

punjab geographer



A DOUBLE BLIND PEER REVIEWED JOURNAL OF APG AND KSS-ISPER INDIA

VOLUME 22

ISSN: 0973-3485

OCTOBER 2026



IMPACT OF ASSETS CREATED UNDER MAHATMA GANDHI NATIONAL RURAL EMPLOYMENT GUARANTEE ACT ON TRANSFORMATION OF AGRICULTURE AND ITS SUSTAINABILITY IN TRANS-GIRI REGION OF HIMACHAL PRADESH, INDIA

Puran Chand
B.R. Thakur

Abstract

This study examines the impacts of assets created under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) on promotion and sustainability of agriculture. It includes assets such as irrigation tanks, kuhls, land development, cattle sheds and vermicomposting pits created under MGNREGA. The study is based on primary data collected through field visits to 431 randomly selected households from 15 panchayats which have been benefitted from 311 MGNREGA assets. The study has adopted before-and-after approach to understand the impact of assets on agricultural outputs, including benefit-cost ratio, increase in area and production of crops in rainfed areas. The findings reveal that the creation of irrigation and land development assets has helped to increase area under agriculture and crop production. Similarly, cattle shed asset has ensured animal protection, and, creation of vermicomposting pits have enabled the production of organic fertiliser. However, the sustainability of asset remains a concern, as 34 per cent of the total sampled non-functional assets could provide service only for less than three years.

Keywords: MGNREGA, Agriculture, Sustainability, Irrigation asset, Trans-Giri region.

Introduction

Key feature of Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is the legal provision of a right-based 100 days of employment per household annually for volunteer wage seekers. Beyond wage employment, MGNREGA also facilitates the creation of durable assets through decentralised and participatory planning. MGNREGA helps agriculture's economic and ecological underpinnings, especially in areas that rely on rain and have not many resources. Water resource management is one of the most

important schemes under MGNREGA that has helped agricultural development (NITI Aayog, 2020). Many of the projects undertaken in this program, like check dams, ponds, percolation tanks, and irrigation tanks, are created for saving water and collecting it. Similarly, projects like land levelling, bunding, terracing, and trenching can help in reducing soil erosion and make soil more fertile (Esteves et al., 2013). Another important objective of this Act is the creation of productive village assets. Community assets such as canal system, kuhl and community water harvesting tank, roads

etc. are constructed for the benefit of entire villages on common land. While individual assets created on personal land, include personal tanks, cattle sheds etc.

Various studies like Godfrey-Wood and Flower (2018) and Fischer (2020) have reported that these durable assets support livelihood sustainability, protect productive systems and boost agricultural yields, contributing to community resilience. By using a mixed-method approach (including before and after), Aggarwal et al. (2012), have revealed that functional wells considerably improved irrigation reliability, allowed for crop diversity, and, raised farm incomes in Jharkhand. But many of the wells are incomplete or underutilised due to poor site selection, technical challenges, and lack of upkeep. Similarly, Esteves et al. (2013) have assessed agricultural and livelihood vulnerability reduction through MGNREGA assets using household surveys and biophysical assessments in Rajasthan, Madhya Pradesh, Karnataka, and Andhra Pradesh. Results have revealed that MGNREGA assets improve soil moisture, groundwater recharge, and crop yield and reduce sensitivity to climate variability; however, results are sensitive to local ecological and institutional factors. Likewise, Pankaj and Bhattacharya (2022) have highlighted the role of individual irrigation assets like wells, bore wells, land development, livestock, and fisheries in the promotion of income and agriculture in districts selected on diverse agro-climatic conditions of Rajasthan, Uttar Pradesh, and Tamil Nadu.

Livelihood analysis provides useful information about the relationship between a household's resource base, assets and access to resources, reflecting overall welfare outcomes

(Lemos et al., 2016). Poverty alleviation programs aim to protect and enhance the assets of the poor, who rely on natural resources and are more vulnerable to climate fluctuations. Asset-building approaches increase their adaptive capacity, leading to better welfare outcomes. In the light of above, this study has been undertaken to assess the role of agricultural assets created under MGNREGA in terms of enhancement of agricultural productivity and providing livelihood to the households in Trans-Giri region of Himachal Pradesh.

Objectives of Study

Major objectives of the study are:

- to assess the economic returns generated by the assets and their impact on agriculture and livelihood promotion, and
- to examine the temporal functionality of the assets and their sustainability in the Trans-Giri region of Himachal Pradesh.

Study Area

The Trans-Giri region forms the northern half of Sirmaur district in Himachal Pradesh, situated in the Shiwalik Range of Himalayas. It includes five MGNREGA blocks: Rajgarh, Sangrah, Shillai, Tilordhar and Paonta Sahib (partially, with only 30 villages). Geographically, it spreads between 30° 30' N and 30° 59' N latitudes and 77° 14' E and 77° 47' E longitudes (Fig. 1). Covering an area of 1,309 km², it has a population of 2,51,657 persons which spread across 153 panchayats. Himachal Pradesh, along with Sirmaur, district, has not significantly benefited from the 'Green Revolution'. Factors such as physical isolation, high transportation costs,

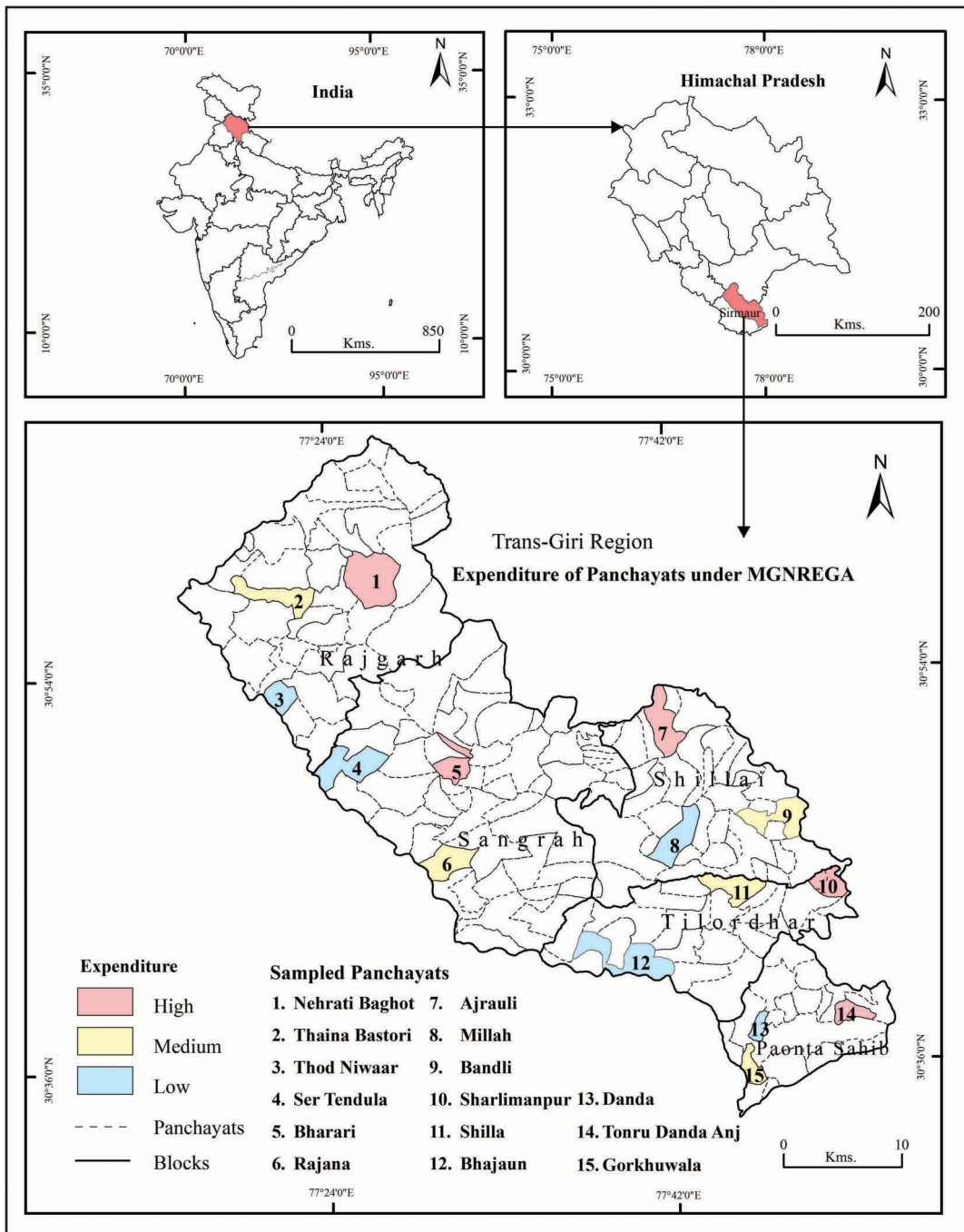


Fig. 1

small landholdings, and stony soils hinder agricultural development (Sharma, 2011).

Database and Methodology

This study is based on primary data collected from 431 households (about 9 per cent of the total) across 41 villages of five MGNREGA blocks. Primary data have been collected through field survey conducted by using interview schedules at the household level. Based on total expenditure since the inception of the MGNREGA scheme from 2006 to 2022, 15 out of 153 panchayats have been randomly selected for the field survey (Table 1; Fig. 1). The criteria for selecting 10 per cent sample of households could not be achieved in Gorkhuwala panchayat due to the lesser number of individual assets found at the time of the field survey. Assets have been selected from MGNREGA MIS (Management Information System) data, including agriculture and livestock, land development, irrigation, cattle sheds, vermicomposting pits, water conservation and harvesting and rural infrastructure. Among sampled assets, a share of 80 per cent has been selected purposively from agricultural assets and 20 per cent from other rural infrastructural assets. On-site visits to assets have been made possible with the help of panchayat officials. All assets have been physically verified on-site, photographed, and recorded as having functional status.

The study employed an indicator-based 'before and after' approach to capture the impacts of the asset on the improvement of agriculture and livelihood. To estimate the returns from assets, cultivation costs and benefits, the 'usual value method' (Aggarwal et al., 2012) has been used, considering the period from 2006 to 2022. Beneficiaries have been asked to estimate the total cost and production

from farms in a 'normal year' before and after asset completion. For kühls, 'after' refers to when the kuhl has been built or concreted under MGNREGA. For non-operational assets, previous cultivation costs and benefits have been used, while for operational assets, current costs and benefits have been recorded. The difference between costs and earnings has been termed as profit. The value of production has been converted to monetary terms by taking current market prices, and the benefit-cost ratio has been calculated. The benefit-cost ratio has been calculated to measure the impact of assets on the total farm output. The results have been analysed at the household level and averaged at the panchayat level.

Results and Discussion

Average Farm Cultivation Cost and Returns from Irrigation Assets

The study reveals that the agricultural assets created under MGNREGA, in the Trans-Giri region, has transformed the agriculture. The provision of irrigation has resulted in or led to an increase in farm cultivation cost and as well as returns. The results show that for community tanks, the cultivation cost per hectare has increased from 264.46 thousand rupees in 2008 to 659.42 thousand rupees in 2022, whereas, for individual tanks, it has increased from 88.26 thousand rupees in 2008 to 264.05 thousand rupees in 2022 (Table 2). Similarly, for kühls, the cultivation cost has increased from 104.84 thousand rupees in 2008 to 199.68 thousand rupees in 2022. In the case of kühls, the smaller cost increase has been due to their pre-existing irrigation system.

Thus, post-asset creation has substantially enhanced the investment in agricultural activities. Apart from the investment on irrigation assets, the households have to

Table 1
Trans-Giri Region: Sample Panchayats Selection Criteria and other Characteristics

Blocks	Agro-ecological Zone	Total Panchayats in Each Block	Panchayats Selected by Expenditure Incurred from Each Block		Panchayats Surveyed	Total Census Villages in Each Panchayat	Total Households in 2011 Census	Households Surveyed
			Order	Expenditure (Rs. Millions)				
Rajgarh	Humid /per humid, Lesser Himalaya and Warm, humid Shiwalik	33	Highest	36.90	Thod Niwaar	2	203	20
			Medium	23.76	Nehrati Baghot	5	259	26
			Lowest	14.68	Thaina Bastori	4	242	24
Sangrah	Warm, humid Shiwalik	44	Highest	54.55	Ser Tendula	7	322	32
			Medium	21.84	Bharari	2	297	30
			Lowest	8.37	Rajana	3	297	30
Shillai	Warm, humid Shiwalik	35	Highest	69.62	Millah	1	277	28
			Medium	38.58	Ajrauli	3	280	28
			Lowest	20.89	Bandli	3	340	34
Tilordhar	Warm, humid Shiwalik	23	Highest	41.68	Bhajaun	4	281	28
			Medium	18.94	Sharli Manpur	1	305	31
			Lowest	14.34	Shilla	2	248	25
Paonta	Warm, humid Shiwalik	18	Highest	60.02	Danda	1	353	35
			Medium	24.95	Toru Danda Anj	2	230	23
			Lowest	2.83	Gorkhuwala	1	919	37
Study Area		153	Total	452.06	15	41	4853	431

Source: Compiled by Authors.

Table 2
Trans-Giri Region: Average per Hectare Cultivation Cost and Farm Returns in 2008 and after adoption of MGNREGA Supported Irrigation Assets, in 2022

Panchayats	Type of Ownership	Asset and	Total Assets	Cultivation Cost in 2008 (Rs. 000) (a)	Cultivation Cost in 2022 (Rs. 000) (b)	Production in 2008 (Rs. 000) (c)	Production in 2022 (Rs. 000) (d)	Profit in 2008 (Rs. 000) (c-a)	Profit in 2022 (Rs. 000) (d-b)	Benefit-cost Ratio	
										2008 (c/a)	2022 (d/b)
Thod Niwaar	Tank	Community Individual	5	20.59	53.29	53.36	208.23	32.77	154.93	1:3	1:4
			3	9.57	57.75	33.66	273.90	24.09	216.15	1:4	1:5
Thaina Bastori	Kuhl	Community	1	16.33	25.24	57.91	96.52	41.58	71.28	1:4	1:4
			7	21.05	52.32	79.21	316.10	79.21	263.78	1:5	1:6
Nehrati Baghot	Kuhl	Community	1	7.92	28.46	29.95	112.61	22.03	84.18	1:4	1:4
			2	32.49	70.65	110.52	352.79	78.03	282.15	1:3	1:5
Bharari	Tank	Community Individual	1	23.76	59.40	100.98	285.12	77.22	225.72	1:4	1:5
			8	11.61	44.45	42.18	254.82	30.57	210.37	1:4	1:6
Rajana	Tank	Community	3	37.77	79.69	128.70	404.90	90.93	325.21	1:3	1:5
			3	36.53	69.30	119.13	272.58	82.60	203.28	1:3	1:4
Ser Tendula	Tank	Community	9	20.15	73.42	86.92	406.84	66.77	266.98	1:4	1:6
			3	25.02	45.02	76.12	160.05	51.10	115.04	1:3	1:4
Ajraul	Tank	Community Individual	4	25.99	67.57	74.99	317.78	49.00	250.22	1:3	1:5
			3	12.65	29.70	33.75	99.68	21.10	69.98	1:3	1:3
Bandli	Tank	Community Individual	6	19.47	56.43	66.66	274.56	47.19	218.13	1:3	1:5
			2	13.89	48.84	48.51	302.28	34.62	253.44	1:3	1:6
Millah	Tank	Community Individual	4	9.48	22.91	34.37	165.12	24.89	132.30	1:4	1:7
			4	14.71	53.95	43.71	236.18	29.01	182.23	1:3	1:4
Shilla	Kuhl	Community	2	13.56	42.57	47.02	233.14	33.46	190.57	1:3	1:5
			6	7.41	12.79	20.14	41.79	12.73	29.00	1:3	1:3
Bhajaun	Tank	Community	1	12.62	25.99	32.67	87.61	20.05	61.63	1:3	1:3
			8	13.18	28.85	52.80	141.74	39.63	112.88	1:4	1:5
Sharli Manpur	Kuhl	Community	6	13.36	32.01	31.68	98.34	18.31	66.33	1:2	1:3
			1	10.48	17.41	41.83	83.74	31.35	66.33	1:4	1:5
Tonru Danda Anj	Tank	Community	8	20.74	34.44	71.41	134.89	50.66	100.45	1:3	1:4
			3	5.28	7.39	16.07	23.89	10.80	16.50	1:3	1:3
Danda	Kuhl	Community	2	26.37	37.03	80.78	124.74	54.50	87.71	1:3	1:3
			3	28.71	153.45	33.00	260.70	23.43	209.55	1:3	1:6
Gorkhuwala	Tank	Community SC	15	18.83	51.98	62.69	208.24	43.86	208.26	1:3	1:5
			20	22.78	60.05	86.57	311.06	63.79	251.01	1:4	1:5
Social Groups	Tank/Kuhl Community	General SC	68	15.31	36.83	51.89	159.19	36.59	122.36	1:4	1:4
			74	264.46	659.42	902.15	3158.63	635.42	2432.75	1:3	1:5
Study Area	Kuhl	Community Individual	18	88.26	264.05	310.65	1316.46	222.39	1042.51	1:4	1:5
			14	104.84	199.68	337.50	825.69	232.75	626.01	1:3	1:4
Total			106	457.71	1123.16	1550.30	5300.79	1090.56	4101.27	1:3	1:5

Source: Compiled by Authors.

purchase new seeds/saplings of tomatoes, garlic, etc., and, chemical fertilisers and pesticides. Thus, the improved irrigation facilities have significantly boosted cultivation costs. However, the introduction of improved irrigation method has transformed the agriculture from cultivation of subsistence crops to cash crops. Thus, the households at present can grow higher-value crops due to longer irrigation access, which correlates with increases in farm returns.

The study reveals that for community tanks, the average per hectare value of production has increased from 902.15 thousand rupees in 2008 to 3158.63 thousand rupees in 2022, while for individual tanks, it has increased from 310.65 thousand rupees in 2008 to 1,316.46 thousand rupees in 2022. For kuhls, the average per hectare value of production has increased from 337.50 thousand rupees in 2008 to 825.69 thousand rupees in 2022. Thus, the irrigation facilities have significantly boosted the production by enabling the farmers to produce higher value crop. On account of profits, in case of community tanks it has been found that profit has increased from 635.42 thousand rupees in 2008 to 2432.75 thousand rupees in 2022. For individual tanks, the profit has increased from 222.39 thousand rupees in 2008 to 1042.51 thousand rupees in 2022 (Table 2). Similarly, for kuhls, the profit has increased from 232.75 thousand rupees in 2008 to 626.01 thousand rupees in 2022.

The study further reveals that the benefit-cost ratio improved markedly after construction of irrigation assets. Overall, for community tanks, it has increased from 1:3 in 2008 to 1:5 in 2022, and for individual tanks, it increased from 1:4 in 2008 to 1:5 in 2022. Spatially, in case of community tanks, the

panchayats located in northern part of the study area have exhibited medium to low benefit-cost ratio whereas, the panchayats located in south-eastern part have shown very contrasting pattern of high and no change in benefit-cost ratio (Fig. 2). At the panchayat level, Millah panchayat has reported the highest benefit-cost ratio change from 1:4 in 2008 to 1:7 in 2022 in case of individual tanks due to greater engagement in cash-based farming (especially off-season vegetables) and better water utilisation. Whereas, Nehrati Baghot panchayat has reported the lowest benefit-cost ratio change from 1:4 in 2008 to 1:5 in 2022 change after the construction of community tanks due to an inadequate source of water and the hilltop location of tanks.

Change in Total Area under Cultivation and Total Production, 2008-2022

The MGNREGA policy goal is to bring the fallow land under cultivation and increase productivity of land. Beneficiaries have reported that land development have revived fallow land and increased area under cultivation. Overall, there has been an increase of 20 hectares in the total area brought under cultivation from 2008 to 2022 after the construction of individual land development assets (Table 3). The largest change in total area under cultivation has been observed in the Sharli Manpur panchayat in 2022 with an increase of 2.34 hectares. While no change in area under cultivation has been reported from the Gorkhuwala panchayat from 2008 to 2022, as no land development works have been undertaken due to the almost plain land of the panchayat. Spatial pattern of change in total area after introduction of MGNREGA assets reveals that panchayats located in northern part of Trans-Giri region have shown medium to

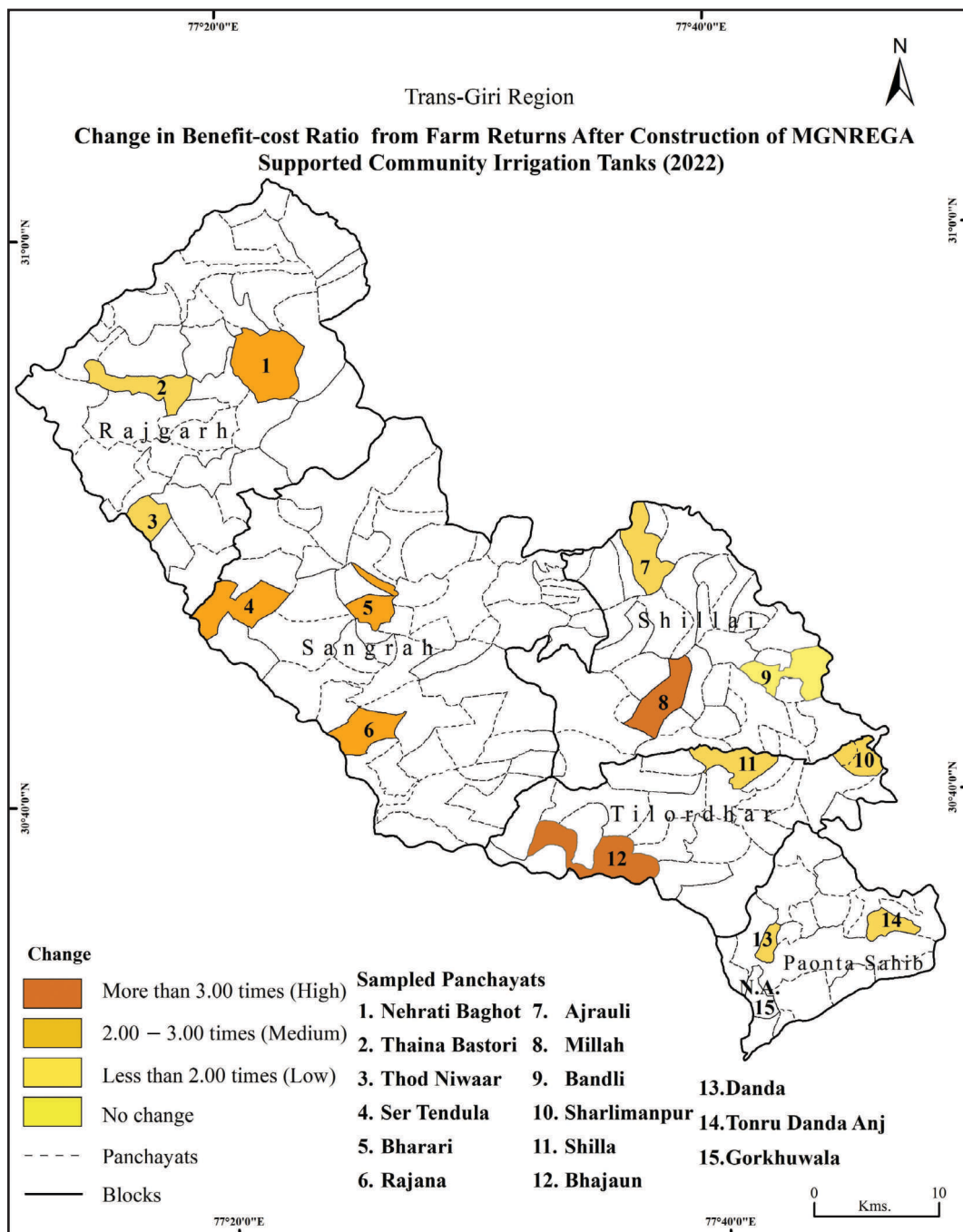


Fig. 2

Table 3
Trans-Giri Region: Change in Total Area Under Cultivation and Total Production before 2008 and after Adoption of MGNREGA Supported Individual Land Development Assets in 2022

Panchayats	Total Area (ha)		Change in Area (ha)	Total Production (Metric Tonnes)		Change in Production (Metric Tonnes)
	2008	2022		2008	2022	
Rajana	2.16	3.91	1.75	8.84	14.85	6.00
Ser Tendula	2.82	3.98	1.16	11.94	19.45	7.51
Bharari	1.78	3.17	1.39	9.26	13.91	4.65
Thod Niwaar	1.42	2.20	0.78	5.40	10.03	4.63
Thaina Basotri	3.07	3.92	0.85	7.78	15.35	7.57
Nehrati Bhagot	3.14	4.67	1.53	15.08	33.88	18.79
Ajrauli	2.21	3.95	1.74	7.07	11.57	4.50
Bandli	1.94	3.12	1.18	6.45	11.92	5.47
Millah	2.76	4.57	1.81	8.18	15.06	6.88
Shilla	2.64	3.45	0.81	9.68	13.79	4.11
Bhajaun	2.13	4.07	1.94	9.76	16.07	6.31
Sharli Manpur	2.75	5.09	2.34	9.34	21.94	12.60
Toru Danda Anj	1.29	2.39	1.10	5.68	8.24	2.56
Danda	1.50	2.66	1.16	8.57	12.58	4.01
Gorkhuwala	0.00	0.00	0.00	0.00	0.00	0.00
Total	31.61	51.15	19.54	123.04	218.65	95.61

Source: Compiled by Authors.

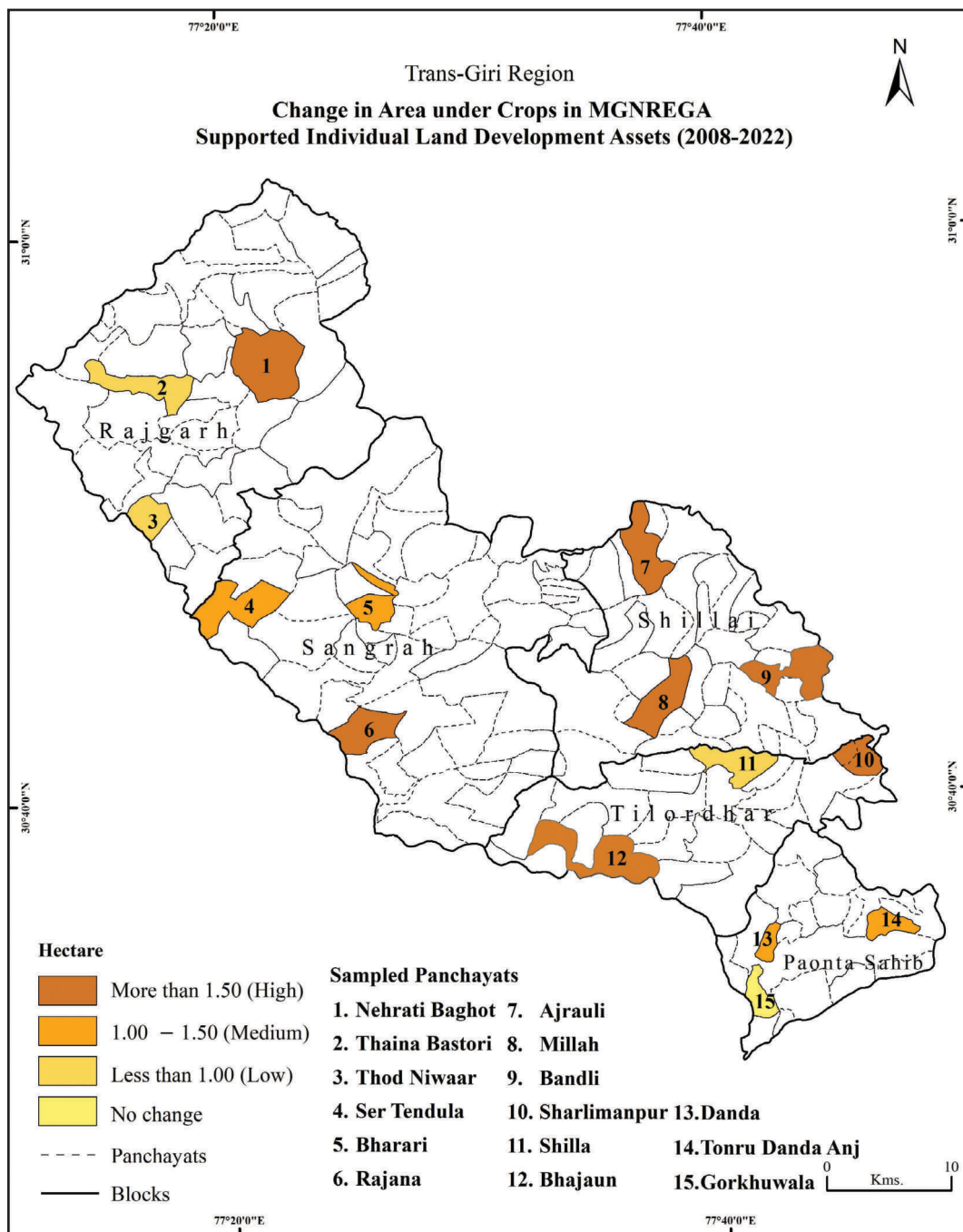


Fig. 3

low increase in total area under cultivation whereas, the panchayats in south-eastern part have shown contrasting pattern of no change to highest change in area under cultivation (Fig. 3).

Result shows that after the construction of land development assets, total production of crops in the region has increased by 95.61 metric tonnes, from 123.04 metric tonnes in 2008 to 218.65 metric tonnes in 2022. At panchayat level, Nehrati Baghot panchayat has reported the highest increase in total production, followed by Sharli Manpur panchayat. Overall, 11 panchayats have reported changes in production ranging between 4 to 7 metric tonnes. However, production did not increase proportionately with the change in area due to the reliance on rain-dependent farming.

Change in Area under Major Crops (2008-2022)

The study reveals that among the major crops, area under wheat has been reported to be 7.51 hectares before the construction of the individual land development asset in 2008 this figure has increased to 12.74 hectares after the construction of individual land development assets in 2022 (Table 4). In the case of maize crop, the total area under cultivation has increased from 7.10 hectares in 2008 to 11.56 hectares in 2022.

Due to environmentally suitable conditions, ginger is traditionally grown in Sirmaur district and known for its production in Himachal Pradesh. Before the land development under MGNREGA, the total area under ginger has been 4.78 hectares, which has increased to 7.39 hectares after the construction of individual land development assets in 2022 (Table 4). The total area under cultivation of tomatoes before the land development assets has been 3.23 hectares in 2008. The area under

this crop has increased to 5.86 hectares after the construction of land development assets in 2022. In other crops like garlic, peas, cabbage, beans, etc., the total area under cultivation has been 8.99 hectares in 2008. After the land development work in 2022, the area under these crops increased to 13.60 hectares. The highest increase has been reported in the Thaina Bastori panchayat, followed by Nehrati Baghot panchayat due to the dominance of commercialised crops and their nearness to the market.

Change in Production (2008-2022)

The production of wheat has increased from 16.54 metric tonnes in 2008 to 28.51 metric tonnes after the construction of the individual land development assets in 2022 (Table 5). While in case of maize, before the construction of the land development asset, total production has been reported to be 17.50 metric tonnes; which increased to 29.38 metric tonnes in 2022 after the construction of the land development assets.

The total production of ginger has increased from 24.75 metric tonnes in 2008 to 38.98 metric tonnes in 2022. The production of tomatoes has increased from 25.55 metric tonnes in 2008 to 57.87 metric tonnes in 2022. The production of other crops like peas, garlic and seasonal vegetables has increased from 19.27 metric tonnes in 2008 to 63.90 metric tonnes in 2022. It has happened due to the addition of more area under cultivation.

Impact of the Construction of Cattle Sheds and Vermicomposting Pits

Construction of cattle sheds and vermicomposting pits has been considered as integrated livelihood assets to enhance livestock production and sustainable agricul-

Table 4
Trans-Giri Region: Area Under Major Crops before 2008 and after Adoption of MGNREGA Supported Individual Land Development Assets in 2022

Panchayats	Area Under Major Crops (ha)									
	Wheat		Maize		Ginger		Tomato		Other Crops	
	2008	2022	2008	2022	2008	2022	2008	2022	2008	2022
Rajana	0.68	1.34	0.66	1.34	0.21	0.35	0.13	0.17	0.48	0.71
Ser Tendula	0.61	1.47	0.87	1.11	0.29	0.55	0.15	0.29	0.37	0.56
Bharari	0.33	1.01	0.53	0.80	0.38	0.52	0.14	0.18	0.40	0.66
Thod Niwaar	0.51	0.42	0.20	0.42	0.25	0.40	0.10	0.29	0.36	0.67
Thaina Basotri	1.44	0.38	0.29	0.34	0.35	0.59	0.17	0.51	0.82	2.10
Nehrati Bhagot	0.43	0.51	0.24	0.34	0.52	0.80	0.53	1.04	1.42	1.98
Ajrauli	0.28	1.14	0.78	0.96	0.17	0.19	0.17	0.29	0.81	1.37
Bandli	0.35	0.87	0.76	0.85	0.25	0.48	0.17	0.31	0.41	0.61
Millah	0.73	0.93	0.35	0.93	0.44	0.72	0.19	0.48	1.05	1.51
Shilla	0.18	0.46	0.34	0.46	0.73	0.97	0.85	0.97	0.54	0.59
Bhajaun	0.59	1.35	0.67	1.18	0.21	0.42	0.18	0.29	0.48	0.83
Sharli Manpur	1.05	1.52	0.51	1.57	0.67	0.93	0.14	0.51	0.38	0.56
Toru Danda Anj	0.08	0.65	0.56	0.65	0.10	0.20	0.12	0.19	0.43	0.70
Danda	0.25	0.69	0.34	0.61	0.21	0.27	0.19	0.34	0.51	0.75
Gorkhuwala	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	7.51	12.74	7.10	11.56	4.78	7.39	3.23	5.86	8.99	13.60

Source: Compiled by Authors.

Table 5
Trans-Giri Region: Production of Major Crops before 2008 and after Adoption of MGNREGA Supported Individual Land Development Assets in 2022

Panchayats	Production of Major Crops (Metric Tonnes)									
	Wheat		Maize		Ginger		Tomato		Other Crops	
	2008	2022	2008	2022	2008	2022	2008	2022	2008	2022
Rajana	1.37	2.45	1.58	2.95	1.40	2.75	1.90	2.30	2.59	4.40
Ser Tendula	2.43	3.70	2.53	3.20	2.08	2.90	3.60	7.20	1.30	2.45
Bharari	1.53	2.16	1.33	2.10	1.40	2.75	2.10	2.70	2.90	4.20
Thod Niwaar	0.85	1.23	0.95	1.75	1.30	1.87	7.50	2.00	1.55	3.18
Thaina Basotri	0.80	1.40	0.85	1.60	1.61	2.85	1.05	4.20	3.47	5.30
Nehrati Bhagot	0.55	1.03	0.95	1.63	2.45	3.85	4.80	16.42	6.33	10.95
Ajrauli	1.10	1.44	1.05	1.40	1.17	1.55	0.80	1.35	2.95	5.83
Bandli	1.15	1.80	1.45	2.22	0.68	1.05	1.00	3.10	2.17	3.75
Millah	1.00	1.86	1.03	2.05	0.75	1.60	1.20	2.75	4.20	6.80
Shilla	1.25	1.75	1.60	2.10	3.33	4.89	2.10	2.75	1.40	2.30
Bhajaun	1.80	3.55	1.80	3.25	1.30	2.05	1.95	2.60	2.91	4.62
Sharli Manpur	0.96	3.12	1.08	3.20	3.25	4.75	1.50	6.80	2.55	4.07
Toru Danda Anj	0.85	1.37	0.60	0.83	0.78	1.37	1.20	1.80	2.25	2.87
Danda	0.90	1.65	0.70	1.10	3.25	4.75	1.60	1.90	2.12	3.18
Gorkhuwala	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	16.54	28.51	17.50	29.38	24.75	38.98	25.55	57.87	19.27	63.90

Source: Compiled by Authors.

ture. The construction of individual cattle shed assets has positively impacted the animal husbandry livelihood of beneficiaries. However, the field observations have revealed that due to decreasing use of animals for cultivation of land, i.e., ploughing etc. the total number of cattle for agricultural use has slightly declined from 179 in 2008 to 151 in 2022 (Table 6). Besides, the growing use of small tiller machines for ploughing has shifted farmers' focus towards keeping only economically viable cattle.

The construction of new cattle sheds under MGNREGA has led to an increase in the number of productive animals, particularly high yielding dairy breeds like Jersey cows and Murrah buffaloes. These breeds offer more milk production as compared to local breeds. Previously (before 2018), cattle sheds made from locally available materials such as thatch, stone, mud, and wood have been vulnerable to extreme weather, fires, and wild animal attacks. The new cattle sheds, built with tin roofs and iron rods, are more durable, spacious and resilient. Now farmers, with the ensured safety of animals, have focused on increasing other inputs like feeding demands of animals, animal health, hygiene, and care for enhanced milk production. As a result, monthly milk production has increased from 1,485 litres in 2018 to 3,120 litres in 2022 (Table 6), and annual income from the sale of meat animals (goat and sheep) has increased from 418.00 thousand rupees in 2018 to 690.00 thousand rupees in 2022. The other benefit of cattle sheds is the increased safety of domesticated animals, as loss of animal life in attacks by wild carnivores has decreased from 15 incidents in 2018 to none in 2022. This is a common issue for the households where cattle sheds are located away from the human settlements.

Vermicomposting pits have also proved beneficial by producing fine-quality organic fertiliser as compared with cattle dung. Total organic fertiliser production reported from all the panchayats has been 3600.00 kg after construction of vermicomposting pits. The adoption of vermicomposting is vital to sustaining soil fertility naturally, without degrading soil quality.

Income Generated from Agricultural Assets and Earning of Wages

Among the assets under study, the share of income generated from the MGNREGA-supported irrigation assets has provided the highest monetary benefits (48.14 per cent), followed by land development assets (31.48 per cent), sale of animals and their products like meat and milk (4.30 per cent) and wages (16.01 per cent) (Table 7). This observation suggests that productive assets have enabled households to reduce their dependence on wage labour. In panchayats with more livelihood assets, the share of income from wages based on MGNREGA assets has decreased, and vice versa. The share of income generated from sale of organic vermicomposting fertiliser has been reported to be less than 1 per cent of the total.

The findings reveal that farming practices have undergone positive transformation after adoption of MGNREGA supported agricultural assets. This includes a shift from rain-dependent farming to irrigated farming with a water storage facility created after MGNREGA support. This has enabled farmers to shift from subsistence farming to market based higher profitable crops. Land development has increased the area under cultivation, and provided stability to terrace farms on slopes. While, cattle sheds ensured animal

Table 6
Trans-Giri Region: Impact of MGNREGA Supported Cattle shed and Vermicomposting Pits on the Stakeholders before 2018 and after 2022

Panchayats	No. of Beneficiary Households	Cattle shed						Vermicomposting Pits			
		Total Number of Animals		Households Rearing New Better Hybrid Animals		Monthly Total Milk Production (Litres)		Total Annual Income from Sale of Meat Animals (Rs. 000)		Animals Died Due to Wild Carnivores Attack on the Cattle shed	
		2018	2022	2018	2022	2018	2022	2018	2022	2018	2022
Rajana	3	18	21	1	2	90	240	30.00	45.00	3	0
Ser Tendula	7	30	25	0	3	405	1320	30.00	70.00	4	0
Bharari	2	12	14	0	0	150	270	35.00	50.00	2	0
Thod Niwaar	6	39	29	1	4	120	210	15.00	24.50	0	0
Thaina Bastori	4	18	14	0	1	420	810	40.00	55.00	2	0
Nehrati Baghot	0	0	0	0	0	0	0	0.00	0.00	0	0
Ajrauli	0	0	0	0	0	0	0	0.00	0.00	0	0
Bandli	0	0	0	0	0	0	0	0.00	0.00	0	0
Millah	0	0	0	0	0	0	0	0.00	0.00	0	0
Shilla	0	0	0	0	0	0	0	0.00	0.00	0	0
Bhajaun	0	0	0	0	0	0	0	0.00	0.00	0	0
Sharli Manpur	1	4	4	0	1	0	0	8.00	10.00	1	0
Tonru Danda Anj	2	22	17	1	1	0	0	25.00	35.00	0	0
Danda	9	34	25	4	4	240	210	100.00	180.00	3	0
Gorkhuwala	1	2	2	0	0	60	60	0.00	0.00	0	0
Total	35	179	151	7	16	1485	3120	418.00	690.00	15	0
										No. of Beneficiary Households	Annual Production of Organic Fertilizer (Kg)
										0	0.00
										0	0.00
										0	0.00
										3	300.00
										0	0.00
										2	0.00
										0	0.00
										0	0.00
										2	300.00
										0	0.00
										0	0.00
										0	0.00
										3	800.00
										1	1150.00
										0	0.00
										0	0.00
										3	1050.00
										0	0.00
										12	3600.00

Source: Compiled by Authors.

Table 7
Trans-Giri Region: Percentage Share of Income Earned by Beneficiaries from MGNREGA Supported Agricultural Assets and Wages

Panchayats	Share of Income Earned from Sale of Agricultural Products under MGNREGA Assets				Share of Income Earned from MGNREGA Wages	Total
	Irrigation Assets	Land Developments Assets	Animal Products Generated from Cattle shed	Organic Fertilizers Produced in Vermicomposting Pits		
Rajana	54.72	17.54	6.00	0.00	21.74	100
Ser Tendula	42.66	40.17	4.94	0.00	12.22	100
Bharari	77.16	6.99	3.74	0.00	12.12	100
Thod Niwaar	46.19	22.86	21.70	0.00	9.25	100
Thaina Bastori	51.90	34.97	3.27	0.00	9.86	100
Nehrati Baghot	41.45	49.01	0.00	0.00	9.55	100
Ajrauli	61.68	17.66	0.00	0.09	20.57	100
Bandli	21.74	68.39	0.00	0.00	9.87	100
Millah	52.22	31.10	0.00	0.00	16.68	100
Shilla	66.76	18.66	0.00	0.16	14.42	100
Bhajaun	31.78	16.86	0.00	1.58	49.78	100
Sharli Manpur	51.03	30.27	0.79	0.00	17.91	100
Tonru Danda Anj	53.37	7.19	7.16	0.00	32.29	100
Danda	40.05	0.96	25.85	0.58	32.56	100
Gorkhuwala	20.52	0.00	0.00	0.00	79.48	100
Study Area	48.14	31.48	4.30	0.07	16.01	100

Source: Compiled by Authors.

safety, creation of vermicomposting pits has helped to produce organic fertilisers.

Functionality and Duration of MGNREGA Assets

The MGNREGA official guidelines provide minimum expected functional life span for each asset constructed under MGNREGA. However, it has been found that due to some constructional or local environmental conditions, some assets become non-functional before the fixed life span of their durability, resulting in wastage of resources. The field observation about asset durability, in terms of functional length of time, reveals that 27 assets comprising 34.62 per cent of the total non-functional assets, have been functional for less than 3 years (Table 8). A total of 9 assets, representing 11.54 per cent of the total, had a life span of 3 to 5 years, whereas 30 assets, comprising 38.46 per cent of the total had a life span of 5 to 10 years. The findings further reveal that only 6 assets comprising 7.69 per cent of the total, provided services for 15-25 years (Table 8). Further, community irrigation tanks have shown long-term functionality, with 44 functional assets compared to 32 non-functional ones, indicating better collective maintenance and shared utility. In contrast, individual irrigation tanks reported higher non-functionality (10) than functionality (8), suggesting weaker household-level maintenance capacity and post-asset construction support under MGNREGA. Kuhl assets recorded comparatively strong durability, with 10 functional assets against only 3 non-functional assets, suggesting that traditional community-managed irrigation system remained effective due to collective utility. The findings further show that land development works emerged to be the most sustainable by

having 131 functional assets against only 25 non-functional assets. It reflects their direct contribution to step farm stability on mountainous slopes and increasing agricultural productivity and livelihood security. Cattle shed assets have also recorded comparatively better working life span due to their everyday relevance to livestock-based livelihoods as there have been 34 functional cattle sheds against only one non-functional (Table 8). However, vermicomposting pits have reported lower sustainability, by having 6 functional assets against 7 non-functional assets indicating limited adoption and their maintenance.

Conclusions

The study reveals that the construction of irrigation assets under MGNREGA has led to transformative impacts on farming practices and improved agricultural income in Trans-Giri region of Himachal Pradesh. The benefit-cost ratio has improved markedly after construction of irrigation assets. Overall, for community tanks, the benefit-cost ratio increased from 1:3 in 2008 to 1:5 in 2022, and for individual tanks, the benefit-cost ratio increased from 1:4 in 2008 to 1:5 in 2022. For kuhls, the ratio increased from 1:3 in 2008 to 1:4 in 2022. The study reveals that the benefit-cost ratio is highest in areas with reliable water supply, market connectivity and under cash crop farming, while areas with water scarcity lag behind. The creation of assets has led to transformative impact on the agriculture. It has been found that 19.54 hectare of additional area has been brought under cultivation and crop production has increased by 95.61 metric tonnes after the construction of land development assets in 2022. Thus, assets creation under MGNREGA has resulted in a transition from subsistence agriculture to cultivation of

Table 8
Trans-Giri Region: Functionality and Duration of Sampled MGNREGA Assets

Type of Assets	Expected Durability by Govt. Norms (Years)	Operational Status of Assets and Ownership		No. of Assets with Years of Service Completed					Average Durability of Non-Functional Assets (Years)	Total Assets
				Less Than 3 Years	3-5 Years	5-10 Years	10-15 Years	15-25 Years		
Tank (Irrigation)	15-25	Individual	Functional	1	0	7	0	0	-	8
			Non-Functional	3	2	5	0	0	3.5	10
Kuhl (Water Channel)	15-25	Community	Functional	2	10	25	7	0	-	44
			Non-Functional	10	3	16	3	0	5.6	32
Land Development	15-25	Community	Functional	1	2	6	1	0	-	10
			Non-Functional	0	0	2	1	0	6.1	3
Cattle shed	10-15	Individual	Functional	63	14	43	8	3	-	131
			Non-Functional	11	2	4	2	6	5.2	25
Vermicomposting Pits	5-10	Individual	Functional	13	14	8	0	0	-	34
			Non-Functional	0	1	0	0	0	3	1
Total		Individual	Functional	0	2	4	0	0	-	6
			Non-Functional	3	1	3	0	0	3.7	7
		Functional		80	42	93	16	3	-	233
		Non-Functional		27	9	30	6	6	4.5	78
		Overall Total		107	51	123	22	9	-	311

Source: Compiled by Authors.

commercial crops. The study reveals that ginger production has increased from 24.75 metric tonnes in 2008 to 38.98 metric tonnes in 2022. Similarly, production of tomato has increased from 25.55 metric tonnes in 2008 to 57.87 metric tonnes in 2022. Whereas, the production of other crops has increased from 19.27 metric tonnes in 2008 to 63.90 metric tonnes in 2022. Finally, it is suggested that along with strengthening the irrigation and land development assets, the policy interventions are required to focus more on animal husbandry for promoting livelihood of the poor. A huge gap between the anticipated and actual functional duration of MGNREGA assets also calls for concerns on the part of the implementing agencies.

Acknowledgements

The first author is grateful to the Indian Council of Social Science Research (ICSSR) for providing financial assistance under the Post-Doctoral Research Fellowship programme to undertake this work (File Number: 3-158/2022-23/PDF/SC).

References

- Aggarwal, A. Gupta, A. and Kumar, A. 2012. Evaluation of NREGA wells in Jharkhand. *Economic and Political Weekly*, 35: 24-27.
- Esteves, T., Rao, K. V., Sinha, B., Roy, S. S., Rao, B., Jha, S. and Ravindranath, N. H. 2013. Agricultural and livelihood vulnerability reduction through the MGNREGA. *Economic and Political Weekly*, 48: 94-103.
- Fischer, H. W. 2020. Policy innovations for pro-poor climate support: Social protection, small-scale infrastructure, and active citizenship under India's MGNREGA. *Climate and Development*, 12 (8): 689-702.
- Godfrey-Wood, R. and Flower, B. C. 2018. Does guaranteed employment promote resilience to climate change? The case of India's Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). *Development Policy Review*, 36: 0586-0604.
- Lemos, M. C., Lo, Y. J., Nelson, D. R., Eakin, H. and Bedran-Martins, A. M. 2016. Linking development to climate adaptation: Leveraging generic and specific capacities to reduce vulnerability to drought in NE Brazil. *Global Environmental Change*, 39: 170-179.
- National Institution for Transforming India (NITI) Aayog. 2020. *Report of the Sub-group of Chief Ministers on Coordination of Agriculture and MGNREGS*. New Delhi: 1-44.
- Pankaj, A. and Bhattacharya, M. 2022. Income and livelihood promotion through individual assets under MGNREGS. *Economic and Political Weekly*, 57 (4): 1-23.
- Sharma, H. R. 2011. Crop diversification in Himachal Pradesh: Patterns, determinants and challenges. *Indian Journal of Agricultural Economics*, 66 (1): 97-114.

Dr. Puran Chand, ICSSR Post-Doctoral Fellow,
Email: pooranc24@gmail.com
(Author for Correspondence)

Dr. B.R. Thakur, Associate Professor,
Department of Geography,
Himachal Pradesh University,
Shimla (Himachal Pradesh).

punjab geographer

