

Regenerative Production Landscape Collaborative: People, Nature, Economy

BASELINE STUDY REPORT FOR WESTERN MP COMPACT

Executive Summary

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CogniSphere

Technical Partner:

IORA Ecological Solutions

Introduction

The Regenerative Production Landscape Collaborative (RPLC) is an innovative partnership model in Madhya Pradesh that aims to foster agricultural ecosystems which conserve and enhance natural resources, build community resilience, and enable responsible sourcing for businesses. RPLC (People, Nature, Economy) – Compact II was launched in April 2022 to scale up regenerative and restorative agricultural practices. This collaborative effort is currently operational in eight districts of Western Madhya Pradesh. Knowledge partners IDH, along with implementing partners ASA and AKRSP, are working together with the government and private sector to promote a system-level shift towards sustainable production landscape management.

The RPLC project follows IDH's Protection, Production, and Inclusion (PPI) Framework, which focuses on sustainable production by increasing the adoption of regenerative practices, improving the income and livelihoods of vulnerable communities and women, and enhancing resource management and biodiversity. By implementing along this framework, RPLC aims to create a more sustainable and resilient agricultural system that benefits both people and the environment.

As part of the beginning of this initiative, a baseline study is being jointly commissioned by ASA and IDH, to map the indicators of the Protection, Production, and Inclusion (PPI) framework and establish a benchmark for the project areas. The study aims to identify the present status of various indicators at household and ecosystem level along with providing recommendations for possible interventions using the PPI framework. The baseline study maps the current state of the project areas that would help in developing targeted interventions that align with the PPI framework. By establishing a robust baseline, the study provides a foundation for measuring progress toward sustainable production landscape management and improving the livelihoods of vulnerable communities and women.

Objectives of the Baseline Study

The baseline study aims to provide a comprehensive snapshot of the project area and its defined areas of concern and interventions. It focuses on six impact areas: soil health, water management, improved income, preservation of biodiversity, greenhouse gas reduction, and gender equity. The study's primary objective is to establish a baseline for each impact area, identifying the current status and suggesting feasible strategies to improve outcomes. This baseline study lays the foundation for sustainable production landscape management, benefiting both people and the environment in the project area

Six Impact Areas:

- Soil Health
- Preservation of Biodiversity
- Water Management
- Greenhouse Gas Reduction
- Improved Income
- Gender Equity

Findings (Madhya Pradesh)

HOUSEHOLD (HH) SAMPLE

- 864 households in total
  15 blocks; 7 districts
- 2 treatment village, 1 control village per district: Average 18 households per village.
- Treatment villages: 68%; Control villages: 32%
- Nimar Plateau: 50%; Jhabua Hills: 31%; Malwa Plateau: 19%

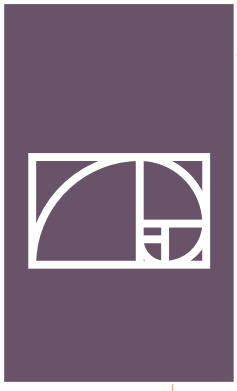
Sustainable Production

Land Classification & Profile

- Upland (31%), medium upland (54%), medium lowland (15%)
- Low access to Individual Forest Rights (IFR), Higher access in Jhabua & Ratlam pushing up the mean.
- Cereals, pulses, oilseeds grown on IFR lands, or kept fallow.

Land Holding

- Treatment: 2.8 acre / household
- Control: 3.3 acre/ household
- Caste-wise disaggregation: OBC household biggest landowners in treatment villages, SCs have smallest land holding size.
- Average landholding in ST households 2.5 acres in treatment villages, 2.2 acres in control villages.



Crop pattern

- Kharif crop grown by >96% households; both kharif and rabi crops grown by 56% households; all three season crops grown by 3.8% households
- Cropping intensity: 136%
- No major variation across treatment and control villages
- Major crops:
- Kharif: Cotton (75% of household), Maize (59% of household), Soybean.
- Rabi: Wheat (56% of household), Bengal gram/chickpea (11% of household)
- Household wise land deployment (mean):
    - Cotton: 1.5 acre; Maize: 1.2 acre; Soybean: 2 acre, Wheat: 1.8 acres.
- Cotton and maize mostly grown in upland and medium upland. Bengal gram grown mostly in upland (control group). Medium upland and medium lowland used for wheat cultivation.
- However, all types of land used for all types of crops. In some cases, the land type selection is counter intuitive (29% upland used for wheat, even though wheat is water-intensive and irrigating upland is challenging)



Irrigation

- Cotton: 21% of household growing cotton (2.5 irrigation)
- Maize: 5% of household growing maize (2.4 irrigation)
- Soybean: <1% of household growing Soybean (0.5 irrigation)
- Wheat: 99% of household growing wheat. 4.7 irrigation



Irrigation Area

- 58% cultivable area can be potentially irrigated: Average 1.2 acres of such land at household level. No significant variation between treatment and control villages.
- Variation exists between potential and actual irrigated land (as most potential irrigation sources are rainfall-dependent)



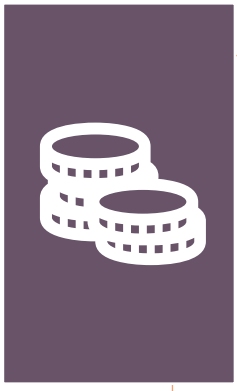
Agricultural Practices

- Line sowing is the most common method across all crops- adopted by >80% household.
- Yearly Seed replacement data (in treatment villages):
  - Cotton –97% household
  - Maize –50% households
  - Wheat – 45% household in treatment
  - Soybean -52% households
  - Gram – 49% households



Sustainable Agronomic Practices

- Higher Farm-yard manure usage (90% households) in Kharif crops (cotton, maize, soybean) vs. Rabi crops.
- Traditional composting (not an effective method because of significant nitrogen loss) most common method for FYM production.
- While newly constructed NADEP pits exist in some villages, no households reported usage of NADEP, vermi-compost, or bio-concoctions.
- Only 3% households adopted new technologies (zero-chemical fertilisers & pesticides, organic compost & other bio-inputs, indigenous seeds, intercropping)
- No household uses mulching, polyhouse, shade-net, tunnel nursery, etc.
- Chemical pesticides usage is high:
  - 82% households in cotton, 90% households in Soybean: 60% households in Maize and Gram.
  - 60% households reported using no pesticides in wheat crop.
  - Wide variation in fertiliser & pesticide usage across crops and villages. In treatment villages, households made small savings in cotton and wheat by using less fertilisers & pesticides, while reverse situation for other crops like soybean and gram.
  - By using less pesticides & fertilisers, the treatment village households save 5.7% (₹ 262/acre) in wheat and 8.1% in cotton (₹ 303/acre)



Crop Input Cost

- Cost components: seeds, land treatment, pesticides, fertilisers, irrigation, and labour
- Average cost of cotton cultivation: ₹10,265 per acre (Treatment: ₹10,089 per acre; Control: ₹10,728 per acre – difference due to less input cost of seeds, fertilizer, and pesticides)
- Average cost of maize cultivation: ₹7,525 per acre (input costs - pesticide, fertilizer, labour - higher in treatment villages; insignificant difference between total costs of cultivation in treatment and control villages)
- Average cost of soybean cultivation: ₹8,062 per acre (Treatment: ₹7,948 per acre; Control: ₹8,342 per acre – difference due to less input cost of seeds, fertilizer, and pesticides)
- Average cost of wheat cultivation: ₹9,432 per acre (Treatment: ₹9,628 per acre; Control: ₹9,800 per acre – difference due to costs of land treatment, seeds, fertilizers, and irrigation)
- Average cost of gram cultivation: ₹6,948 per acre (Land treatment and seed costs higher in treatment and control villages; costs of pesticide, irrigation, and labour higher in control villages)



Production, usage, and income from crops

- Mean productivity:
  - Maize: 8.5Q/acre; Cotton: 5.9 Q/acre; Soybean: 6.4 Q/acre; Wheat: 11 Q/acre; Bengal gram: 3.7 Q/acre
- % of production households are selling:
  - Maize: 50% of production
  - Cotton: 100% of production
  - Wheat: 57% of production
  - Gram: 68% of production
  - Most of Soybean. Amount which is not sold kept as seeds for next year.
- Average mean income from crop at a household-HH level (function of area deployed for crop, average productivity per acre, and market rate):
  - Income from cotton 14% higher in treatment villages; income from maize almost the same
    - Maize: ₹24,500/HH.
    - Cotton: ₹50,000/HH.
    - Soybean: ₹49,000/HH.
    - Wheat: ₹30,473/HH.
    - Bengal gram: ₹29, 104/HH
- Perspective:
  - Cotton productivity matches the state average (6Q/acre) while maize productivity falls below. Soybean productivity is higher in the baseline villages (6.4Q/acres vs. the state average 2Q/acre). Wheat (75% - 11.3 Q/acre against 14.5 Q/acre) and Gram productivity (56% of the state average - 3.7Q/acre vs. 6.6 Q/acre)



Livestock ownership and issues around livestock

- High ownership: only 6.9% households have no livestock.
- 80% household reported owning cows, followed by goat (66%) and Backyard Poultry (BYP) (50%)
- Average herd/stock size: 1 (big ruminants); 1.5 (small ruminants); 8 (BYP)
- Animal health care through govt. veterinary doctors (more so in control villages) and from private vets.
- Almost no or minimal inflow of income reported from livestock rearing though significant annual expenditure on livestock, especially on fodder.

Protection and Restoration



GIS data analysis – LULC, Forest cover

- Largely agricultural land with around 2% of built-up area and 3% of wetland
- Remarkable expansion and growth during the past few decades in urban built-up area, roads, and other infrastructure due to population growth, leading to land conversion and change in Land Uses and Land Cover (LULC).
- The land classification and season wise crop cover data done broadly corresponds to the data from HH survey.
- Forest cover minimal at 3.5% (only in 4 villages). Exception in Burhanpur and parts of Ratlam.
- As per the RS data, upland % highest in Malwa plateau villages and medium lowland highest in Jhabua Hills.



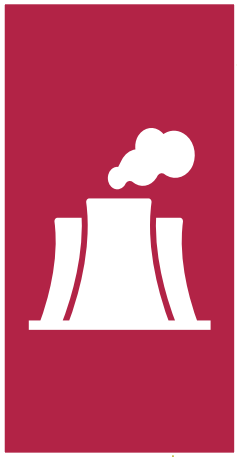
Forest Land

- Limited forest cover, accessed by only 20% households, more so in the treatment villages (maximum access in Alirajpur, Barwani and Ratlam)
- Maximum forest cover in Burhanpur district, however accessed by only 15% households.
- Forest produce: fuelwood and fodder, mahua, kendu leaves and bamboo, mostly for self-consumption.



Soil Quality

- Moderately fine, with pH within the neutral range
- On an average salt-free soils in both treatment and control areas
- Average soil organic carbon (SOC) at district level (treatment and control) between 0.42 to 0.55%, indicating not very high SOC and medium soil quality in these regions.
- Low Nitrogen and Phosphorus contents, Potassium levels high.



GHG Emissions and Carbon Sequestrations

- Enteric fermentation emissions from livestock: 1,940.37 tCO_2e/head/year; highest from cows
- Highest emissions in Barwani and Alirajpur districts (marginal farmer category)
- Paddy cultivation not very prevalent, thus, low GHG emissions
- Crop residues mostly used as cooking fuel; emissions: 1820 tCO_2e/ha.
- Fertiliser emissions (agricultural soils): 42.01 tCO_2e/Ha (maximum from small farmers)
- Emissions from diesel or electricity in areas with pump irrigation: 38.5 tCO_2e/ Ha (mostly for wheat crop)
- Mean carbon sequestration by trees on farms: 0.66 tCO_2e/Ha
- Per Acre GHG emissions: Cotton-1209 kg CO_2e, Maize: 890 kg CO_2e, Soybean – 548 kg CO_2e, Wheat: 575 kg CO_2e

Inclusion (People)



Socio-economic status of the households

- Indigenous tribal communities (97%); 61% of whom lack formal education.

Primary Sources of livelihood:

- Farming: 62%
- Casual labour: 35%
- Average number of labour days generated per household in MGNREGS: 43
- MGNREGS Job cardholding HHs: 57%
- HHs engaged in MGNERGS work in the last year: 17%

Infrastructure:

- Electric connection: 99% households (the extent and quality of this connection remain uncertain)
- Average months of food security/HH (own production): 9 months, with the Public Distribution System (PDS) filling this gap
- HHs living in kuccha houses: 41%
- 35% households owning pucca houses have received benefits from the Pradhan Mantri Awas Yojana (PMAY)



Household participation in community organisations

- SHG participation: 70%
- Producers' groups (PGs)and Farmer Producer Organizations (FPOs): 63%. (Numbers significantly higher in treatment villages)
- Joint Forest Management Committee (JFMC) participation: 1.2%
- Other Community organization participation: 10%

Benefits received:

- SHGs: Credit and grant
- PGs: Agricultural inputs
- Primary Agriculture Credit Society (PACS): Loans and Agri inputs



Access to banking and insurance services

- Savings accounts: 99% (primarily Jan Dhan Yojana)
- Enrolments in Ayushman Bharat and PM Kisan schemes common.
- Higher access to govt subsidy among treatment group, with mean subsidy amount significantly higher than control group



Access to extension services

- Village level Extension workers committee (VLW) visits more common in treatment villages
- Only 8.6% HHs took support from VLWs.
- 53% HHs in treatment villages confirmed monthly VLC visits, while 51% of control group confirmed annual visits.



Access to soil health card and soil testing

- Soil quality tested by only 12.1% of surveyed households.
- 5.9% households have Soil Health Card



Access to credit

- Credit taken by 31% households.
- Average loan amount per HHs in the past one year: ₹70,120
- SHG is the major loan source in treatment villages, while money lenders are a source of loan for 30% families in control group.
- Loans for production and consumption purposes almost similar in control and treatment villages



Migration status and remittance

- Short- and long-term migrations in 51% HHs (53% - control group; 49% - treatment group), with 1.6 male and 1.1 female members from a household migrating
- Mean income from migration: ₹62,000/HH
- Annual mean home remittance: ₹35,000/HH



Household income and expenditure

- Mean income (baseline villages): > ₹132,600/pa
- Main sources of income: Agriculture, followed by remittance and salary (including pension)
- Net income from livestock low (considering the expenditure on livestock)
- Household income is directly proportional to land holding and agriculture activity, except for landless farmers, who earn more than HHs with very small parcel of land (<1 acre)
- Mean annual expenditure: ₹101,2700/ annum in treatment villages and ₹ 93,745/ annum in control villages. – lowest at ₹76,000/HH in control villages of Burhanpur, highest at ₹112,000/HH in treatment villages of Ratlam
- Maximum expenses on food (43%) for both treatment and control villages, followed by social events (14% of total income) and other household expenses (12%)
- Minimal expenses on health and education

Recommendations



Project strategy around NRM relevant. Land treatment strategies to be according to the land type and status. Bunding and trenching may be probable pathways with drainage line treatment in few areas.



Project strategy around water resource also very relevant - In-situ moisture conservation measures required however on field bunding may be an issue as there is community resistance in some geography. Scope for creation of WDS. Village planning to harvest max precipitation may lead to the scope of NRM.



Crop planning around water availability need to be the cornerstone activity.

A deeper analysis of land type, soil type, water availability, investment, and return (both financial and nonfinancial) may be required to develop the best crop matrix.

Need for Oilseeds and pulses to be added to the intervention stack.

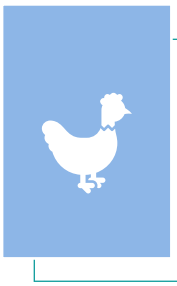
Revival of traditional crops, millets, kitchen garden, bund plantation with fruit trees, perennial pulses need to be explored. Project's strategy for responsible cotton is in the right direction. Veg cultivation may be a possibility in certain geographic cluster



For soil carbon enhancement – introduction of legumes and green manuring along with large scale and regular organic manure application, NADEP and vermi-composting may be introduced at a scale.



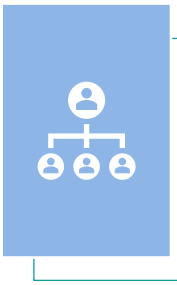
Since forest land is limited and nothing can be done in that patch without forest permission, probable pathways may be identifying barren/ fallow land and develop models around silvi-pasture and agro forestry for both fodder and income enhancement including carbon sequestration.



The coupling between land-agri-livestock needs further exploration to fix the cattle herd size and support need to be extended accordingly.



Youth engagement in agri and reduction in migration can only happen if per acre additional return is to the tune of 50-60K. The intervention plan needs to address these two issues



The existing organizations like SHGs needs leveraging. The capacity building inputs may come from project in absence of NRLM team. Rigorous capacity building on livelihood and agriculture, both for local producer groups and SHGs would enhance the quality of intervention as well as ensure long term sustainability.



Training of project staff to comprehend the complex issues of landscape and do ecosystem level planning will be an important step.



Development of certain key output and intermediate outcome indicators and benchmarking against them; strong MIS development for data capture and using a simple dashboard for decision making. A mid-term evaluation would add considerable value to gauge progress and do mid-course correction.