Economics of Land Degradation

Insights from an evaluation study in Bundelkhand by Development Alternatives Group

Presented at UNCCD COP 14
Rio Pavilion
3rd September, 2019
• Land Degradation – Current scenario in India
• Bundelkhand – A Brief Profile
• Introduction to Project- ELD
• ELD Methodology Adapted to Local Context
• Insights from Field : TBL impact of Land Management.
• Initial Evaluation Findings
• Opportunities for India
• Emerging Questions
- India, with 2.4% of the world’s land but 17% of its population has very low per capita availability of land (SoER, 2015)
- 97 mn (i.e. 29%) hectares of land is under degradation and of this 83 Mha is undergoing desertification (SoER, 2015)
- Major causes of degradation are water erosion (36 Mha) and wind erosion (18 Mha) (SoER, 2015)
- 67% of net sown area is rain-fed and therefore completely dependent on ecosystems for water access (CRIDA)
- India is losing Rs. 28,500 crore, on account of degraded lands equal to 12% of total value productivity of these lands (Ankita Rai, 2015)
The Bundelkhand Context

**Environmental**
- Reduced precipitation rate by 32% between 2013-2018 (IMD)
- 33% of the cropped area receives less than 750 mm rainfall
- 22% of total area under forests mainly shrub and heavily encroached
- Shift in monsoon period by 55-60 days, from mid-June to mid-August
- 70% of tanks, ponds and reservoirs are dry due to fall in surface and groundwater

**Social**
- Seasonal migration rate in Bundelkhand is 39.4%
- Aggregated HDI rank at 0.594 is amongst the lowest in the country (India average is 0.663)
- Average literacy rate 66%, lower than the state average of MP and UP which is 69%
- 48% of population below poverty line
- 26% of population belong to lower social class

**Economic**
- Per capita income is 50-55% lower than the national average
- 67% population is in agriculture and 77% of those are small and marginal farmers
- Small and fragmented size land holdings
- Per capita food availability is only 330kg per annum
- 48% of population below poverty line
- 26% of population belong to lower social class

**Map Note:** Reproduced with permission.
### Watershed Development
- Soil water conservation
- Participatory net planning
- GIS based planning
- Water use efficiency

### Sustainable Agriculture
- Crop diversification and integrated farming
- Climate resilient agri-practice
- Organic farming
- Farmer producer Org.

### Climate Adaptive Planning
- Awareness generation
- Climate adaptive decentralized planning

### Reviving Natural Ecosystems
- Ecological rejuvenation in arid and semi arid region
- Afforestation

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**Research & Policy Influence**

**Training & Capacity Building**

**Outreach & Awareness Creation through Rural Communication Channels**
Insight from Field: Triple Bottom-Line Impact of Land Management

Integrated Natural Resource Management

Social Wellbeing

Ecological Security

Economic Development

TBL Impact

- participatory management
- social cohesion
- investment in health, education
- reduced migration

- reduced degradation, erosion
- aquifer recharge, soil OC, moisture
- improved biodiversity, biomass
- pollination services

- drought resilience
- improved crop yield, fodder
- improved income
- Improved agri-practice

Improved Natural Capital
We present an ‘economic’ approach that values natural resources under different management regimes to combat desertification.

Using the value of ecosystem services, the augmented value of our natural capital is estimated as a function of how the ecosystems are used and managed.

Increases in the value of services of land through remediation are compared with the costs of remediation.
To evaluate the potential of land remediation activities as beneficial and cost effective measures for combating desertification.

To develop a toolkit for assessment of similar land remediation programmes under similar environmental and socio-economic conditions.

To evaluate changes in SDG indicator values for a reduction in land degradation.

Geographical Coverage
3 districts: Datia, Shivpuri, Niwari

Comparison Period
2013 and 2018

Partners:

bc3 | BASQUE CENTRE FOR CLIMATE CHANGE
zc | Sustainability, that’s it!

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

GREEN GROWTH
Knowledge Platform

Development Alternatives
ELD Research Methodology Adapted to Local Context

Perceptions Mapping

Primary and secondary data collection

GIS based mapping

Social capital assessment

InVEST
Software based analysis

InVEST GLOBIO

Habitat Quality
Crop Pollination
Carbon storage and Sequestration
Forest Carbon Edge Effects
Annual Water Yield
Nutrient Delivery Ratio
Sediment Delivery Ratio
Seasonal Water Yield
Crop Production
Visitation: Recreation and Tourism
Social Capital

Inception
Geographical categorization
Types of Ecosystem Services
Ecosystem services and economics
Identifying Patterns and Pressures
Cost benefit analysis and others
Take action

Crop Production

Habitat Quality

Crop Pollination

Carbon storage and Sequestration

Forest Carbon Edge Effects

Annual Water Yield

Nutrient Delivery Ratio

Sediment Delivery Ratio

Seasonal Water Yield

Visitation: Recreation and Tourism

Social Capital
Initial Evaluation Findings – Land Use Changes from 2013 to 2018 – In Intervention Cluster

Data Source: Survey of India, MPOCDT, Department of Agriculture, FSI

Legend
- Beneficiary Villages
- Moderately Dense Forest
- Open Forest
- Single Crop (Kharif Season)
- Single Crop (Rabi Season)
- Double Crop Land
- Fallow Land
- Grazing Land
- Revisous / Gullied Land
- Stony / Waste Land
- Habitation
- Water Body
- Agriculture in Forest
- District Boundary

Development Alternatives
Initial Evaluation Findings – Land Use Changes from 2013 to 2018 – In Intervention Cluster

- Conversion of single cropped land to double cropped land
- Increase in on-farm habitation
Initial Evaluation Findings – Relative Change in Land Use from 2013 to 2018 – In Intervention & Control Cluster

2013

2018

- Increase in area under double cropping by 3 times in the beneficiary village

- All the single crop area during rabi season (Oct-Feb) got converted to double cropping, farmers have started cultivating Khariff season crops like paddy, groundnut and Black gram

- Increase in double crop area in control villages also, but not as much as in intervention villages
Initial Evaluation Findings - Crop Production

**CROP AREA (In ha)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Intervention Villages</th>
<th>Control Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>7.4</td>
<td>6.4</td>
</tr>
<tr>
<td>2019</td>
<td>30</td>
<td>17.7</td>
</tr>
</tbody>
</table>

**TOTAL PRODUCTION (In quintals)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Intervention Villages</th>
<th>Control Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>11692</td>
<td>53939</td>
</tr>
<tr>
<td>2019</td>
<td>10332</td>
<td>30812</td>
</tr>
</tbody>
</table>

**PRODUCTIVITY (Quintals/ha)**

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<thead>
<tr>
<th>Year</th>
<th>Intervention Villages</th>
<th>Control Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>0</td>
<td>1000</td>
</tr>
<tr>
<td>2019</td>
<td>30</td>
<td>17.7</td>
</tr>
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</table>

**VALUE PER HA (INR)**

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## Benefits from land remediation

<table>
<thead>
<tr>
<th>Benefits from land Remediation</th>
<th>Rs. Lakh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If Sustained (For 30 years)</td>
</tr>
<tr>
<td>Crop Production</td>
<td>10,033</td>
</tr>
<tr>
<td>Carbon Sequestered</td>
<td>332</td>
</tr>
<tr>
<td>Total</td>
<td>10,364</td>
</tr>
<tr>
<td>Costs of Remediation (Project costs)</td>
<td>450</td>
</tr>
<tr>
<td><strong>Benefit-Cost Ratio</strong>*</td>
<td><strong>23.0</strong></td>
</tr>
</tbody>
</table>

*Benefits are present values at 4% discount rate
• The initial results show that the benefits received from the land remediation activities (natural capital) are much greater than the costs and are unparalleled in terms of economic value.

• The study can provide scientific evidence for policy recommendation of where to invest in remediation and how much to invest.

• It can contribute to India’s commitment of achieving the LDN targets of halting any further land degradation and rehabilitation of at least 30 m ha degraded wasteland, forest and agricultural land.
• Can this methodology play an important role in restoring the land degradation and achieving the LDN target?

• Can this contribute to the decision making and incentivize investments in land restoration?

• Can this influence biodiversity conservation and better management of ecosystem services?
THANK YOU