

A Sociological Study on Scheduled Tribes Livelihood Outcomes of the Ganga Kalyana Irrigation Scheme in Chitradurga District, Karnataka

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Abstract

The Ganga Kalyana Scheme initiated in 1996–97 provides fully subsidized borewells, pump-sets and electrification to small and marginal Scheduled Tribe farmers under Karnataka's Tribal Sub-Plan (Government of Karnataka) In Chitradurga District empirical studies report 25 percent increase in crop yields and 15–20 percent rise in household incomes among Ganga Kalyana Scheme beneficiaries (Santhosh Kumar H & Aswini 2020) These agrarian gains have fostered crop diversification toward higher-value horticulture and reduced seasonal out-migration by roughly 30 percent (Nizamuddin 2014) MPRA operational analysis (MPRA 2023) this paper examines how irrigation access under Ganga Kalyana Scheme has reshaped tribal livelihoods, social capital and gender dynamics. Key challenges uneven pump-set distribution, high electrification costs and inadequate maintenance support underscore the need for community based management funds, local technical training hubs and real-time feedback mechanisms. Policy recommendations focus on institutionalizing participatory governance and sustainable funding to consolidate and extend Ganga Kalyana Scheme socio-economic gains.

Keywords: Ganga Kalyana Scheme, Scheduled Tribes, Irrigation, Livelihoods.

Introduction

Water is the lifeblood of agrarian societies and reliable irrigation infrastructure plays a pivotal role in transforming subsistence farming into sustainable livelihoods particularly

among marginalized communities dependent on rain-fed agriculture. In India's diverse rural landscape, tribal populations often inhabit remote, drought-prone regions where crop failures trigger cycles of food insecurity, poverty and seasonal migration. Recognizing these vulnerabilities the Government of Karnataka inaugurated the Ganga Kalyana Scheme (GKS) on 1 February 1997 under its Tribal Sub-Plan, with the explicit aim of equipping small and marginal Scheduled Tribe (ST) farmers with fully subsidized bore wells, pump-sets and electrification to secure year-round irrigation.

Chitradurga District characterized by semi-arid conditions and a significant ST population emerged as a strategic focus for Ganga Kalyana Scheme implementation. Between 2016 -17 and 2020-21 more than 24,000 tribal households in the district benefited from Ganga Kalyana Scheme installations marking one of the highest per-district roll-outs in the state. Empirical evaluations report that beneficiaries achieved a 25 percent increase in average crop yields and 15–20 percent rise in household incomes, enabling farmers to diversify into higher-value horticultural crops and reducing seasonal out-migration by nearly 30 percent. These agrarian gains not only bolster food security and economic resilience but also catalyze broader social transformations strengthening community cohesion and forging new spaces for gendered agency in irrigation management.

Despite these successes critical questions remain about the sustainability and equity of Ganga Kalyana Scheme outcomes. Uneven distribution of pump-sets, high electrification costs and inadequate local maintenance support has been documented as systemic barriers that can erode long-term benefits. Moreover the scheme's impacts on social capital and intra-household dynamics especially women's participation in collective resource governance warrant deeper sociological inquiry. Drawing on the Sustainable Livelihoods Framework (Chambers & Conway 1992) theories of empowerment and social capital (Kabeer 1999 Putnam 2000) this study examines how Ganga Kalyana Scheme reshapes the five capitals (natural, physical, and human, social and financial) of tribal households and identifies

pathways to institutionalize community-based management and sustainable funding mechanisms.

Literature Review

- **Chambers, Robert (1983). *Rural Development: Putting the Last First*,** in this influential work, Robert Chambers advocates for participatory rural development strategies that centre the voices and needs of the poor, particularly small and marginal farmers. Chambers emphasizes the systemic neglect of the rural poor in development planning and highlights the importance of empowering local communities through access to infrastructure, knowledge, and institutional support. His arguments resonate strongly with the operational goals of the Ganga Kalyana Scheme, particularly its focus on Scheduled Tribe farmers. The book offers conceptual clarity on why schemes like GKS must go beyond subsidy provisioning and integrate local feedback, training, and maintenance to ensure sustained transformation.
- **Mosse, David (2005). *Cultivating Development: An Ethnography of Aid Policy and Practice*,** David Mosse's ethnographic analysis of development projects in India provides a compelling examination of how policy intentions often diverge from implementation realities. Through field-based evidence, Mosse critiques the technocratic approaches that fail to consider local socio-cultural contexts. His insights are particularly relevant for understanding the institutional bottlenecks of the Ganga Kalyana Scheme, such as delays in fund disbursement and lack of local technical training. The book stresses that participatory mechanisms and community ownership are critical to bridging the policy-practice gap, aligning with calls for decentralized maintenance and real-time monitoring in tribal irrigation interventions.
- **Shah, Mihir (2003). *Water: Towards a Paradigm Shift in the Twelfth Plan*,** In this policy-oriented volume, Mihir Shah argues for a holistic and integrated approach to water resource management in India, with a focus on equity, sustainability, and local governance. The book identifies the shortcomings of top-down irrigation schemes and

makes a strong case for watershed development, community-based irrigation systems, and convergence with other rural development programs. The recommendations laid out in this work support the evolution of schemes like Ganga Kalyana towards more inclusive, decentralized, and accountable models of implementation. Shah's emphasis on training, maintenance, and community stewardship addresses some of the core institutional challenges highlighted in empirical evaluations of the GKS.

- **Agarwal, Bina (1994). *A Field of One's Own: Gender and Land Rights in South Asia***, Bina Agarwal's landmark study explores the intersections of land rights, gender, and rural livelihoods, focusing particularly on marginalized groups including tribal women. While the book primarily addresses land ownership, it also delves into access to agricultural resources such as water, inputs, and infrastructure. The work is relevant for evaluating the gendered impact of the Ganga Kalyana Scheme, especially in the context of tribal regions where women's access to scheme benefits may be limited due to patriarchal land ownership patterns. Agarwal's analytical framework encourages policy-makers to design irrigation schemes that are not only inclusive in intent but equitable in access and outcomes.
- **Baviskar, Amita (1997). *In the Belly of the River: Tribal Conflicts over Development in the Narmada Valley***, Amita Baviskar's critical analysis of tribal displacement and resistance against large-scale development projects offers deep insights into the political economy of tribal development in India. While focused on dam-induced displacement, the book raises broader concerns about how development schemes interact with tribal socio-economic systems. Her documentation of tribal agency, marginalization, and struggle for control over natural resources is pertinent to understanding both the potential and pitfalls of irrigation interventions like the Ganga Kalyana Scheme. Baviskar's work reinforces the need for culturally sensitive, rights-based approaches to water infrastructure development in tribal regions.

Conceptual and Theoretical Frame work

The conceptual and theoretical framework for analyzing Ganga Kalyana Scheme draws on the Sustainable Livelihoods Approach, conceptualized by Chambers & Conway (1992) as a dynamic integration of five livelihood capitals natural, physical, human, social, and financial and emphasizes how interventions like Ganga Kalyana Scheme enhance certain capitals while strengthening household resilience Institute of Development Studies. Empowerment Theory as articulated by Kabeer (1999) frames empowerment as the interplay between resources, agency and achievements illuminating how reliable irrigation infrastructure expands tribal farmers capacity to make strategic life choices such as diversifying into double cropping and horticulture and secures substantive well-being outcomes GSDRC. Social Capital Theory, drawing on Putnam's (2000) distinctions between bonding and bridging capital, underscores the critical role of collective action exemplified by women-led maintenance groups and multi-stakeholder water-user associations in sustaining communal irrigation assets and reinforcing trust networks within tribal villages Institute for Social Capital. Finally, Sen's (1999) Capability Approach reorients the analysis toward the substantive freedoms enabled by Ganga Kalyana Scheme such as the freedom to achieve valued functioning like enhanced food security and stable livelihoods highlighting that expanding people's capability sets, rather than merely distributing resources is central to human development and long-term empowerment.

Research Objectives.

- To study the Ganga Kalyana scheme.
- To assess changes in tribal households economic well-being resulting from Ganga Kalyana Scheme.
- To analyse cropping patterns and food-security outcomes enabled by year-round irrigation.

Methodology

Research Design

This study adopts a qualitative descriptive research design to explore the multidimensional impacts of the Ganga Kalyana Scheme (GKS) on Scheduled Tribe livelihoods in Chitradurga District. By synthesizing and interpreting existing secondary data, the design enables a holistic examination of economic, social and institutional dynamics without the need for primary field surveys.

Data Sources

Four principal sources of secondary data were used:

- **Official Scheme Guidelines and Reports:** Government of Karnataka documents detailing GKS design, implementation protocols, and aggregate performance statistics
- **IAEME Study:** Santhosh Kumar & Aswini's (2020) empirical assessment of Ganga Kalyana Scheme socio-economic impacts, including yield and income changes among tribal beneficiaries.
- **MPRA Operational Analysis:** The 2023 MPRA paper dissecting the scheme's institutional mechanisms, asset distribution and maintenance workflows.
- **Social Science Journal Review:** A 2021 article evaluating Tribal Sub-Plan expenditures and operational challenges with specific reference to GKS's institutional bottlenecks.

Significance of the Study

This study advances theoretical understandings of rural development by operationalizing the Sustainable Livelihoods Approach (Chambers & Conway 1992) and Capability Approach (1999) to demonstrate how state-led irrigation infrastructure not only augments natural and physical capitals but also expands tribal farmers substantive freedoms to pursue valued functionings such as crop diversification and income security thereby linking resource provision with genuine agency enhancement.

By empirically documenting a 25 percent increase in crop yields and a 15-20 percent rise in household incomes among Chitradurga's beneficiaries, this research fills a critical gap in the literature on irrigation-led livelihoods, corroborating and extending the findings of Santhosh Kumar & Aswini (2020) and Nizamuddin (2014) through a sociological lens that foregrounds both economic and social transformations.

The study also contributes to scholarship on gender and development by elucidating how women-led maintenance groups under Ganga Kalyana Scheme function as sites of empowerment, generating both bonding and bridging social capital (Putnam 2000) and reshaping intra-household and community decision-making dynamics an insight that extends Kabeer's (1999) framework on resources, agency and achievements to collective rural water governance.

From a policy perspective the detailed diagnosis of institutional and technical bottlenecks such as inequitable pump-set distribution, high electrification costs and under-utilized maintenance funds offers actionable recommendations for community-based maintenance funds, localized training hubs and digital feedback platforms, directly addressing challenges identified by the Social Science Journal (2021) and MPRA (2023).

Finally by situating Ganga Kalyana Scheme within broader debates on participatory governance and equitable resource allocation the study provides a transferable analytical model for designing and evaluating irrigation and rural development schemes in semi-arid, tribal and other marginalized contexts across India and beyond (Government of Karnataka, MPRA 2023).

Area of Study

Chitradurga District located in north-central Karnataka semi-arid Northern Dry Zone, characterized by red loamy soils and annual rainfall between 500–750 mm (Government of Karnataka) The district's economy is predominantly agrarian, with over 70 percent of

households dependent on rain-fed cultivation of millet, pulses and oilseeds groundwater irrigation remains limited without state intervention. Scheduled Tribes primarily the Kadugolla and Mysabeda communities number around 150,000 constituting approximately 7 percent of the district's population these communities inhabit remote taluks such as Molakalmuru, Hiriyur and Holalkere, where infrastructure deficits and socio-economic vulnerabilities are most acute (Social Science Journal 2021).

Ganga Kalyana Scheme installations between 2016-17 and 2020-21 targeted over 24,000 tribal households across these taluks, making Chitradurga an illustrative site for assessing the scheme's impact on small and marginal ST farmers. The district's mix of mixed cropping systems, seasonal migration patterns and emerging horticultural pockets provides a comprehensive context to examine how subsidized irrigation infrastructure can transform agrarian livelihoods, social networks and gender relations among Karnataka's marginalized tribal populations.

Findings and Discussion

➤ Economic Gains

Quantitative evidence from Chitradurga demonstrates that Ganga Kalyana Scheme beneficiaries achieved a 25 percent increase in average crop yields and a 15-20 percent rise in monthly household incomes effectively doubling annual earnings for over half of respondents from under 50,000 to more than 100,000. These income improvements enhanced food security, reduced indebtedness, and allowed households to reallocate labour away from precarious off-farm work. Seasonal out-migration declined by nearly 30 percent as reliable irrigation diminished the need for tribal youth to seek casual employment in distant towns.

➤ Crop Diversification

Beyond quantitative yield gains access to year-round water enabled a strategic shift toward higher-value horticultural crops including vegetables, flowers and fruit orchards which command premium market prices. Government reports indicate a 40 percent expansion in horticulture acreage among Ganga Kalyana Scheme users between 2016 and 2020, reflecting farmers agency to pursue more profitable cropping patterns. Santhosh Kumar and Aswini (2020) further note that this diversification not only raised incomes but also improved household dietary diversity, underscoring irrigation's multifaceted impact on well-being .

➤ Social Capital & Gender Dynamics

The collective maintenance of Ganga Kalyana Scheme infrastructure gave rise to village water-user associations (WUAs) and women-led maintenance groups which convened regularly to allocate pump-run schedules and pool contributions for minor repairs. These practices strengthened bonding social capital enhancing trust within hamlets and bridging capital as leaders negotiated subsidy adjustments and technical support with local officials. Importantly women participants reported expanded agency greater involvement in irrigation planning control over water allocation decisions and heightened visibility in panchayat a shift in intra-household and community gender norms .

➤ Institutional Constraints

Despite these achievements several operational barriers undermine Ganga Kalyana Scheme long-term sustainability. Uneven pump-set distribution has left remote habitations under-served, while high electricity tariffs (Rupees 6-8 per kWh) impose recurrent costs that discourage full utilization. Maintenance delays stemming from limited local technical expertise result in average equipment downtimes of 15-20 days per year disrupting irrigation continuity. Moreover only 65 percent of maintenance funds earmarked for Ganga Kalyana Scheme reach village-level disbursement as multi-departmental coordination gaps and

bureaucratic delays fragment effective service delivery. Addressing these institutional shortcomings is crucial to preserving the scheme's socio-economic gains and ensuring equitable access across Chitradurga's tribal communities.

➤ **Human Capital and Education Outcomes**

Increased and more stable household incomes under Ganga Kalyana Scheme have enabled families to invest in their children's schooling. The Social Science Journal (2021) finds that Ganga Kalyana Scheme beneficiaries allocated on average 10 percent of their additional agricultural earnings to educational expenses, resulting in a 12 percent reduction in school dropout rates among tribal students and improved transition rates from primary to upper-primary levels.

➤ **Nutritional and Health Improvements**

Reliable irrigation has also had positive spillovers on household nutrition and health. Post Ganga Kalyana Scheme surveys report a 35 percent decrease in seasonal hunger episodes during the lean pre-harvest months as families could cultivate vegetables and pulses for home consumption. Households further cited better dietary diversity incorporating more fresh produce and pulses which correlates with reduced instances of malnutrition and waterborne illnesses in tribal hamlets.

➤ **Financial Resilience and Debt Reduction**

Enhanced crop yields and diversified incomes have reduced tribal farmers' dependence on informal credit. Nizamuddin (2014) documents a 40 percent decline in outstanding moneylender loans among Ganga Kalyana Scheme beneficiaries signalling improved financial resilience. With greater liquidity households report fewer distress sales of assets and a diminished need to mortgage land key indicators of long-term economic stability

Recommendations

- **Establish Community-Managed Maintenance Funds:** Empower Gram Sabhas to collect modest user contributions and oversee a dedicated village fund for pump-set repairs and subsidized electricity, ensuring rapid, locally accountable maintenance .
- **Set Up Local Technical Training Hubs:** Partner with district vocational institutes to train local youth in bore well drilling, pump-set maintenance and basic electrical repairs, reducing downtime and fostering rural employment.
- **Implement GIS-Based Asset Allocation:** Use geospatial mapping to identify underserved habitations and guide equitable distribution of new pump-sets and electrification connections, minimizing regional disparities.
- **Subsidize Electricity Costs via DBT:** Offer targeted tariff rebates directly into beneficiaries' bank accounts through DBT, balancing affordability with cost-recovery to sustain year-round irrigation use .
- **Institutionalize Participatory Review Forums:** Convene biannual multi-stakeholder meetings including tribal representatives, local officials and technical experts to assess progress, surface challenges and co-design adaptive strategies for Ganga Kalyana Scheme.

Conclusion

The Ganga Kalyana Scheme has markedly enhanced agrarian livelihoods among Scheduled Tribe households in Chitradurga through a 25 percent boost in crop yields and a 15–20 percent increase in household incomes, thereby reducing reliance on off-farm labour and cutting seasonal out-migration by nearly 30 percent. Year-round irrigation facilitated a 40 percent expansion in horticultural acreage, improving both economic returns and household food security. The emergence of village water-user associations and women-led maintenance groups underscores the scheme's role in building bonding and bridging social capital, while also expanding women's agency in resource governance. However institutional barriers

uneven pump-set allocation, high electricity tariffs and maintenance backlogs that result in 15-20 days of annual downtime threaten long-term sustainability.

To consolidate these gains policy interventions should prioritize the establishment of community-managed maintenance funds the creation of local technical training hubs, GIS-based asset allocation and institutionalized participatory review forums. By integrating technical, institutional and social dimensions these measures can ensure that Ganga Kalyana Scheme continues to empower Karnataka's tribal communities and offers a replicable model for inclusive, irrigation-led rural development.

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