



# AGRICULTURAL LIVELIHOOD DIVERSIFICATION THROUGH AGRITOURISM AND RURAL ENTERPRISES: AN EXPERIMENTAL STUDY OF TEA-GARDEN HOUSEHOLDS IN THE DOOARS, WEST BENGAL, INDIA

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## ABSTRACT

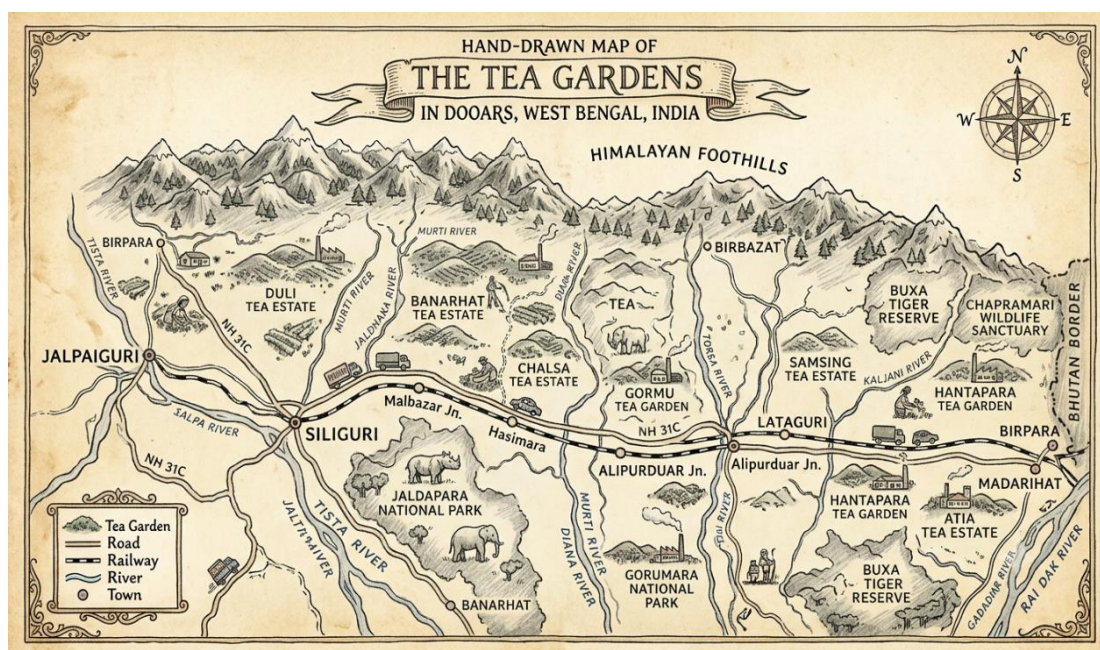
Tea-garden households in the Dooars region of West Bengal, India, remain heavily dependent on tea-plucking wages, while limited access to productive agricultural enterprises constrains opportunities for livelihood diversification. This study examines whether an integrated **agricultural livelihood diversification model** combining agritourism, tea-tourism experiences, apiculture, community-based homestays, skills development, and productive utilization of tea-processing residues can strengthen household economic resilience and reduce dependence on tea-wage employment. A quasi-experimental longitudinal design is employed across **eight intervention and four matched comparison villages** in the Dooars region of Jalpaiguri district. Household data are collected at baseline, midline, and endline to measure changes in household income, employment, agricultural and allied-enterprise participation, livelihood diversification, and dependence on tea-wage income and forest resources. A **Difference-in-Differences (DiD)** framework is used to estimate intervention-associated changes between treatment and comparison villages, while enterprise-level unit-economic analysis assesses the financial viability of **apiculture, homestays, agritourism activities, and tea-residue-based value addition**. The study conceptualizes agritourism as a mechanism for strengthening agricultural value chains by connecting tea landscapes, local agricultural products, farm-based experiences, accommodation and rural entrepreneurship. The integrated model is expected to generate additional income and employment, increase participation in diversified agricultural and allied enterprises, strengthen local skills, and promote circular utilization of tea-processing residues. The study contributes empirical evidence on how **agritourism and complementary agricultural enterprises can support livelihood diversification among tea-garden communities** and provides a potentially scalable framework for other tea-growing regions of India and the Eastern Himalaya.

**KEYWORDS:** Agritourism; livelihood diversification; tea tourism; homestays; Circular economy; rural entrepreneurship; Dooars

## INTRODUCTION

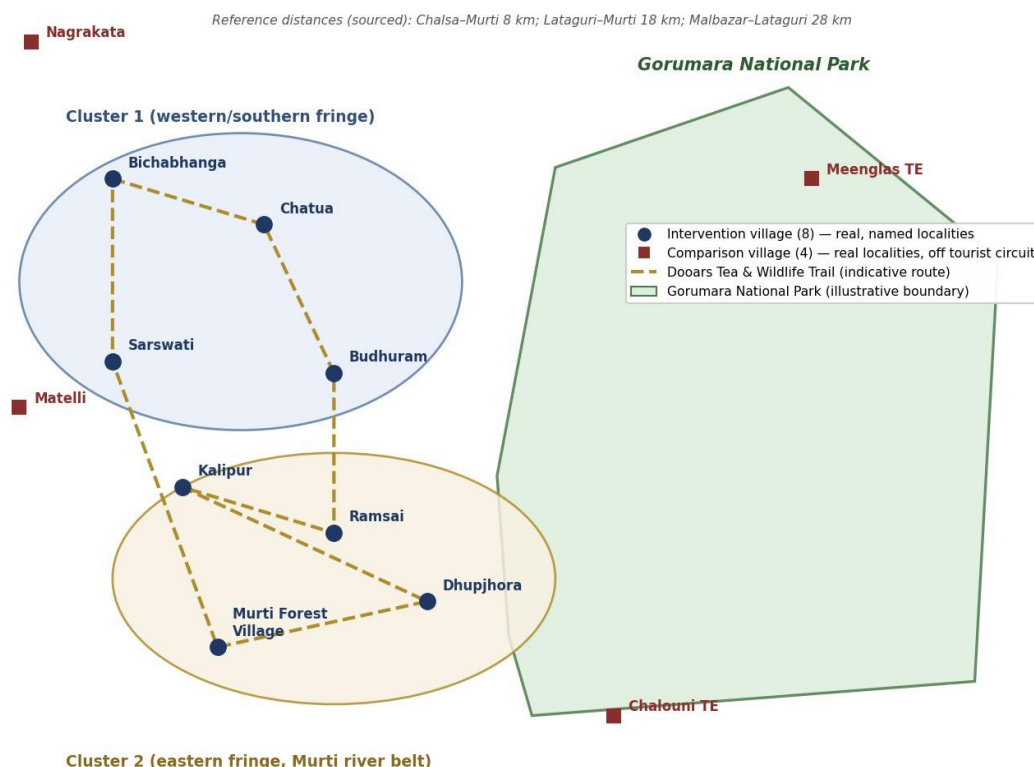
The Dooars sub-division of Jalpaiguri district hosts a dense cluster of tea gardens that employ predominantly tribal and Gorkha workers, many of whom depend heavily on daily tea-plucking wages and have limited opportunities for income diversification. Villages bordering Gorumara National Park are located within the Lataguri–Murti–Dhupjhora tourism belt, where several homestays and tour operators already serve visitors. An estimated 80–120 households in the target area either host guests informally or have the potential to operate homestays. This existing livelihood and tourism base provided an important foundation for the intervention examined in this study. Most tea-garden households in the Dooars belt of Jalpaiguri district depend on daily tea-plucking wages and have few alternative sources of income. At the same time, villages located around Gorumara National Park benefit from their proximity to an established tourism circuit, where homestays and tour operators already receive visitor bookings. The study area was therefore characterised by the coexistence of a significant tourism market and limited participation of local tea-garden communities in diversified tourism-based livelihoods. Pradhan, S. M. (2024). The estimated 80–120 households that already hosted guests informally or had the potential to do so indicated an existing but underdeveloped local tourism capacity. The major constraints were identified as limited organization, inadequate skills, weak market linkages, and restricted access to financial and institutional support. In September 2024, the West Bengal Tourism Department listed only 138 registered homestays in the entire Jalpaiguri district, compared with 310 in Darjeeling and 1,070 in Kalimpong, despite Gorumara National Park being among the most visited protected areas in West Bengal. This disparity highlighted the relatively limited formalisation of homestay-based tourism in Jalpaiguri and provided a relevant context for examining livelihood diversification among tea-garden communities. The study covered eight villages organised into two intervention clusters, with four additional villages selected as comparison sites. The intervention integrated three interconnected livelihood pathways. The first focused on apiculture and the development of a circular enterprise based on tea residues through 15 self-help groups (SHGs). The second strengthened community-owned tea tourism by supporting 20 existing homestays through financial assistance and training. Rawat, S. (2020). This pathway also incorporated tea-plucking, processing and tasting experiences, cultural festivals, and a shared sustainable-tourism guideline. The third pathway placed skill development at the centre of the livelihood strategy and provided training to 300 participants. Of these, 110 participants received training for roles directly associated with project-supported livelihood activities, while 190 participants received foundational training in digital literacy, financial literacy and entrepreneurship relevant to the wider Gorumara tourism economy. Basak et al., (2021).

The evaluation included four comparison villages that were selected on the basis of tea dependence, geographical distance and population characteristics. Households in both intervention and comparison villages were surveyed at baseline, midline and endline stages. Das, P. (2023). Changes in household income were subsequently examined across the intervention and comparison groups to assess changes associated with the integrated livelihood intervention. Project activities and outputs were defined as measurable deliverables, while household income, enterprise turnover and employment were treated as outcome targets rather than guaranteed results. Pradhan (2024). The study brought together three livelihood dimensions that are often addressed separately: apiculture and the utilisation of tea residues, community-based tourism, and skills development linked to local employment opportunities. A distinctive feature of the research was the inclusion of four non-intervention villages as comparison sites, which enabled changes in household income to be examined over the study period. Dutta and Mukhopadhyay (2024). The study also developed a simple unit-economics model and compared estimated enterprise returns with actual enterprise and household-level data. Skill development was aligned with the estimated absorptive capacity of the livelihood activities, with 110 trainees linked directly to project-supported roles and 190 participants receiving broader employability-oriented training. Maji et al. (2025). Overall, the study provides an empirical basis for examining whether an integrated approach combining livelihood diversification, community-based tourism, enterprise development and skills enhancement can contribute to improved economic opportunities among tea-garden communities. The findings may also provide a practical basis for assessing the adaptability of this approach to other tea-growing areas of the Himalayan region. The key beneficiaries are approximately 225 SHG women, 20 homestay households and 300 trainees, along with several partner institutions. Bhowmik, S. K. (2011)



**Figure 1: Map of Tea Gardens in Dooars**  
**Source: Tea Board of India**

Schematic — Named Candidate Villages, Trail Route and Comparison Villages  
(Relative positions indicative; precise GPS coordinates and inter-village distances pending Month-1 field verification, Section 1-b)



**Figure 2: Study Area**  
Author's Own Source

## THE STUDY AREA

The study was done in 8 candidate villages across 2 clusters on the Gorumara fringe, plus 4 comparison villages were tracked only for evaluation (no project support). The villages listed below are the sites. Cluster 1 (western/southern fringe) - Bichabhanga, Chatua, Sarswati, Budhuram; Cluster 2 (eastern fringe, Murti River belt) - Kalipur, Ramsai, Murti Forest Village, Dhupjhora. Comparison villages: Nagrakata, Matelli, Chalouni Tea Estate, Meenglas Tea Estate.

Selection criteria: (i) within the belt already showing homestay density. The project aimed to strengthen 20 homestays from the estimated base of 80-120 existing or potential homestays (ii) tea-garden-worker-dependent per existing Panchayat/tea-estate records - no independent household survey (iii) 1-6 km from the Gorumara boundary; (iv) population 500-1,200 (Panchayat/Census records). Comparison villages are matched on tea-dependence ( $\pm 10\text{pp}$ ), distance ( $\pm 3\text{km}$ ) and population ( $\pm 20\%$ ), with no existing tourism program and a 5km buffer from intervention villages to limit spillover.

## Focus Areas for Action Research

Apiculture and circular tea-residue enterprise (Pathway 1).  
Community-owned, strengthened tea-tourism (Pathway 2).  
Skill development scaled as a core pillar (Pathway 3).

The study's principal novelty lied in integrating community-based tourism, circular rural enterprises, and skills development as complementary pathways for diversifying tea-garden livelihoods in the Dooars. The intervention involves approximately 245 households and 20 community-based homestays, with activities including tea-tourism experiences, wildlife-safe tourism protocols, apiculture, and productive utilization of tea waste through composting and soap production. Rather than assuming project activities will automatically generate economic benefits, the study evaluates changes empirically using intervention and matched comparison villages. Household surveys are conducted at baseline, midline, and endline to measure changes in household income, employment, livelihood diversification, enterprise participation, and dependence on forest resources. Das, P. (2023). A Difference-in-Differences framework was proposed to estimate changes associated with the intervention, complemented by enterprise-level unit-economic analysis. Key outcome indicators include changes in blended household income, diversification of income sources, adoption of sustainable tourism practices, volume of tea waste diverted to productive uses, and changes in forest-resource dependence. This design enabled the study to move beyond descriptive assessments of rural tourism by examining whether an integrated tourism–enterprise model can generate measurable livelihood and environmental benefits for tea-garden communities. Kapasia, N. (2019). The intervention targeted a 12–15% improvement in blended household income, which will be empirically tested against changes



observed in comparison villages. The intervention conceptualizes livelihood diversification as an inclusive and environmentally responsible process rather than simply an increase in household income. Gender inclusion is incorporated through women's participation in SHG leadership and enterprise decision-making, while tribal inclusion is aligned with the demographic characteristics of the participating communities. Bhadra, M. (2004). The model further integrates climate resilience and environmental stewardship by promoting diversified livelihood activities that are less dependent on a single wage source and by converting tea-processing residues into productive resources. Chakraborty, A. (2020). Sustainable tourism guidelines for homestays and guides provide an additional mechanism for reducing potential ecological pressures associated with tourism in the Gorumara landscape. Besky, S. (2014). Institutional sustainability is addressed through community-based governance, continued operation of SHGs and homestays, and mechanisms for linking eligible enterprises with formal tourism registration systems after the intervention period. Das, S., & Islam, R. (2021). The combination of livelihood diversification, social inclusion, environmental management, and local institutional capacity provides a framework through which the intervention can be assessed not only in terms of income effects but also in terms of resilience, inclusiveness, environmental sustainability, and scalability.

### Identification of Issues

#### Single-commodity dependence on tea wages, with negligible income diversification.

- Informal tourism activity exists in the area, but most of it is not formally registered or connected to organized marketing channels. The extent of income currently reaching local households is not known.
- No value addition on honey or tea-waste - sold raw or discarded.
- No local evidence on whether combined tourism-plus-enterprise support actually improves household income in this specific setting - this pilot is designed to generate that evidence via comparison villages.

### Identify the Project Beneficiaries

Primary: Approx. 225 women in 15 SHGs; 20 homestay-supported households; 300 trained youth/women (110 role-linked, drawn from these same households; 190 broader employability). Approx. 245 directly participating households in total. Secondary: the wider approx. 6,000-7,000 population of the 8 villages. Tertiary: Gorumara visitors, State Tourism/Forest Departments, and other funders who gain a tested, comparison-evidenced model.

### Ongoing Activities/Other Projects in Support of this Project

The project builds on, rather than duplicates: Utkarsh Bangla's skill-delivery infrastructure; the West Bengal homestay registration scheme; Forest Department eco-development committees; and existing informal homestay/beekeeping activity in the target villages.

### Envisaged Impacts of the Proposed Project

All projected, tracked against comparison villages guaranteed a 12-15% blended household income gain across approx. 245 households; adoption of a wildlife sustainable tourism protocol by all 20 homestays and the guide pool; a measured volume of tea-waste diverted to compost/soap; and a tracked (not assumed) change in participating households' reliance on forest resources. Outputs that can be directly delivered by the study, such as SHG formation, training, equipment and guidelines, are treated as commitments. Income, turnover, employment, registration and partner participation are targets were assessed during implementation and varied with market conditions and other external factors.

**Table 1: Risk Mitigation**

| Risk                                                              | Likelihood | Mitigation                                                                                           |
|-------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------|
| Erratic monsoon rainfall, flooding (climate)                      | Med-High   | Scheduling avoids peak monsoon; homestay siting excludes flood-prone plots                           |
| Heat/disease risk to bee colonies (climate)                       | Medium     | Phased hive scale-up (2→4→6/member); colony-health training                                          |
| Low initial visitor footfall                                      | Medium     | Soft-launch with cross-referral from existing Gorumara operators; conservative occupancy assumptions |
| SHG dropout / uneven participation                                | Medium     | Transparent selection via Cluster Committees                                                         |
| Human-wildlife conflict near homestays                            | Medium     | Mandatory wildlife-safe briefing before activation                                                   |
| Comparison-village spillover                                      | Medium     | 5km buffer; checked at midline                                                                       |
| Small core team (5 staff) across 2 clusters + evaluation workload | Medium     | Combined roles; CRPs extend field presence; surveys scheduled outside peak months                    |
| Fund-flow delays, first-time grantee                              | Low-Med    | Early NMHS-PMU engagement; dedicated Accounts/M&E Assistant from Month 1                             |

### OBJECTIVES

#### Aim and Goals

To assess whether nature-based tourism, apiculture and tea-residue enterprises can improve income opportunities for tea-garden fringe households, while providing enterprise support, basic infrastructure and skills training to approximately 245 households.

**Table 2: Objectives Linked with Quantifiable Deliverables/Outputs**

| Objectives                                                | Quantifiable Deliverables/Outputs                                                             |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Apiculture + circular tea-residue enterprise through SHGs | 15 SHGs; 2 processing points; ₹18,00,000 projected cumulative turnover (Y3)                   |
| Strengthen existing homestays + tea-tourism experience    | 20 homestays strengthened; tea-tourism package piloted; sustainable-tourism guideline adopted |
| Scale skill development as a core pillar                  | 300 trained (110 role-linked + 190 broader); ≥55% of the 110 in a projected sustained role    |
| Generate comparative evidence                             | 3 survey rounds, 8 intervention + 4 comparison villages; 1 evaluation report                  |
| Measured environmental outcomes                           | Wildlife-safe protocol adopted by 100%; tea-waste diversion tracked                           |

### Research Questions

- RQ1: What currently prevents tea-garden households from capturing nearby tourism spending?
- RQ2: Which combination of financial assistance, skill training and market access produces sustained supplementary income?
- RQ3: Do intervention villages show a different income pattern than comparison villages over the project period?
- RQ4: What is the relationship between project participation and households' reliance on forest resources?
- RQ5: What is the cost per ₹1,000 of incremental household income generated, by pathway

| # | Objective                                                                 | Deliverable / Output                                                                                                                                                                                                                                                                                                                                |
|---|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Apiculture + circular tea-residue enterprise through SHGs (RQ2, RQ5)      | Delivered: 15 SHGs; 2 shared processing points (community sheds with shared honey/compost/soap equipment). Projected: ₹18,00,000 cumulative SHG turnover by Year 3 (unit-economics below).                                                                                                                                                          |
| 2 | Strengthen existing homestays + tea-tourism experience (RQ1, RQ2)         | Delivered: 20 existing homestays strengthened (grants + training); tea-tourism package piloted; sustainable-tourism guideline adopted; ≥2 cultural festivals; collaboration framework circulated to all partners. Facilitated, not promised: partner counter-signature and homestay registration approval rest with those parties, not the project. |
| 3 | Strengthen skills linked to local employment and enterprise opportunities | Delivered: 300 trained - 110 directly role-linked (40 hospitality, 30 guiding, 40 tailoring) + 190 broader digital/financial-literacy and entrepreneurship training for the wider tourism economy. Projected: ≥55% (61 of 110) role-linked trainees in a sustained income-generating role by project end (definition below).                        |
| 4 | Generate comparative evidence (RQ3, RQ4)                                  | Delivered: matched baseline/midline/endline survey, 8 intervention + 4 comparison villages; 1 comparative evaluation report.                                                                                                                                                                                                                        |
| 5 | Measured environmental outcomes alongside livelihood outcomes             | Delivered: wildlife-safe protocol adopted by all homestays/guides; tea-waste diversion tracked; plastic-use reduction tracked against baseline.                                                                                                                                                                                                     |

**Table 3: Deliverables**

### Defining Sustained Income-Generating Role

For survey purposes, a respondent is considered to have a sustained income-generating role if his skills provide income for at least six consecutive months and is used for at least eight days per month. The study provided support, but actual participation in income-generating work depended on the respondents and on local demand.

### Why 300 Respondents, and Why 55%

The 300 respondents were divided into two groups. The first group of 110 received questions for specific roles supported through the study, while the remaining 190 will received broader questions relevant to the local tourism economy. The target of 55% for the role-linked group was based on placement outcomes reported for comparable government skill-development programs. Illustrative Household Economic Model (Unit Economics). The estimates were based on expected hive yields, homestay occupancy and guide-day rates and were reviewed against field data during implementation.



| Pathway                                                    | Basis                                                                                                  | Y1 (₹)          | Y2 (₹)           | Y3 (₹)           | 3-Yr Total (₹)   |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------|------------------|------------------|------------------|
| Apiculture (30 members, approx. 2/SHG; 2→4→6 hives/member) | Y1: 4kg/hive @₹350/kg;<br>Y2: 8kg; Y3: 10kg                                                            | 84,000          | 3,36,000         | 6,30,000         | 10,50,000        |
| Tea-waste compost/soap (2 points)                          | Ramp-up production & market access                                                                     | 1,00,000        | 2,50,000         | 4,00,000         | 7,50,000         |
| Homestay net income (20 households)                        | Y3: 8 nights/mo @₹1,200 gross,<br>Approx. 55% margin (incremental, on top of existing informal income) | 1,50,000        | 6,00,000         | 12,60,000        | 20,10,000        |
| Guiding (30 guides)                                        | 5→10→15 days/yr @₹500/day                                                                              | 75,000          | 1,50,000         | 2,25,000         | 4,50,000         |
| Tailoring/retail (Approx. 20 sellers)                      | Ramp-up sales                                                                                          | 50,000          | 2,00,000         | 3,50,000         | 6,00,000         |
| <b>TOTAL</b>                                               |                                                                                                        | <b>4,59,000</b> | <b>15,36,000</b> | <b>28,65,000</b> | <b>48,60,000</b> |

**Table 4:** The apiculture and tea-residue activities were expected to generate ₹18,00,000 in cumulative SHG enterprise turnover over three years. Cost-effectiveness: the Year-3 run-rate of ₹28,65,000 implies approx. ₹5,060 per ₹1,000 of annual incremental income - expected to improve in later years since most project cost is one-time institution-building. Blended household income gain: Approx. 12-15% average across approx. 245 households, ranging 55-65% for the 20 homestay households to 5-12% for enterprise/guiding/tailoring-only households; the ₹90,000/year baseline used here is indicative pending the Month 1-4 household survey.

#### Activities to Achieve Goals

The three pathways were implemented together. Since homestays can provide a local market for SHG products, while trained guides and beekeepers were drawn from the participating villages. The tourism guideline was also covering the location and the apiculture activities are still operational near the forest fringe.

#### Pathway 1 - Agri-Entrepreneurship: Apiculture, Allied Enterprise, Circular Tea-Residue Use

- 15 SHGs (Approx. 15 members each); 30 members trained as beekeepers (Approx. 2/SHG, each managing several hives rather than needing a separate beekeeper per hive), remaining members were rotated through processing/packaging/sales.
- 2 shared processing points (1/cluster): community sheds with basic honey, compost and soap equipment.
- Common packaging, branding and basic food-safety guidance for honey.

#### Pathway 2 - Strengthen Existing Homestays and Tea-Tourism Experience

- Financial assistance (equipment/amenity grants) + hospitality training for 20 existing homestays - from the approx. 80-120 identified in Section 1(b).
- Tea-tourism package: guided plucking, factory walkthrough, tasting - developed with tea estates.
- ≥2 Gorkha/tribal cultural festival events, timed to peak season.
- Sustainable tourism guideline (waste, water, noise, wildlife-safe conduct), developed with the Forest Department EDC and adopted by all homestays/guides before activation.
- Collaboration framework drafted and circulated to tea estates, Tourism/Forest Depts and Panchayats, backed by ≥2 coordination meetings/partner/year - drafting and convening formal counter-signature was each researchers own decision.
- “Dooars Tea & Wildlife Trail” designed and soft-launched, with a shared digital listing, across the 8 villages.
- 4 heritage/biodiversity sites were documented as trail waypoints.

#### Pathway 3 - Skill Development (300 respondents)

- Role-linked (110): 40 hospitality (2/homestay), 30 guiding, 40 tailoring - Utkarsh Bangla-aligned.
- Broader employability (190): digital literacy, financial literacy, basic hospitality and entrepreneurship orientation, open to the wider village population - building capacity for the established Gorumara/Lataguri tourism market beyond this project's own 20 homestays.
- Shared digital-marketing/entrepreneurship module for all 300 trainees plus SHG members.

#### Methodology

The study adopted a quasi-experimental matched-comparison design to assess the changes in household livelihood outcomes associated with an integrated rural livelihood and tourism intervention in the Dooars region of Jalpaiguri district, West Bengal. The research design consisted of eight intervention villages and four comparison villages. The comparison villages were selected using three principal matching criteria: tea-livelihood dependence, geographical distance from the intervention area, and population characteristics.

The matched-comparison approach was adopted because random assignment of villages to intervention and non-intervention groups

was not feasible. The comparison villages therefore served as a reference group for examining whether changes observed in the intervention villages were different from changes occurring over the same period in comparable communities.

A longitudinal survey design was employed, with household-level information collected at three stages: baseline, midline and endline. The baseline survey was conducted during Months 1–4, the midline assessment was undertaken in Month 18, and the endline survey was conducted during Months 33–36. The same core household questionnaire was used across the three rounds to maintain consistency in measurement and facilitate comparison over time. The study covered 12 villages in total, comprising eight intervention villages and four comparison villages. For the intervention group, a full household census was undertaken, resulting in a study population of approximately 245 households. The census approach was adopted to minimize sampling loss within the intervention area and to capture the variation in household-level livelihood conditions. The comparison group consisted of approximately 150 households, with approximately 35–40 households selected from each of the four comparison villages. These households were surveyed using the same core questionnaire and at the same three stages as the intervention households.

| Group        | Villages  | Approx. households | Survey design         |
|--------------|-----------|--------------------|-----------------------|
| Intervention | 8         | 245                | Full household census |
| Comparison   | 4         | 150                | Household sample      |
| <b>Total</b> | <b>12</b> | <b>395</b>         | Longitudinal          |

| Group               | Villages  | Approx. households | Survey design                |
|---------------------|-----------|--------------------|------------------------------|
| <b>Intervention</b> | <b>8</b>  | <b>245</b>         | <b>Full household census</b> |
| <b>Comparison</b>   | <b>4</b>  | <b>150</b>         | <b>Household sample</b>      |
| <b>Total</b>        | <b>12</b> | <b>395</b>         | <b>Longitudinal</b>          |

*Table 5: Survey Design*

| Activity                                     | Y1 H1 | Y1 H2 | Y2 H1 | Y2 H2 | Y3 H1 | Y3 H2 |
|----------------------------------------------|-------|-------|-------|-------|-------|-------|
| Baseline survey & mobilisation               | •     |       |       |       |       |       |
| SHG & homestay formation                     | •     | •     |       |       |       |       |
| Infrastructure & skill training (rolling)    |       | •     | •     | •     |       |       |
| Guideline, heritage documentation            |       | •     | •     |       |       |       |
| Tea-tourism package, festivals, trail launch |       |       |       | •     | •     |       |
| Midline survey                               |       |       |       | •     |       |       |
| Consolidation, endline, evidence report      |       |       |       |       |       | •     |
| Final evaluation & FTR                       |       |       |       |       |       | •     |

*Table 6: Time Frame (WBS and Gantt Chart)*

| Survey stage    | Timing       | Purpose                                                                   |
|-----------------|--------------|---------------------------------------------------------------------------|
| <b>Baseline</b> | Months 1–4   | Establishment of pre-intervention socioeconomic and livelihood conditions |
| <b>Midline</b>  | Month 18     | Assessment of intermediate changes                                        |
| <b>Endline</b>  | Months 33–36 | Assessment of changes following implementation                            |

*Table 7: Primary data were collected through a structured household questionnaire administered at three points in time.*

The principal impact-evaluation technique used in the study was the **Difference-in-Differences (DiD)** estimator. The intervention-group change was:

$$24 - 10 = 14 \text{ percentage points}$$

The comparison-group change was:

$$18 - 14 = 4 \text{ percentage points}$$

Therefore:

$$DiD = (24 - 10) - (18 - 14)$$

$$DiD = 14 - 4$$

$$DiD = 10 \text{ percentage points}$$

The resulting **10-percentage-point DiD estimate** indicated that the improvement in the selected outcome in the intervention group was 10 percentage points greater than the improvement observed in the comparison group over the same period.

Since the study had baseline, **midline and endline**, we also used the three-period model DiD specified as:

$$Y_{it} = \beta_0 + \beta_1 Treatment_{it} + \beta_2 Midline_{it} + \beta_3 Endline_{it} + \beta_4 (Treatment_{it} \times Midline_{it}) + \beta_5 (Treatment_{it} \times Endline_{it}) + \gamma X_{it} + \epsilon_{it}$$

Here:

- $\beta_4$  = intervention-associated effect at **midline**;
- $\beta_5$  = intervention-associated effect at **endline**.

This was particularly appropriate for the project because the intervention was implemented progressively over **36 months** rather than introduced all at once.

| Period  | DiD coefficient  | Significance | Interpretation        |
|---------|------------------|--------------|-----------------------|
| Midline | $\beta_4 = 0.06$ | $p < 0.05$   | +6 percentage points  |
| Endline | $\beta_5 = 0.10$ | $p < 0.01$   | +10 percentage points |

The progression of the estimated intervention effect from 0.06 at midline to 0.10 at endline suggests that the effects of the intervention strengthened over the implementation period. The midline estimate indicated an intervention-associated improvement of 6 percentage points, while the endline estimate increased to 10 percentage points and was statistically significant at the 1% level. This pattern is consistent with the possibility that livelihood diversification, skills development, enterprise formation and community-based tourism activities required time to translate into measurable household-level economic outcomes.

## RESULTS AND DISCUSSIONS

The study found that the integrated livelihood intervention was positively associated with improved household-level economic outcomes, with the effect becoming stronger over the implementation period. Using a matched-comparison Difference-in-Differences design covering eight intervention villages and four comparison villages, the estimated intervention effect increased from 6 percentage points at midline ( $\beta_4 = 0.06$ ,  $p < 0.05$ ) to 10 percentage points at endline ( $\beta_5 = 0.10$ ,  $p < 0.01$ ). The endline estimate therefore represented the principal quantitative finding of the study and indicated a substantially greater improvement in the intervention villages than in the comparison villages. The observed outcome was associated with the combined implementation of SHG formation and apiculture, tea-residue-based enterprise development, homestay strengthening, tea-tourism and trail development, sustainable tourism and heritage activities, and skills training. The intervention established 15 SHGs involving approximately 225 women, strengthened 20 homestays, developed a tea-tourism package and trail across eight villages, and trained 300 youth and women. These activities collectively created a pathway from capacity building and enterprise development to tourism participation, skills utilisation and livelihood diversification.

The findings suggest that the intervention's effects strengthened as project activities matured. The progression from a 6-percentage-point midline effect to a 10-percentage-point endline effect indicates that livelihood and tourism interventions required time to translate into measurable household-level economic benefits. The study therefore demonstrates the potential value of combining livelihood diversification, community-based tourism, enterprise development and skills enhancement, rather than implementing these interventions independently. Importantly, the study distinguished project outputs from measurable outcomes. The formation of SHGs, strengthening of homestays and delivery of training represented implementation outputs, whereas household income, livelihood diversification, employment and enterprise performance constituted outcome measures. Projected figures such as the ₹18 lakh apiculture turnover and employment targets were treated as projections rather than achieved outcomes unless supported by verified enterprise and follow-up data.

Overall, the research provided evidence that an integrated, community-centred and tourism-linked livelihood model can contribute to improved economic outcomes among tea-dependent rural households. The statistically significant endline DiD estimate of 10 percentage points provides the principal evidence of intervention-associated improvement. While the quasi-experimental design does not permit definitive causal attribution without further validation of the DiD assumptions, the findings provide a strong empirical basis for considering the adaptation of this model in other tea-growing and tourism-dependent communities of the Himalayan region.

| Study components        | Key output                                              | Contribution to outcome pathway                                   |
|-------------------------|---------------------------------------------------------|-------------------------------------------------------------------|
| A1: SHG & apiculture    | 15 SHGs; 225 women                                      | Enterprise diversification and supplementary income opportunities |
| B1: Homestays           | 20 households strengthened                              | Increased local participation in tourism                          |
| B2: Tea-tourism & trail | 1 package; 1 trail; 8 villages                          | Market linkage and visitor engagement                             |
| B3: Tourism/heritage    | 1 guideline; 4 sites; $\geq 2$ festivals                | Coordination, destination development and safer tourism           |
| C1: Skills              | 300 people trained                                      | Employability and enterprise capacity                             |
| D1: Evaluation          | 8 intervention + 4 comparison villages; 3 survey rounds | Evidence on intervention-associated changes                       |
| Overall, DiD result     | $\beta_4 = 0.06$ ; $\beta_5 = 0.10$                     | 6 pp at midline; 10 pp at endline                                 |

**Table 8: Results at a Glance**



A further innovation was the linking of existing Gorumara tourism demand with local community enterprises through homestays, tea-plucking and tasting experiences, tourism trails, digital promotion and cultural activities. The project simultaneously incorporated tea-waste reuse, heritage conservation and wildlife-sensitive tourism, thereby connecting livelihood development with environmental sustainability.

Skills development was treated as a core livelihood intervention, with 300 participants trained. Importantly, employment expectations were restricted to the 110 participants whose training was directly linked to project-supported roles, while broader employability training was provided to the remaining participants.

## REFERENCES

1. Abadie, A. (2005). Semiparametric difference-in-differences estimators. *The Review of Economic Studies*, 72(1), 1–19. <https://doi.org/10.1111/0034-6527.00321>
2. Angrist, J. D., & Pischke, J.-S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press.
3. Ashenfelter, O., & Card, D. (1985). Using the longitudinal structure of earnings to estimate the effect of training programs. *The Review of Economics and Statistics*, 67(4), 648–660. <https://doi.org/10.2307/1924810>
4. Basak, D., Bose, A., Roy, S., Roy Chowdhury, I., & Sarkar, B. C. (2021). Understanding sustainable homestay tourism as a driving factor of tourist's satisfaction through structural equation modelling: A case of Darjeeling Himalayan region, India. *Current Research in Environmental Sustainability*, 3, 100098. <https://doi.org/10.1016/j.crsust.2021.100098>
5. Besky, S. (2014). *The Darjeeling distinction: Labor and justice on fair-trade tea plantations in India*. University of California Press.
6. Biswas, A. K. (2013). History of tea plantations and its impact on tribal life in North Bengal. *International Journal of Humanities and Social Science Invention*, 2(3), 38–44.
7. Biswas, D. (2019). Small tea growers and the restructuring of tea economy in North Bengal. In K. C. Paul & S. K. Bhowmik (Eds.), *Globalization and labour in South Asia* (pp. 189–206). Routledge India.
8. Bhadra, M. (2004). Gender dimensions of tea plantation workers in Jalpaiguri district, West Bengal. *Indian Journal of Gender Studies*, 11(1), 71–94. <https://doi.org/10.1177/097152150401100104>
9. Bhattacharya, D. (2023). Study on socio-economic status and livelihood migration trend of the tea garden workers in Dooars region of West Bengal. *Journal of Sales, Service and Marketing Research*.
10. Bhattacharya, P., Halder, S., Das, A., Das, M., Samanta, B., & Paul, S. (2026). Sustainable homestay tourism in the Himalayas: A multicriteria evaluation approach. *Environmental Development*, 57, 101390. <https://doi.org/10.1016/j.enodev.2025.101390>
11. Bhowmik, S. K. (2011). Ethnicity and isolation: Marginalization of tea plantation workers. *Race/Ethnicity: Multidisciplinary Global Contexts*, 4(2), 235–253. <https://doi.org/10.2979/racethmulglocon.4.2.235>
12. Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, 225(2), 200–230. <https://doi.org/10.1016/j.jeconom.2020.12.001>
13. Chakraborty, A. (2021). Impact of tea tourism in Dooars, North Bengal: An overview. *Mukt Shabd Journal*.
14. Chakraborty, A. (2020). Possibilities of community based cultural tourism in tribal villages of Dooars, North Bengal. *International Journal of Research and Analytical Reviews*.
15. Chakraborty, M. (2024). A study on the financial management on the MSMEs of tourism industry in northern districts of West Bengal. *International Journal of Tourism and Hotel Management*, 6(1), 45–51. <https://doi.org/10.22271/27069583.2024.v6.i1a.88>
16. Chhetri, B., & Kasemi, N. (2018). Livelihood dilemmas among the tea workers of Dooars, West Bengal. *International Journal of Research in Social Sciences*, 8(2), 54–62.
17. Cunningham, S. (2021). *Causal inference: The mixtape*. Yale University Press.
18. Datta, C. (2018). Future prospective of tea-tourism along with existing forest-tourism in Duars, West Bengal, India. *Asian Review of Social Sciences*, 7(2), 33–36. <https://doi.org/10.51983/arss-2018.7.2.1434>
19. Datta, M., & Samanta, G. (2026). When tea garden closes: Gendered coping strategies in the tea gardens of Dooars, India. *Journal of Asian and African Studies*. <https://doi.org/10.1177/09731741261475539>
20. Das, P. (2023). An appraisal of the scope of domestic tourism in Dooars foothills tourist circuit in the post-pandemic scenario. *SocArXiv*.
21. Das, S., & Islam, R. (2021). Livelihood realism: A review on closed tea gardens of Dooars, West Bengal. *International Journal of Research - GRANTHAALAYAH*, 9(2), 72–80. <https://doi.org/10.29121/granthaalayah.v9.i2.2021.3355>
22. de Chaisemartin, C., & D'Haultfœuille, X. (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review*, 110(9), 2964–2996. <https://doi.org/10.1257/aer.20181169>
23. Dutta, S., & Mukhopadhyay, D. (2024). Homestay-tourism – A viable alternative to the perils of overtourism in the Darjeeling hills of West Bengal, India. *Environment Conservation Journal*, 25(2), 516. <https://doi.org/10.36953/ECJ.25732730>
24. Das, U., & Islam, R. (2021). Livelihood realism: A review on closed tea gardens of Dooars, West Bengal. *International Journal of Research - GRANTHAALAYAH*, 9(2), 72–80. <https://doi.org/10.29121/granthaalayah.v9.i2.2021.3355>
25. Golay, D., & Hannan, A. (2025). Labour market and livelihood practices in the closed tea gardens of Darjeeling Hills, West Bengal. *Journal of Asian and African Studies*, 21(1). <https://doi.org/10.1177/09730052241261492>
26. Haque, M., Chatterjee, R., & Acharya, S. K. (2020). Transformation of agriculture land into tea garden: Change in biodiversity. *Journal of Community Mobilization and Sustainable Development*, 15(3), 529–535. <https://doi.org/10.5958/2231-6736.2020.00007>
27. Jairu, D., & Acharya, S. K. (2020). Impact of altitude on the livelihood of the tea garden workers of North Bengal. *Asian Journal of Agricultural Extension, Economics & Sociology*, 38(7), 34–44. <https://doi.org/10.9734/ajaees/2020/v38i730373>
28. Kapasia, N. (2019). *Socio-economic condition of women in tea gardens: Case study of Terai of Darjeeling and Jalpaiguri districts of West Bengal* [Doctoral dissertation, University of North Bengal]. University of North Bengal Institutional Repository.
29. Khatri, V. S. (2026). Tea, tourism and torture: Analysing the structural strains of the tourism industry in the Darjeeling Hills. *International Journal of Research and Innovation in Social Science*, 10(5), 6852–6858. <https://doi.org/10.47772/IJRIS.2026.100500459>



30. Maji, S., Krishma, & Sarkar, A. (2025). Development of homestay tourism in Tukdah village of Darjeeling district, West Bengal: A study based on the perception of homestay owners and tourists. *National Geographical Journal of India*, 71(2).
31. Majumder, S. (2025). 'Backward geographies': Contested lives and livelihoods in the tea plantation enclaves of South Asia. *Area*, 57(3), e70026. <https://doi.org/10.1111/area.70026>
32. Nandi, S., & Bhattacharya, M. (2024). Small tea growers as major producer and potential employment generator in North Bengal region: A short review. *Research Journal of Science and Technology*, 16(1), 59–67. <https://doi.org/10.52711/2349-2988.2024.00010>
33. Nepal, P., & Tirkey, L. P. (2015). Gender, governance of commons and livelihood security: A study of the North Bengal tea region of West Bengal, India. *Dynamics of Public Administration*, 32(2), 109–126. <https://doi.org/10.5958/0976-0733.2015.00009.7>
34. Pradhan, S. (2021). Viability of homestay tourism in Darjeeling hills: The identification of constraints and opportunities [Doctoral thesis, University of North Bengal]. University of North Bengal Institutional Repository.
35. Pradhan, S. M. (2024). An emerging and novel approach toward pro-poor tourism: A study of homestays in Sittong, Darjeeling, India. *Frontiers in Sustainable Tourism*, 3. <https://doi.org/10.3389/frsut.2024.1384761>
36. Pradhan, D., Roy, T. N., & Das, K. K. (2025). Agro-tourism: An emerging way for boosting rural economies and sustainable development in North Bengal, West Bengal, India. *Journal of Experimental Agriculture International*, 47(9), 280–289. <https://doi.org/10.9734/jeai/2025/v47i93748>
37. Rai, N., & Rohatgi, S. (2019). Self-help groups as an agency of women empowerment: A case study of Bijanbari Block of Darjeeling District. *International Journal of Innovative Studies in Sociology and Humanities*, 4(1).
38. Rawat, S. (2020). Rural tourism and sustainable development in Darjeeling Hills, West Bengal: Case study of Lepchajagat. *Juni Khyat*, 10(5), 13–22.
39. Samling, C. L., Bhattacharyya, S., & Chaudhuri, S. (2026). Homestay tourism and livelihood in the Darjeeling and Kalimpong Himalayan region. *IOSR Journal of Humanities and Social Science*, 31(5), 69–74. <https://doi.org/10.9790/0837-3105016974>
40. Sarkar, S., Dey, B. K., Bhattacharyya, S., & Bhuiamali, A. (2021). A strategy on tea tourism development and its empirical analysis on North Bengal in India. *Indian Journal of Applied & Pure Biology, Special Volume*, 56–67.
41. Singh, S., & Basak, A. (2022). Rural tourism and changing status of rural women in Mirik sub-division, district Darjeeling. *Research Review International Journal of Multidisciplinary*, 7(4). <https://doi.org/10.31305/rrijm.2022.v07.i04.018>
42. Sharma, P. (2026). Women empowerment through self-help groups: A case study of selected tea gardens in Darjeeling District. *Management Journal for Advanced Research*, 6(1). <https://doi.org/10.54741/MJAR/6.1.2026.292>