

Research Article**IRRIGATION, FARMING AND RURAL LIVELIHOODS IN TELANGANA:
A STUDY OF FARMERS****Nagesh Kadam**

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Corresponding Author: Nagesh Kadam**Abstract**

Irrigation plays an important role in agricultural production and rural livelihoods, particularly in regions where farming depends heavily on rainfall and groundwater. In Telangana, differences in water availability influence cropping patterns, agricultural production, employment and household income. The formation of Telangana in 2014 brought greater policy attention to irrigation development and the utilisation of water resources from the Godavari and Krishna river systems. Against this background, the present study examines the relationship between irrigation, farming and rural livelihoods among farmers in Telangana. The study focuses on irrigation sources, irrigation conditions, cropping patterns, agricultural income, household livelihoods, institutional credit and major problems faced by farmers. Primary data were collected from 50 farmers through a structured interview schedule, supplemented by secondary information from government reports and agricultural statistics. The study adopts a descriptive and analytical approach and examines the association between irrigation availability, crop choice, agricultural income and livelihood conditions.

Keywords: Irrigation, Farming, Rural Livelihoods, Farmers, Telangana, Agricultural Income, Crop Diversification, Rural Development.

Introduction

Agriculture plays a crucial role in the rural economy of Telangana, where rural households rely on it not only for food production but also for income, employment, and livelihood security. Often, farming is combined with agricultural wage labour, livestock, dairy production, small businesses, and other non-farm activities. Thus, any changes in agricultural conditions can significantly impact the livelihoods of these rural households. Water availability is a key factor influencing agricultural production. Farmers who have access to reliable irrigation systems can generally plan their cultivation more effectively and have better opportunities to grow crops that require a consistent water supply. In contrast, those who primarily depend on rainfall face greater exposure to fluctuations in rainfall and the associated risks of crop failure and income loss. Telangana became a separate state on June 2, 2014. It is closely linked with the Godavari and Krishna rivers the Telangana the Telangana farmers failed in access those water due to no-availability of water. Irrigation development was a critical aspect of Telangana agriculture. The state boasts various irrigation sources, such as canals, tanks, open wells, and borewells. Following the state's formation, efforts were made to enhance irrigation infrastructure and restore traditional water resources. Mission Kakatiya concentrated on the restoration and strengthening of minor irrigation tanks. Under this around 42 thousands of tanks were restored in Telangana. Additionally, several major and medium irrigation projects were initiated or expanded to improve water availability for agriculture.

However, irrigation alone does not solely determine the economic well-being of farmers. Farm income is also affected by factors such as crop selection, productivity, cultivation costs, labour expenses, agricultural prices, access to credit, technology, and market facilities. Therefore, any evaluation of irrigation must be connected to farming practices and livelihood outcomes. Rural households often employ diverse livelihood strategies. Alongside crop cultivation, agricultural labour, livestock rearing, dairy production, non-farm wage employment, and small businesses contribute to household income. Such diversification helps reduce reliance solely on agriculture. In this context, the current study explores the relationship between irrigation, farming, and rural livelihoods among selected farmers in Telangana. It focuses on irrigation conditions, cropping patterns, agricultural income, livelihood sources, institutional credit access, and the challenges faced by farmers.

Review of Literature

1. **Vakulabharanam (2004)** examined agricultural growth and irrigation in Telangana during 1970–2001. The study found that irrigation increased from 17% to 38% of net sown area, mainly through groundwater wells. Irrigation growth was strongly associated with agricultural growth, but dependence on groundwater created concerns regarding declining water levels, farmer indebtedness and livelihood sustainability.
2. **Colie (2005)** examined drought and farming conditions in Medak and other drought-prone areas of Andhra Pradesh. The study highlighted the effects of water scarcity on agriculture, farmer debt, migration, fallow land and rural livelihoods. It emphasized tank restoration, rainwater harvesting, groundwater recharge, crop diversification, efficient irrigation and community participation as important measures for drought mitigation and sustainable farming.
3. **Shah, Singh and Verma (2017)** examined the revival of minor irrigation tanks in Telangana under Mission Kakatiya. The study focused on tank restoration, irrigation availability, groundwater recharge and agricultural development. The findings highlighted the importance of minor irrigation infrastructure in improving water access, supporting crop cultivation and strengthening rural farming livelihoods.
4. **Srinivasa Chary et al. (2021)** examined the performance of restored tanks and farmers' experiences under Mission Kakatiya. The study highlighted improvements in agricultural water availability following tank restoration. It also emphasized effective management, regular maintenance and farmer participation as essential for sustaining minor irrigation systems and their benefits to rural agriculture.
5. **Peddi and Suresh Reddy (2023)** examined irrigation enhancement, crop diversification and farm profits in Telangana. The study explored the influence of irrigation and farm-level factors on crop choices and profitability. The findings established the importance of irrigation in promoting crop diversification and improving farm income, making it relevant to farming livelihoods.

Objectives of the Study

1. To examine the availability and sources of irrigation and their influence on farming practices and cropping patterns among farmers in Telangana.
2. To assess the relationship between irrigation conditions, agricultural income and rural livelihoods among the selected farmers.
3. To identify the major problems faced by farmers and suggest measures for improving irrigation, farm income and rural livelihood security.

4. Hypotheses of the Study

H₁: There is a significant association between the availability of irrigation and cropping patterns among farmers in Telangana.

H₂: There is a significant relationship between irrigation conditions and agricultural income among the selected farmers.

H₃: There is a significant association between access to institutional credit and agricultural income and rural livelihood conditions among the selected farmers.

Research Methodology

The present study adopted a descriptive and analytical research design to examine irrigation, farming and rural livelihoods in Telangana. Primary data were collected from 50 farmers (N=50) selected through purposive sampling from Bheemadevarapally and Elkathurthy Mandals of Hanumakonda District, Telangana. Both mandals are predominantly agrarian and depend on different irrigation sources, making them suitable for the study. Data were collected through a structured interview schedule covering irrigation, cropping patterns, agricultural income, and institutional credit and livelihood conditions. Secondary data were obtained from government reports and relevant literature. The collected data were analysed using frequency, percentage, cross-tabulation and Chi-square tests.

Data Analysis and Interpretation:

Table -1: Age wise distribution of the Sample

Age Group	Respondents	Percentage
20-30 Years	04	08%
31-40 Years	19	38%
41-50 Years	18	36%
51-60 Years	06	12%
60 Years and above	03	06%
TOTAL	50	100%

Source: Field data

The majority of the respondents belonged to the 31–40 years age group (38%), followed by the 41–50 years age group (36%). Respondents aged 51–60 years constituted 12%, while 20–30 years accounted for 8%. Farmers aged 60 years and above represented 6% of the sample.

Table 2: Gender-wise Distribution of Respondents

Gender	Frequency	Percentage
Male	32	64%
Female	18	36%
Total	50	100%

Source: Field data

The table shows that 32 respondents (64%) were male, while 18 respondents (36%) were female. Thus, male farmers constituted the larger proportion of the respondents, whereas female farmers accounted for more than one-third of the total sample.

Table 3: Educational Status of Respondents:

Educational Level	Frequency	Percentage
No formal education	14	28%
Primary education	11	22%
Secondary education	07	14%
Higher Education	18	36%
TOTAL	50	100%

Source: Field data

The table shows that 36% of the respondents had higher education, representing the largest group. About 28% had no formal education, while 22% had primary education and 14% had secondary education. Thus, the respondents had varied educational backgrounds, with a considerable proportion having higher education.

Table 4: Land Size

Land Size	Frequent	Percentage
Below 1 Acre	04	08%
1-2.5 Acers	27	54%
2.5 – 5 Acers	11	22%
5-10 Acers	06	12%
10 Acers and more	02	04%
TOTAL	50	100%

The table shows that the majority of respondents, 27 (54%), owned 1–2.5 acres of land. This was followed by 11 (22%) who owned 2.5–5 acres. About 12% owned 5–10 acres, while 8% had below 1 acre. Only 4% owned 10 acres or more, indicating that most respondents were small and marginal farmers.

Table 5: Main Source of Irrigation

Main Irrigation Source	Frequency	Percentage
Bore well/Tube well	21	42%
Open well	09	18%
Canal	04	08%
Tank	13	26%
Mainly rainfed	03	06%
Total	50	100%

Source: Field data

The table shows that bore wells/tube wells were the main source of irrigation for 21 respondents (42%). Tank irrigation was the second major source, used by 13 respondents (26%), followed by open wells at 18%. Canal irrigation accounted for 8%, while only 6% of respondents depended mainly on rainfall. The findings indicate that groundwater and tank irrigation were important sources of agricultural water among the selected farmers.

Table 6: Irrigation Condition of Respondents

Irrigation Condition	Frequency	Percentage
Fully irrigated	24	48%
Partially irrigated	23	46%
Mainly rainfed	03	06%
Total	50	100.0

Source: Field data

The table indicates that 24 respondents (48%) reported having fully irrigated agricultural land, while 23 respondents (46%) had partially irrigated land. Only 3 respondents (6%) depended mainly on rainfall. Thus, most farmers had access to irrigation, although a substantial proportion continued to experience partial irrigation conditions.

Table 7: Major Crops Cultivated by Respondents

Major Crop	Before 2014		After 2014	
	Frequency	Percentage	Frequency	Percentage
Rice	14	28%	35	70%
Cotton	29	58%	12	24%
Maize	05	10%	01	02%
Other crops	02	04%	02	04%
Total	50	100%	50	100%

Source: Field data

The table shows a clear change in the cropping pattern between the periods before and after 2014. Before 2014, cotton was the major crop, cultivated by 29 respondents (58%), followed by rice at 28%. After 2014, rice cultivation increased substantially to 35 respondents (70%), while cotton declined to 12 respondents (24%). Maize also declined from 10% to 2%. The findings indicate a significant shift from cotton-oriented cultivation towards rice cultivation among the selected farmers.

Table-8: Annual Agricultural Income of Respondents

Annual Agricultural Income	Before 2014		After 2014	
	Frequency	Percentage	Frequency	Percentage
Below ₹50,000	21	42%	06	12%
₹50,001–₹1,00,000	24	48%	19	38%
₹1,00,001–₹2,00,000	04	08%	22	44%
₹2,00,001–₹3,00,000	01	02%	02	04%

Above ₹3,00,000	-	-	01	02%
Total	50	100%	50	100%

Source: Field data

The table reveals a substantial shift in the income distribution of farmers after 2014. Before 2014, 90% of respondents earned below ₹1 lakh annually, whereas this proportion declined to 50% after 2014. At the same time, respondents earning ₹1–2 lakh increased sharply from 8% to 44%. Higher-income categories also emerged after 2014. However, only 6% earned above ₹2 lakh after 2014, indicating that although agricultural incomes improved, the gains remained concentrated within moderate income levels.

Table 9: Irrigation Condition and Annual Agricultural Income

Annual Agricultural Income (Per Acre)	Fully Irrigated	Partially Irrigated	Mainly Rainfed
Below ₹15,000	-	-	02 (04%)
₹15,001–₹25,000	-	16 (32%)	01 (02%)
₹25,001–₹50,000	02 (04%)	07 (14%)	-
₹50,000 and above	22 (44%)	-	-
Total	24 (48%)	23 (46%)	03 (06%)

Source: Field data

The table shows a clear association between irrigation conditions and annual agricultural income per acre among the 50 selected farmers. Of the total respondents, 22 (44%) reported an income of ₹50,000 and above per acre, and all of them had fully irrigated land. Among partially irrigated farmers, 16 (32%) earned ₹15,001–₹25,000, while 7 (14%) earned ₹25,001–₹50,000. None of the partially irrigated farmers reached the ₹50,000 and above category. The three mainly rainfed farmers were concentrated in the lower income groups, with 2 (4%) earning below ₹15,000 and 1 (2%) earning ₹15,001–₹25,000 per acre. These findings indicate that farmers with assured irrigation generally reported higher agricultural income per acre than those with partial or rainfed irrigation.

Table 10: Major Sources of Rural Household Livelihood

Livelihood Source	Frequency	Percentage
Crop cultivation	38	76%
Agricultural wage labour	21	42%
Livestock/Dairy	17	34%
Non-farm wage employment	14	28%
Small business	11	22%
Government/Private employment	7	14%
Other sources	5	10%

Source: Field data

The table indicates that crop cultivation is the major source of rural household livelihood, reported by 38 respondents (76%). Agricultural wage labour is the second important source, reported by 21 respondents (42%), followed by livestock and dairy activities with 17 respondents (34%). Non-farm wage employment contributes to the livelihoods of 14 respondents (28%), while 11 respondents (22%) depend on small businesses. Government or private employment is reported by 7 respondents (14%), and 5 respondents (10%) have other livelihood sources. The findings show that rural households depend mainly on agriculture, but many combine farming with additional activities to support household income. The presence of multiple livelihood sources suggests that households diversify their economic activities to reduce dependence on crop income and manage agricultural

risks. Since the percentages exceed 100%, the table indicates that respondents could report more than one livelihood source.

Major Findings

1. The age distribution indicates that farming is predominantly undertaken by middle-aged respondents. About 38% of the farmers belonged to the 31–40 years age group and 36% belonged to the 41–50 years group. Together, these groups accounted for 74% of the sample.
2. The gender distribution shows that 64% of the respondents were male and 36% were female. This indicates that men formed the majority of the selected farmers, while women also had a substantial presence in farming activities.
3. The educational background of the respondents was diverse. Higher-educated farmers constituted the largest group at 36%, while 28% had no formal education. Primary and secondary education accounted for 22% and 14%, respectively.
4. The landholding pattern shows that small holdings were dominant. About 54% of respondents owned 1–2.5 acres, while 22% owned 2.5–5 acres. Overall, 84% owned less than 5 acres, indicating the predominance of small and marginal farmers.
5. Bore wells/tube wells were the major irrigation source, reported by 42% of respondents, followed by tanks at 26% and open wells at 18%. Canal irrigation accounted for only 8%, while 6% were mainly dependent on rainfall. This demonstrates the importance of groundwater and tank irrigation in the study area.
6. The irrigation condition indicates that 48% of farmers had fully irrigated land and 46% had partially irrigated land. Only 6% were mainly rainfed. Thus, although irrigation access was widespread, nearly half of the respondents continued to experience partial irrigation.
7. A substantial change in cropping pattern was observed between the periods before and after 2014. Before 2014, cotton was the major crop for 58% of respondents, while rice accounted for 28%. After 2014, rice became the dominant crop at 70%, whereas cotton declined to 24%.
8. Agricultural income also showed a shift towards higher income categories after 2014. Before 2014, 90% of respondents earned below ₹1 lakh annually. After 2014, this proportion declined to 50%, while the proportion earning ₹1–2 lakh increased from 8% to 44%.
9. The irrigation-income relationship shows a clear descriptive association. Among the total respondents, 44% earned ₹50,000 or more per acre, and all of these farmers had fully irrigated land. Partially irrigated farmers were concentrated mainly in the ₹15,001–₹25,000 income category.
10. The mainly rainfed farmers reported the lowest income levels, with two respondents earning below ₹15,000 per acre and one earning ₹15,001–₹25,000. This indicates greater income vulnerability among farmers without assured irrigation.
11. Crop cultivation was the principal livelihood source, reported by 76% of households. However, 42% also depended on agricultural wage labour and 34% on livestock/dairy activities. Non-farm employment, small business and government/private employment also contributed to household livelihoods.
12. The livelihood findings demonstrate that rural households generally follow multiple livelihood strategies rather than depending exclusively on farming. Such diversification can help households manage fluctuations in agricultural income and risks associated with rainfall, irrigation shortages and changing agricultural markets.

Discussion

The findings of the study show that irrigation has an important relationship with farming practices, agricultural income and rural livelihoods among the selected farmers of Bheemadevarapally and Elkathurthy Mandals of Hanumakonda District, Telangana. Most respondents were small farmers, with 84% owning less than five acres. Therefore, reliable irrigation is particularly important because small farmers have limited land and fewer opportunities to absorb agricultural losses. Bore wells/tube wells were the major source of irrigation for 42% of respondents, followed by tanks (26%) and open wells (18%). This indicates the continuing

importance of groundwater and minor irrigation resources. The finding is consistent with Vakulabharanam (2004), who observed the increasing importance of well irrigation in Telangana, while also highlighting concerns regarding groundwater depletion and sustainability. In the present study, although 48% of farmers had fully irrigated land, 46% had only partial irrigation, showing that irrigation access does not always mean assured water availability.

A major change was observed in cropping patterns after 2014. Cotton was the major crop before 2014, cultivated by 58% of respondents, whereas rice became dominant after 2014, increasing to 70%. Improved irrigation may have contributed to this shift, although crop prices, procurement, input costs, government programmes and market conditions may also have influenced farmers' decisions. Agricultural income also shifted towards higher income categories after 2014. Farmers earning below ₹1 lakh declined from 90% to 50%, while those earning ₹1–2 lakh increased from 8% to 44%. Table 9 further shows that all farmers earning ₹50,000 or more per acre had fully irrigated land. This provides descriptive evidence of an association between irrigation and agricultural income. The livelihood findings show that crop cultivation remained the main livelihood source (76%), followed by agricultural wage labour (42%) and livestock/dairy (34%). Thus, households combine farming with other activities to manage income and agricultural risks.

Policy Implications

The findings of the study have several important policy implications for improving agriculture and rural livelihoods in Telangana.

1. **Improvement of Irrigation Reliability:** Since a substantial proportion of farmers depend on partial irrigation, greater attention should be given to providing reliable and timely irrigation water. Existing irrigation systems should be properly maintained, and water distribution should be improved, particularly for small and marginal farmers.
2. **Strengthening Tank Irrigation:** Tanks are an important source of irrigation for the selected farmers. Regular desilting, repair of bunds, restoration of feeder channels and proper maintenance of tanks can improve water storage and agricultural use. Greater participation of local farming communities in tank management can also support long-term sustainability.
3. **Sustainable Groundwater Management:** Borewells and tube wells are important irrigation sources, but excessive dependence on groundwater can create long-term risks. Groundwater recharge structures, rainwater harvesting, farm ponds and community-based groundwater management should be promoted. Farmers should also be encouraged to adopt water-saving irrigation practices.
4. **Promotion of Efficient Irrigation Technologies:** Drip and sprinkler irrigation, where technically and economically suitable, can reduce water wastage and improve water-use efficiency. Government support through subsidies, technical guidance and easy access to irrigation equipment can encourage adoption among small farmers.
5. **Support for Crop Diversification:** The study indicates a considerable change in cropping patterns, particularly an increase in rice cultivation after 2014. Agricultural policies should encourage farmers to consider crop diversification according to water availability, soil conditions, market demand and profitability. Suitable pulses, oilseeds, vegetables and other less water-intensive crops can help reduce excessive dependence on a single crop.
6. **Improvement of Farm Income:** Irrigation development should be accompanied by measures that improve farm income. Access to quality seeds, fertilizers, agricultural extension services, mechanisation, storage facilities, market information and remunerative prices should be strengthened. Better access to local and organised markets can help farmers reduce marketing difficulties.
7. **Strengthening Institutional Credit:** Easy and timely institutional credit is important for farmers, particularly those with small landholdings. Banks and cooperative institutions should improve the accessibility of agricultural loans and reduce procedural difficulties. Credit facilities should also support irrigation equipment, livestock and other productive livelihood activities.
8. **Promotion of Livelihood Diversification:** The findings show that rural households depend not only on crop cultivation but also on agricultural wage labour, livestock, non-farm

employment and small businesses. Policies should therefore support livestock development, dairy activities, skill development, rural enterprises and non-farm employment opportunities to strengthen household livelihood security.

9. **Strengthening Agricultural Extension Services:** Farmers need regular information on water management, crop selection, climate-resilient farming, pest management, input use and market opportunities. Village-level extension services and farmer training programmes should be strengthened, with special attention to small and marginal farmers.
10. **Greater Attention to Women Farmers:** Women constitute a considerable proportion of the respondents and are involved in agricultural and livelihood activities. Agricultural programmes should ensure that women farmers have access to training, institutional credit, technology, extension services and livelihood-support programmes.
11. **Integrated Rural Development Approach:** Irrigation development should not be treated as an isolated agricultural intervention. Irrigation, credit, markets, extension, livestock, employment and rural infrastructure should be implemented in an integrated manner. Such an approach can improve both agricultural productivity and the overall livelihood security of rural households.
12. **Local-Level Planning and Monitoring:** Irrigation and agricultural programmes should be planned according to local water availability, cropping conditions and farmers' needs. Regular monitoring at mandal and village levels can help identify gaps in irrigation coverage and ensure that benefits reach small and marginal farmers.

Conclusion

Irrigation plays an important role in shaping farming practices, agricultural income and rural livelihood conditions among farmers in Telangana. The findings from 50 selected farmers in Bheemadevarapally and Elkathurthy Mandals show that borewells, tanks and open wells are important sources of irrigation. Although 48 percent of farmers reported full irrigation, 46 percent depended on partial irrigation, indicating continuing limitations in water availability. A considerable change in cropping patterns was observed after 2014, with rice becoming more prominent and cotton declining. Agricultural income also shifted towards higher income categories among the selected farmers. However, rural households continue to depend on multiple livelihood sources, including agricultural wage labour, livestock and non-farm employment. Sustainable irrigation development, groundwater management, tank restoration, crop diversification, institutional credit and livelihood opportunities are therefore important for improving farm income and strengthening rural livelihood security in Telangana.

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Citation: Nagesh Kadam 2025. "IRRIGATION, FARMING AND RURAL LIVELIHOODS IN TELANGANA: A STUDY OF FARMERS". *International Journal of Academic Research*, 12(2): 150-158.

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