

Impact of Minor Irrigation on Farmers' Employment, Income and Production: An Empirical Study

Original Research Article | Volume 1 | Issue 5 | 2026 | Article Number: 082

Accepted: 05 October 2026 | Published: 10 October 2026 | ISSN: 2979-8582 (Online)

 Crossref : <https://doi.org/10.67693/BJCR-CIHDS3AN>



B. Suresh Lal¹, Vidyasagar S², Priyanka Lakavath³, Vasantha Kampa³

¹Professor of Economics & Principal Investigator, RUSA 2.0 Project, Kakatiya University, Warangal, Telangana, India,

²Assistant Professor(C), Department of Economics, Kakatiya University, Warangal, Telangana, India,

³Project Fellow, RUSA 2.0, Department of Economics, Kakatiya University, Warangal, Telangana, India

 BSL [0000-0002-7110-7783](https://orcid.org/0000-0002-7110-7783)

Correspondence: B. Suresh Lal, lalbsuresh@kakatiya.ac.in

Abstract

Minor irrigation plays an important role in stabilising agricultural production, generating employment, and improving rural households' economic conditions, notably in regions where agriculture depends heavily on rainfall. This paper examines the role and impact of minor irrigation on farmers' employment, income, and agricultural production using field-level data from 120 farmers selected from Kamalapur, Kesamudram, Mancherial, and Khammam. The study finds that tanks are the principal source of irrigation for most respondents, with 73.3 per cent depending primarily on tanks. Paddy is the dominant irrigated crop, reported by 87.5 per cent of the respondents. The sample mainly comprises marginal and small farmers, with marginal farmers accounting for 53.3 per cent. Agricultural income is concentrated in the ₹20,001–30,000 per-acre category for 35.8 per cent of respondents, while 13.3 per cent earn more than ₹40,000 per acre. The evidence suggests that access to minor irrigation supports more reliable cultivation, increases demand for agricultural labour and contributes to farm income and production. However, the study also reveals constraints such as dependence on non-institutional credit and relatively small landholdings. The findings underline the relevance of maintaining tanks, improving water-use efficiency and strengthening institutional support for small and marginal farmers.

Keywords: Minor Irrigation, Tank Irrigation, Farmers, Agricultural Employment, Farm Income, Crop Production, Telangana, Rural Development

1. INTRODUCTION

Agriculture is still a major source of livelihood in rural India, but agricultural production is highly sensitive to water availability and reliability. Irrigation reduces dependence on uncertain rainfall and enables farmers to undertake agricultural operations at appropriate times. In semi-arid regions such as Telangana, minor irrigation tanks have historically served as important sources of agricultural water.

Minor irrigation includes relatively small irrigation systems such as tanks, ponds, wells, check dams, anicuts and other local water-harvesting structures. In Telangana, tank irrigation is especially important because of the state's topography and rainfall characteristics. The Government of Telangana describes tanks as an important component of the state's irrigation system and spotlights their role in agricultural development, rural employment and livelihoods. (Telangana Government)

The importance of minor irrigation goes beyond merely supplying water. Reliable irrigation can enable higher cropping intensity, greater use of agricultural inputs, crop diversification, and greater demand for agricultural labour. FAO notes that irrigation can extend the agricultural season, increase cropping intensity and diversify production, thereby generating employment both within agriculture and in associated rural activities. (FAO Home)

The present study examines these relationships using primary data collected from 120 farmers in four locations. The field data show that agriculture is the primary occupation of all respondents, while many households also undertake dairy farming and other activities as secondary occupations.

1.1. Review of Literature

Water resources have historically shaped rural Telangana's economic and social organisation. Tanks and ponds have served more than irrigation; they have supported a wider rural production system involving agriculture, livestock, fisheries, and several traditional occupations. Among potters, 89.17% reported increased pottery production, and 65% reported improved monthly income after Mission Kakatiya. Among washermen, 60.83% reported that tank restoration helped their occupational activities, while 63.33% perceived additional employment opportunities (Lal-2026c). Mission Kakatiya has gone beyond irrigation restoration to become a comprehensive rural development intervention. A difference-in-differences analysis of 230 households in Kamalapuram Village shows sizeable benefits in agricultural production, crop productivity, dairy development, fisheries, washermen's livelihoods, and pottery production (Lal-2026b). The study finds that restoring tanks is more than an irrigation intervention; it is a holistic, ecosystem-based development paradigm. Through ecological restoration and livelihood augmentation, Mission Kakatiya delivers a sustainable road for rural development in semi-arid areas (Lal-2026a).

2. OBJECTIVES OF THE STUDY

The major objectives of the study are:

1. To examine the role of minor irrigation in agricultural production among the sample farmers.
2. To analyse the relationship between irrigation availability and farmers' employment.
3. To examine the income levels of farmers using minor irrigation.
4. To analyse agricultural expenditure and returns among the sample respondents.
5. To identify the major constraints affecting farmers' use of minor irrigation.
6. To suggest measures to strengthen minor irrigation and improve rural livelihoods.

3. RESEARCH METHODOLOGY

3.1 Study Area and Sample

The study is based on primary field data collected from 120 farmers, with 30 respondents each from

Kamalapur, Kesamudram, Mancherial and Khammam. The information covers demographic characteristics, landholdings, irrigation sources, cropping patterns, agricultural expenditure, income and access to credit.

The sample mainly comprises smallholders. The field data indicate that 53.3 per cent are marginal farmers, 27.5 per cent are small farmers, and 19.1 per cent are medium farmers.

3.2 Nature of the Data

The analysis uses descriptive statistics, particularly frequencies and percentages. The results are interpreted in relation to the role of minor irrigation in employment, production and income. An important methodological qualification is necessary: because the supplied table is primarily a cross-sectional field survey, the findings show patterns and associations rather than establishing a statistically identified causal effect of minor irrigation. The phrase "impact" is therefore used in the empirical and livelihood sense supported by the recorded patterns.

4. RESULTS AND DISCUSSION

4.1. Socio-Economic Characteristics of the Sample Farmers

Understanding farmers' socio-economic characteristics is important for understanding the context in which irrigation affects livelihoods.

Table 1. Demographic Information of Sample Respondents

Sl.No	Indicator	Kamalapur	Kesamudram	Mancherial	Khammam	Total
1	Age: Below 35 years	11 (36.7)	7 (23.3)	2 (6.7)	5 (16.7)	25 (20.8)
2	Below 45 years	10 (33.3)	9 (30.0)	8 (26.7)	9 (30.0)	36 (30.0)
3	Below 60 years	9 (30.0)	14 (46.7)	20 (66.7)	16 (53.3)	59 (49.1)
4	Total	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)	120 (100.0)
5	Gender: Female	6 (20.0)	3 (10.0)	2 (6.7)	5 (16.7)	16 (13.3)
6	Male	24 (80.0)	27 (90.0)	28 (93.3)	25 (83.3)	104 (86.6)
7	Total	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)	120 (100.0)
8	Social Status: SC	0 (0.0)	17 (56.7)	6 (20.0)	2 (6.7)	25 (20.8)
9	ST	1 (3.3)	2 (6.7)	4 (13.3)	0 (0.0)	7 (5.8)
10	BC	29 (96.7)	11 (36.7)	20 (66.7)	21 (70.0)	81 (67.5)
11	Others	0 (0.0)	0 (0.0)	0 (0.0)	7 (23.3)	7 (5.8)
12	Total	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)	120(100.)
13	Type of family: Joint	20 (66.7)	17 (56.7)	24 (80.0)	25 (83.3)	86 (71.6)

14	Nuclear	10 (33.3)	13 (43.3)	6 (20.0)	5 (16.7)	34 (28.3)
15	Total	30 (100.0)	30 (100.0)	30 (100.0)	30 (100.0)	120 (100.0)

Source: Field Study.

The sample is predominantly male, with 86.6 per cent male and 13.3 per cent female respondents. Agriculture is the primary occupation of all 120 respondents. As a secondary occupation, 29.1 per cent reported agriculture, 27.5 per cent dairy farming and 43.3 per cent other activities. The landholding pattern demonstrates the importance of irrigation for relatively small farms. More than half of the respondents (53.3 per cent) possess 1–2 acres, while 15.8 per cent have less than one acre. Thus, irrigation reliability is particularly important for these farmers because even small variations in crop productivity can markedly affect household income. The study further shows that 71.6 per cent of respondents live in joint families, which may provide additional family labour for agricultural operations.

4.2. Minor Irrigation as the Main Source of Agricultural Water

One of the study's most important findings is the dominant role of tanks.

Table 2. Major Sources of Irrigation among Sample Farmers

Sl.No	Source of irrigation	Frequency	Total/ Percentage
1	Tank	88	88(73.3)
2	Bore well/Open well	16	16(13.3)
3	Canal	10	10(8.3)
4	Rainfed	6	6(5.0)
5	Total	120	120(100.0)

Source: Field Study.

The table 2 demonstrates that tanks are the principal irrigation source for the sample farmers. Nearly three-fourths (73.3 per cent) depend on tanks, while only 5 per cent depend exclusively on rainfed cultivation.

Dependence on tanks is particularly high in Kamalapur, where 90 per cent of respondents rely on tank irrigation, followed by Kesamudram at 86.7 per cent. Mancheri records 63.3 per cent and Khammam 53.3 per cent.

This finding is consistent with the broader importance of tank irrigation in Telangana. Government sources describe tank irrigation as an important mechanism for agricultural production and rural livelihood development, and identify restoring minor irrigation infrastructure as a means of improving water availability for agriculture. (Telangana Government)

4.3. Impact on Agricultural Production

Irrigation availability is strongly linked to crop choice. Paddy is the major irrigated crop among the respondents.

Table 3. Crop Receiving the Highest Irrigation

Sl.No	Crop	Frequency	Total/ Percentage
1	Paddy	105	105(87.5)
2	Cotton	11	11(9.1)
3	Vegetables	4	4(3.3)
4	Total	120	120(100.0)

Source: Field Study.

As shown in Table 3, 87.5 per cent of the respondents reported paddy as the crop receiving the highest amount of irrigation. Cotton accounted for 9.1 per cent and vegetables for 3.3 per cent.

This pattern suggests that minor irrigation has supported the cultivation of water-intensive crops in the study locations. Reliable tank water reduces rainfall uncertainty and allows farmers to maintain cultivation during periods of inadequate rainfall. The Telangana government's documentation on tank restoration similarly identifies increased irrigated area, higher productivity and crop diversification as important predicted outcomes of improved minor irrigation. (Telangana Government)

4.4. Agricultural Investment

Irrigation also appears to be associated with substantial expenditure on agricultural inputs.

Table 4. Expenditure on Fertilisers and Pesticides per Acre

Sl.No	Expenditure	Frequency	Total/ Percentage
1	₹2,000–4,000	5	5(4.1)
2	₹4,100–6,000	23	23(19.1)
3	₹6,100–9,000	56	56(46.6)
4	Above ₹10,000	36	36(30.0)
5	Total	120	120(100.0)

Source: Field Study.

Nearly 46.6 per cent of respondents spend ₹6,100–9,000 per acre on fertilisers and pesticides, while another 30 per cent spend more than ₹10,000. This relatively high level of input expenditure indicates that irrigation is not an isolated production factor. Water availability facilitates the use of complementary inputs such as fertilisers, pesticides, labour and improved cultivation practices. Thus, irrigation's economic benefits can arise from interactions between water availability and other agricultural inputs.

4.5. Impact on Farmers' Employment

Irrigation influences employment through several channels. First, reliable water enables farmers to cultivate land more consistently. Second, irrigated cultivation can increase the number of agricultural operations that require labour, including land preparation, transplanting, weeding, fertiliser application, harvesting, and post-harvest activities.

FAO identifies this mechanism explicitly: irrigation can extend the agricultural season and increase cropping intensity, thereby creating sustained rural employment and supporting demand for non-farm goods and services. (FAO Home)

In the present study, all 120 respondents identify agriculture as their primary occupation. Secondary occupations also indicate livelihood diversification. About 27.5 per cent undertake dairy farming as a secondary occupation, while 43.3 per cent report other secondary activities.

The relationship can be conceptualised as:

Minor irrigation → greater water availability → more reliable cultivation → increased agricultural operations → greater labour demand → expanded employment opportunities → improved household livelihood.

This mechanism is particularly relevant to marginal farmers. Because 53.3 per cent of the sample consists of marginal farmers, more reliable irrigation can help them use their limited land more intensively.

However, the available data do not directly measure the number of employment days before and after irrigation. Therefore, the study supports an interpretation of employment-generating potential and livelihood support, rather than a precise estimate of additional employment days.

4.6. Impact on Farmers' Income

The income data provide important evidence concerning the economic importance of agricultural production.

Table 5. Agricultural Income per Acre

Sl.No	Income per acre	Frequency	Total/ Percentage
1	Below ₹20,000	31	31(25.8)
2	₹20,001–30,000	43	43(35.8)
3	₹30,001–40,000	30	30(25.0)
4	Above ₹40,000	16	16(13.3)
5	Total	120	120(100.0)

Source: Field Study.

The largest group, 35.8 per cent, earns ₹20,001–30,000 per acre from agriculture. Another 25 per cent earn ₹30,001–40,000, while 13.3 per cent report more than ₹40,000 per acre.

The data therefore indicate substantial variation in agricultural returns across farmers and locations.

At the household level, the income distribution differs somewhat: 65.8 per cent of respondents report total income in the ₹50,001–100,000 category, while 33.3 per cent fall in the ₹30,001–50,000 category.

These results indicate that irrigation-supported agricultural income is an important component of the surveyed households' economic livelihood.

4.7. Expenditure and Income Relationship

The income effect of irrigation should be examined alongside production costs.

Table 6. Agricultural Expenditure per Acre

Sl.No	Expenditure	Frequency	Total/Percentage
1	₹20,000–30,000	37	37(30.8)
2	₹30,001–40,000	54	54(45.0)
3	Above ₹40,000	29	29(24.1)
4	Total	120	120(100.0)

Source: Field Study.

The largest proportion of farmers (45 per cent) spend ₹30,001–40,000 per acre. Another 24.1 per cent spend more than ₹40,000. This finding is important because higher irrigation availability does not automatically translate into higher net income. Irrigation can encourage greater input use, but farmers also bear higher expenditure on fertilisers, pesticides, labour and other cultivation operations.

Consequently, the economic effect of minor irrigation should be evaluated not only through gross production and income but also through net returns, input costs and profitability. The supplied field tables provide income and expenditure categories but do not provide sufficient individual-level observations to calculate a statistically valid average net return.

4.8. Credit Constraints and Irrigation-Based Agriculture

Access to agricultural credit is another important factor affecting farmers' ability to exploit irrigation opportunities.

Table 7. Sources of Agricultural Credit

Sl.No	Credit source	Frequency	Total/Percentage
1	Institutional	7	7(23.3)
2	Non-institutional	64	64(53.3)
3	Both	49	49(40.83)
4	Total	120	120(100.0)

Source: Field Study.

The table indicates considerable dependence on non-institutional credit. More than half of the respondents (53.3 per cent) depend on non-institutional sources, while 23.3 per cent report institutional credit.

This matters because irrigation-induced opportunities require complementary investments in seeds, fertilisers, pesticides, labour, and machinery. When formal agricultural credit is inadequate, farmers may rely on informal lenders, which can increase cultivation costs. Thus, the impact of minor irrigation on farmer income depends partly on the availability of affordable institutional credit.

4.9. Minor Irrigation and Rural Economic Transformation

The results show that minor irrigation has implications beyond crop cultivation. The Government of Telangana identifies several possible benefits of tank rehabilitation, including expansion of irrigated area, crop diversification, fisheries, livestock development, groundwater recharge and rural income generation. (Telangana Government)

The Telangana Socio-Economic Outlook also reports that minor irrigation tanks perform multiple functions including irrigation, soil and water conservation, drought mitigation, livestock rearing, fish production and groundwater recharge. It cites evaluation evidence suggesting that rehabilitated tanks increased the availability and use of tank water for irrigation and increased the number of days of tank irrigation in beneficiary areas. (Telangana Government)

The present field data are consistent with this broader livelihood perspective. Agriculture is the primary occupation of all respondents, while dairy farming constitutes an important secondary occupation for 27.5 per cent.

Thus, minor irrigation may contribute to a multiplier effect in rural economies:

Water availability → agricultural production → farm employment → farm income → demand for livestock and services → broader rural economic activity.

4.10. Location-Wise Differences

The field data show considerable variation across the four study locations. Kamalapur has the highest dependence on tanks, at 90 per cent, while Kesamudram follows at 86.7 per cent. Tank dependence is relatively lower in Mancheri and Khammam.

The crop pattern also differs. Paddy is dominant across all locations, but its share ranges from 73.3 per cent in Khammam to 96.7 per cent in Mancheri.

Earnings also vary. In Mancheri, 40 per cent of respondents report agricultural income of ₹30,001–40,000 per acre, while 36.7 per cent of Kamalapur respondents report more than ₹40,000 per acre.

These differences indicate that local conditions such as landholding size, crop choice, water availability, input expenditure, and access to credit influence irrigation's effect.

4.11. Hypothesis Testing Results

Hypothesis 1: Irrigation and Study Area

H₀₁: There is no significant association between irrigation source and study area.

H₁₁: Irrigation source and study area are significantly associated.

Table 1. Chi-Square Test: Source of Irrigation × Study Area

Source of irrigation	Kamalapur	Kesamudram	Mancherial	Khammam	Total
Tank	27	26	19	16	88
Bore/Open well	0	2	0	14	16
Canal	0	0	10	0	10
Rainfed	3	2	1	0	6
Total	30	30	30	30	120

Chi-square (χ^2) = 71.242, df = 9, p < 0.001

Result: The calculated chi-square statistic is 71.242, with 9 degrees of freedom and a p-value below 0.001. Therefore, we reject the null hypothesis at the 5% significance level.

This indicates a statistically significant association between study area and irrigation source. Tank irrigation dominates overall, but the pattern differs considerably across locations. For example, tank dependence is 90.0 per cent in Kamalapur compared with 53.3 per cent in Khammam, where bore/open wells account for 46.7 per cent of respondents. Conclusion: Irrigation structures differ markedly across the four study areas.

Hypothesis 2: Agricultural Production and Study Area

For production, the available table identifies the crop receiving the highest irrigation on each farm.

H₀₂: There is no significant association between the crop receiving the highest irrigation and the study area.

H₁₂: A significant association exists between the crop receiving the highest irrigation and the study area.

Table 2. Chi-Square Test: Main Irrigated Crop × Study Area

Crop	Kamalapur	Kesamudram	Mancherial	Khammam	Total
Paddy	26	28	29	22	105
Cotton	4	2	0	5	11
Vegetables	0	0	1	3	4
Total	30	30	30	30	120

χ^2 = 12.459, df = 6, p = 0.052.

The field study reports that 87.5 per cent of respondents identify paddy as the crop receiving the highest irrigation.

Result: The calculated p-value is 0.052, which is slightly greater than the conventional 5 per cent significance level. Therefore, we do not reject the null hypothesis at the 5 per cent level. Thus, the available data do not provide sufficient evidence at the 5 per cent level to conclude that the distribution of the main irrigated crop differs significantly among the four study areas. Nevertheless, the descriptive pattern is noteworthy: paddy accounts for 87.5 per cent of the sample, indicating considerable concentration of irrigation in paddy cultivation.

Conclusion: The study finds a strong descriptive dominance of paddy, but the chi-square test does not establish a statistically significant location-wise association at the 5 per cent level.

Hypothesis 3: Agricultural Income and Study Area

H₀₃: Agricultural income per acre is not significantly associated with study area.

H₁₃: Agricultural income per acre is significantly associated with study area.

Table 3. Chi-Square Test: Agricultural Income per Acre × Study Area

Agricultural income per acre	Kamalapur	Kesamudram	Mancherial	Khammam	Total
Below ₹20,000	9	13	9	0	31
₹20,001–30,000	6	17	7	13	43
₹30,001–40,000	4	0	12	14	30
Above ₹40,000	11	0	2	3	16
Total	30	30	30	30	120

$\chi^2 = 54.188$, $df = 9$, $p < 0.001$.

Result: The calculated chi-square statistic is 54.188, with 9 degrees of freedom, and the p-value is below 0.001. Therefore, we reject the null hypothesis at the 5 per cent significance level.

Therefore, there is a statistically significant association between study area and agricultural income category per acre.

The descriptive differences are considerable. For example, 36.7 per cent of farmers in Kamalapur report income above ₹40,000 per acre, whereas none of the Kesamudram respondents falls in this category. In contrast, 56.7 per cent of Kesamudram respondents fall in the ₹20,001–30,000 category. Hence, Agricultural income distributions differ substantially across the four study areas.

4.12. Discussion

The main discussion point is that tank irrigation is the dominant irrigation source, with 73.3 per cent of respondents depending on tanks. Agriculture is the primary occupation of all respondents, indicating the central importance of irrigation to household livelihoods. Marginal farmers make up 53.3 per cent of the sample, illustrating the importance of minor irrigation for smallholders. Paddy is the dominant irrigated crop, accounting for 87.5 per cent of respondents. Agricultural input expenditure is substantial, with 46.6 per cent spending ₹6,100–9,000 per acre on fertilisers and pesticides. 35.8 per cent of farmers earn ₹20,001–30,000 per acre, while 13.3 per cent earn more than ₹40,000. 65.8 per cent of respondents report a total household income of ₹50,001–100,000. Agricultural expenditure is concentrated in the ₹30,001–40,000 category, with 45 per cent of respondents reporting this range. Non-institutional credit is an important source of agricultural finance, reported by 53.3 per cent. The evidence indicates that minor irrigation supports agricultural stability, production and livelihood opportunities. Still, its economic benefits depend on complementary factors such as credit, farm size, input costs and crop selection.

Despite the importance of minor irrigation, field data reveal multiple challenges. A substantial proportion of respondents are marginal farmers. Small holdings limit the scale at which farmers can exploit irrigation infrastructure and may restrict the ability to generate high net returns. The high dependence on non-institutional credit is a major constraint. Access to affordable institutional finance is necessary to ensure irrigation-induced production opportunities do not lead to excessive indebtedness or high financial costs. Fertiliser and pesticide expenditure is considerable. Increased irrigation must therefore be matched with efficient input management to ensure higher production translates into higher net income. The overwhelming concentration of irrigation in paddy indicates limited diversification. Telangana's policy documents have also identified crop diversification and high-value crops as possible benefits of improved

irrigation management. (Telangana Government). The economic value of tank irrigation depends on regular desiltation and maintenance of feeder channels, bunds, sluices, and distribution channels. Government programmes such as Mission Kakatiya have emphasised these components as part of minor irrigation restoration. (Kamareddy District)

5. SUGGESTIONS AND POLICY IMPLICATIONS

Based on the field findings, the following measures are suggested:

1. Tank desiltation, feeder-channel maintenance, bund strengthening, and sluice repair should be undertaken regularly to ensure dependable water availability.
2. Institutional credit should be made more accessible to marginal and small farmers to reduce dependence on costly non-institutional finance.
3. Farmers should be motivated to adopt suitable combinations of paddy, pulses, oilseeds, vegetables, horticultural crops and other crops according to local agro-climatic and commercial conditions.
4. Promote efficient irrigation practices to increase productivity per unit of water.
5. The benefits of minor irrigation can be expanded through fisheries, dairy and livestock activities. This is particularly relevant because dairy farming is already reported as a secondary occupation among 27.5 per cent of the respondents.
6. The study finds that 62.5 per cent of farmers participate in farmer meetings. Strengthening participatory irrigation management could improve local maintenance and water distribution.
7. Irrigation development should be accompanied by extension services covering improved seeds, balanced fertiliser application, integrated pest management, crop diversification and post-harvest management.
8. Since marginal farmers form the largest category in the sample, minor irrigation programmes should specifically address their access to water, credit, technology and markets.

6. CONCLUSION

Minor irrigation has an important function in strengthening the economic foundations of rural agriculture. Field evidence from 120 farmers in Kamalapur, Kesamudram, Mancheri and Khammam demonstrates the central role of tank irrigation in the study area's agricultural economy. Nearly three-fourths of respondents depend on tanks, while agriculture is the primary occupation of all sampled farmers.

The dominance of paddy cultivation, agricultural input investment and the distribution of farm income indicate that irrigation is closely connected with agricultural production and livelihood generation. The evidence also suggests that improved water availability can support employment by enabling more reliable and intensive agricultural operations. This is consistent with the broader development literature, which links irrigation to longer agricultural seasons, higher cropping intensity, and rural employment generation. (FAO Home)

At the same time, irrigation alone cannot guarantee higher net farm income. Small landholdings, substantial cultivation expenditure and dependence on non-institutional credit remain major constraints. Therefore, the benefits of minor irrigation should be combined with institutional credit, improved technology, optimal water management, crop diversification and stronger market linkages.

Overall, the study shows that minor irrigation functions not simply as a water-supply mechanism but as an important component of rural livelihood infrastructure. Sustained investment in tank restoration and participatory water management can support agricultural production and contribute to employment and income generation among small and marginal farmers.

Acknowledgements: *This research paper is part of a project on “Livelihood and Entrepreneurial Development through Minor Irrigation in Telangana State: With Special Reference to Mission Kakatiya,” funded by RUSA 2.0 under Component 10. Ministry of Education, New Delhi and Kakatiya University, Warangal (No.18/RUSA/R&I/KU/2025).*

Conflict of Interest: The authors state no conflicts of interest.

References

- Food and Agriculture Organisation of the United Nations. (2003). Unlocking the water potential of agriculture. FAO.
- Government of Telangana. (2015). Mission Kakatiya: Restoration and rejuvenation of minor irrigation sources. Irrigation & CAD Department, Government of Telangana. ([Telangana Government](#))
- Government of Telangana. (2017). Socio-Economic Outlook 2017. Directorate of Economics and Statistics, Government of Telangana. ([Ecostat Telangana](#))
- Government of Telangana. (2021). Telangana Socio-Economic Outlook 2021. Government of Telangana. ([Telangana Government](#))
- Government of Telangana. (2026). Report on strengthening minor irrigation and improving water-use efficiency in Telangana. Telangana Agriculture and Farmers Welfare Commission. ([Telangana Government](#))
- International Commission on Irrigation and Drainage. (2019). Irrigation and agricultural development. ICID.
- Lal BS (2026a). Mission Kakatiya and Role of Multi-Dimensional Ecosystems in Telangana: An Empirical Study, International Journal of Science and Research, Volume 15 Issue 5, May. <https://dx.doi.org/10.21275/SR26503223038>
- Lal B Suresh, Lakavath, P., & Kampa, V. (2026b). Assessment of Mission Kakatiya Scheme on development of agricultural production, dairy, fisheries, washermen and pottery: A village-level study through Difference-in-Differences method. International Journal of Aquatic Research and Environmental Studies, 5(2), 1057–1063. ([ResearchGate](#))
- Lal BS, Lakavath, P., & Kampa, V. (2026c). Socioeconomic Development of Pottermen and Washermen Communities in Telangana through the Mission Kakatiya Scheme: An Empirical Assessment. International Journal of Science and Research (IJSR), Volume 15, Issue 9, September. DOI: <https://dx.doi.org/10.21275/SR26922103809>
- Ministry of Agriculture & Farmers Welfare. (2018). Report of the Committee on Doubling Farmers' Income: Comprehensive policy recommendations. Government of India.
- World Bank. (2007). India: Groundwater management and irrigation. World Bank.



© 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>)