Sources of Irrigation in 1991

Lift irrigation systems used to use springs, but with the introduction of tube wells, both springs and traditional open wells have vanished from the study area. This type of irrigation can only be sustained with effective rain harvesting for agriculture and efficient water management.

Canal irrigation covered approximately 83.2% (82,799 hectares) of the district's net irrigated area in 1991, ranking first. Despite an increase in area to 84,867 hectares in 2001, the percentage fell to 79.4%. The area increased to 90,172 hectares in 2017, but the percentage decreased to 70.9%.

Well irrigation covered approximately 7.7% (7,709 hectares) in 1991, ranking second, and increased significantly to 13.3% (14,232 hectares) in 2001. Well irrigation had increased to 16.6% (21,110 hectares) by 2017.

Tank irrigation fell from 7.5% (7,448 hectares) and third place in 1991 to 6.5% (6,941 hectares) in 2001. However, after recovering from siltation and encroachment by other economic activities, it increased to 11.6% (14,654 hectares) in 2017.

Other irrigation sources have not seen significant development. Other sources contributed only 1.6% (1,607 hectares) of total irrigated area in 1991, 0.8% (912 hectares) in 2001, and 0.9% (1,252 hectares) in 2017.

Canal Irrigation

Canals, which originate at the KRS dam, provide a vital water supply for fields and tanks in the study areas. The KRS dam is the district's primary canal irrigation development, with sub-canals distributing water to major tanks and agricultural fields. Canal irrigation in this region has changed significantly between the study periods of 1991, 2001, and 2017. The table depicts the taluk-wise distribution of canal irrigation area and percentage. Notably, the canal-irrigated area of the district increased from 82,799 hectares in 1991 to 90,172 hectares in 2017. Mandya taluk has the highest proportion of canal irrigation, while Nagamangala, Pandavapura, and Srirangarattana taluks lag behind.

Tank Irrigation

Despite a decline following the construction of the KRS dam, tank irrigation continues to play an important role in this semi-arid region. Tanks continue to be important, particularly in areas where canal water has not reached the fields. The district had approximately 630 major tanks in 2017, irrigating 14,654 hectares, up from 7,448 hectares in 1991. Due to topographical conditions, the taluks of K.R.Pet, Maddur, and Nagamangala have the most tanks. While tank irrigation decreased from 1991 to 2001, it rebounded to 14,654 hectares in 2017, with the exception of Nagamangala taluk, which experienced a decrease due to an increase in well irrigation.

Well Irrigation

In the Mandya district, well irrigation has emerged as a major source, employing traditional lifts such as Charsa, rent, and kapali. With 47,559 wells observed in 2017, the transition from open wells to tube wells has accelerated. In 2017, this source irrigated 21,110 hectares, an increase from 7,709 hectares in 1991. The scarcity of tank and canal irrigation correlates with the dominance of well irrigation. The highest percentages of well irrigation were recorded in Malavalli and K.R. Pet taluks in 2017, while the lowest percentages were recorded in Srirangangapattana and Nagamangala taluks.

Other Irrigation Methods

In addition to canals, wells, and tanks, other methods of irrigation, such as lift irrigation by streams, are used. Lifts use electric pumps near riverbanks to draw water from rivers and

Table 1. Irrigated area (in Hectares) by different sources 1991, 2001 and 2017

	Sources of Irrigated area	1991		2001		2017	
		Area	%	Area	%	Area	%
A	Canals	82799	83.2	84867	79.4	90172	70.9
B	Tanks	7448	7.5	6941	6.5	14654	11.6
C	Wells	7709	7.7	14232	13.3	21110	16.6
D	Other Sources	1607	1.6	912	0.8	1252	0.9
E	Net Irrigated Area	99563	-	106952	-	127188	

Source: Directorate of Economics and Statistics, Government of Karnataka, Bangalore.

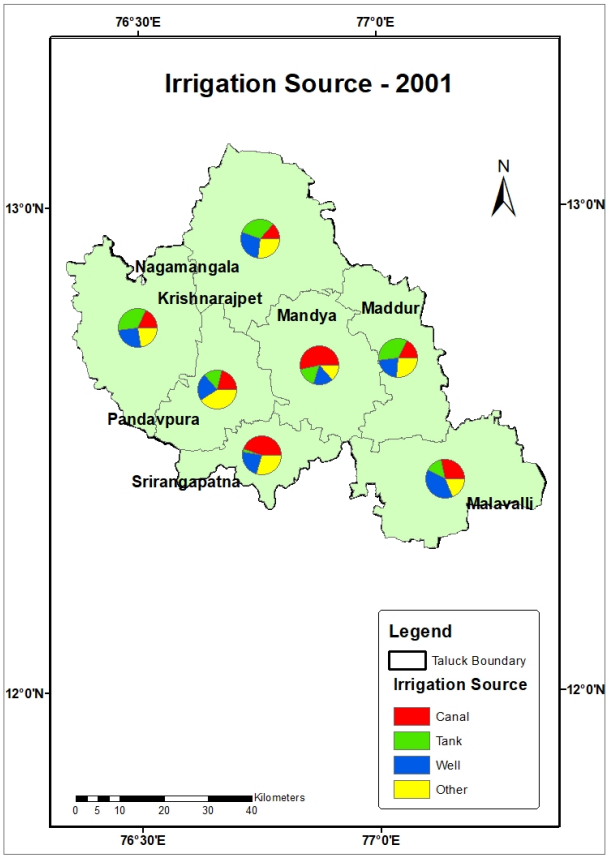

Fig. 3. Sources of Irrigation in 2001

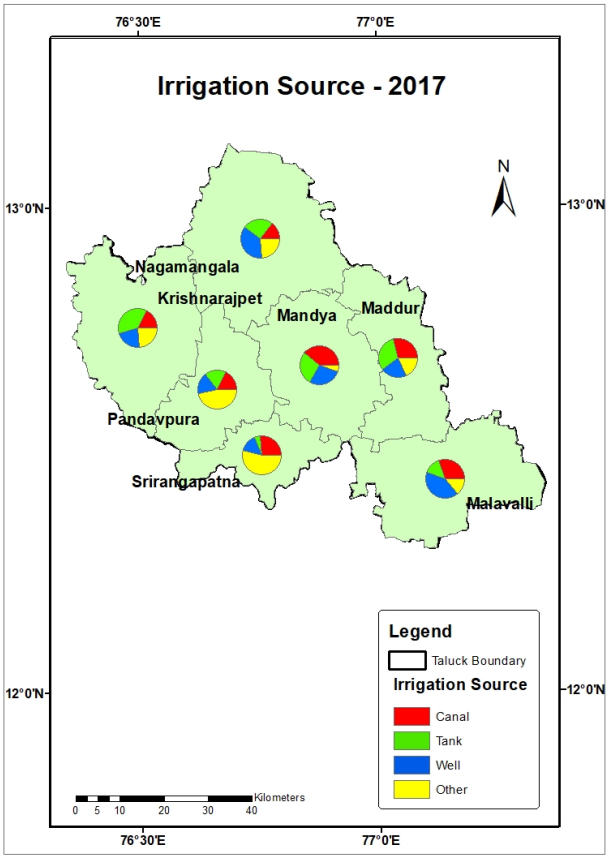

Fig. 4. Sources of Irrigation in 2017

canals and distribute it through small channels or pipelines. Other irrigation area decreased from 1,607 hectares in 1991 to 1,252 hectares in 2017.

Conclusion

Finally, the research paper delves into the critical issue of disparities in water resource utilisation, with a specific focus on the Mandya District. The study shed light on the region's unequal distribution and accessibility of water resources by conducting a thorough examination of various factors such as socioeconomic status, geographical location, and infrastructure development.

The findings emphasise the critical importance of targeted interventions and equitable policies in addressing the identified disparities. As the Mandya District grapples with water scarcity issues, policymakers, community leaders, and relevant stakeholders must work together to implement long-term solutions. Infrastructure improvements, community-based water management initiatives, and educational pro-

grammes promoting responsible water usage are examples of these.

Furthermore, the study emphasises the interconnectedness of water resource disparities with larger socioeconomic issues. Recognising these connections is critical for developing holistic strategies that improve water accessibility while also contributing to overall community development.

As we navigate an era of increasing environmental awareness and sustainable development goals, the insights provided by this research paper contribute significantly to the ongoing debate on water resource management. By addressing the identified disparities in Mandya District, we can strive to create a more just and resilient water distribution system that meets the needs of all residents, fostering sustainable development and ensuring a better quality of life for the entire community.

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