Geospatial Impact Evaluation and Valuation of Land Degradation Projects

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Impact of GEF Land degradation interventions?

Factors associated with the environmental outcomes?

Value for Money in terms of Carbon sequestered?

Objectives
PORTFOLIO HIGHLIGHTS

237 projects
$630 million in grant funding
$2.97 billion in cofinancing

Number of projects*

GEF phase
3 4 5 (6)
0 50 100 150 200 250

Grant amount*

GEF phase
3 4 5 (6)
0 250 500 750 1,000

Top 3 agencies*
43% UN Development Programme
17% World Bank Group
17% UN Environment Programme

Regional distribution*
34% Africa
24% Asia
20% Latin America & Caribbean
13% Europe and Central Asia
7% Global
2% Regional

Total GEF funding per region*

Global 11%
Regional 32%
Africa 34%
ECA 8%
LAC 8%
Asia 7%

*Includes LDFA and multifocal projects.

GEF Land Degradation Focal Area
GEF Land Degradation Projects
Indicators

Vegetation Productivity (Tier 2a)

Forest Cover (Tier 1)

Carbon Sequestration (Tier 2b)

Forest Fragmentation (Tier 3a)
Methodology

1. Geocoding
2. Geospatial data
3. Data integration
4. Matching analysis
5. Causal trees analysis
6. Valuation of Carbon sequestration
Uncertainty in Estimates (±/ @ 95% Confidence Interval)

- [96.86, 130.8]
- (130.8, 164.8]
- (164.8, 198.8]
- (198.8, 232.8]
- (232.8, 266.7]

Matched Model: SFA Land (Treated), Null Case Comparisons (Control)

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>0.08**</td>
<td>0.03, 0.14</td>
<td>0.01</td>
</tr>
<tr>
<td>Dist. to Rivers (m)</td>
<td>-0.04</td>
<td>-0.14, 0.07</td>
<td>0.01</td>
</tr>
<tr>
<td>Dist. to Roads (m)</td>
<td>0.06*</td>
<td>-0.01, 0.12</td>
<td>0.01</td>
</tr>
<tr>
<td>Elevation (m)</td>
<td>-0.18***</td>
<td>-0.31, -0.06</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Slope (degrees)</td>
<td>-0.11**</td>
<td>-0.21, -0.02</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Urb. Dist. (rel)</td>
<td>-0.01</td>
<td>-0.08, 0.07</td>
<td>0.01</td>
</tr>
<tr>
<td>Pop. Density (2000)</td>
<td>0.06</td>
<td>0.04, 0.17</td>
<td>0.01</td>
</tr>
<tr>
<td>Protected Area %</td>
<td>0.03**</td>
<td>0.03, 0.14</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Treecover (2000, %)</td>
<td>0.05</td>
<td>0.04, 0.13</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Latitude</td>
<td>-0.09</td>
<td>-0.16, 0.003</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Longitude</td>
<td>-0.13**</td>
<td>-0.22, -0.03</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Max Precip. (2002, mm)</td>
<td>-0.42***</td>
<td>-0.58, -0.27</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Min Precip (2002, mm)</td>
<td>-0.08</td>
<td>-0.17, 0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Mean Precip (2002, mm)</td>
<td>0.23***</td>
<td>0.08, 0.45</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Max Temp (2002, C)</td>
<td>0.004</td>
<td>-0.03, 0.34</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Min Temp (2002, C)</td>
<td>-0.28</td>
<td>-0.78, 0.22</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Mean Temp (2002, C)</td>
<td>-0.23</td>
<td>-0.98, 0.52</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Nighttime Lights (2002, Relative)</td>
<td>-0.02</td>
<td>-0.10, 0.06</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>NDVI (2002, Unitless)</td>
<td>0.01</td>
<td>0.07, 0.10</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Urb. Dist. (rel) *Treatment</td>
<td>-0.04</td>
<td>-0.08, 0.07</td>
<td>&lt;0.01</td>
</tr>
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<td>Dist. to Rivers (m) *Treatment</td>
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<td>Pop. Density (2000) *Treatment</td>
<td>-0.06</td>
<td>-0.17, 0.04</td>
<td>&lt;0.01</td>
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<tr>
<td>Latitude *Treatment</td>
<td>0.03</td>
<td>0.06, 0.12</td>
<td>&lt;0.01</td>
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<tr>
<td>Longitude *Treatment</td>
<td>0.08</td>
<td>0.02, 0.17</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>NDVI (2002, Unitless) *Treatment</td>
<td>0.07</td>
<td>-0.01, 0.15</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Elevation (m) *Treatment</td>
<td>0.25**</td>
<td>0.12, 0.37</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Slope (degrees) *Treatment</td>
<td>-0.12**</td>
<td>-0.22, -0.02</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Treecover (2000, %) *Treatment</td>
<td>-0.03</td>
<td>-0.11, 0.06</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Max Temp (2002, C) *Treatment</td>
<td>0.57***</td>
<td>0.24, 0.90</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Min Temp (2002, C) *Treatment</td>
<td>-1.05***</td>
<td>-1.80, 0.31</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Nighttime Lights (2002, Relative) *Treatment</td>
<td>0.01</td>
<td>-0.05, 0.09</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Protected Area % *Treatment</td>
<td>-0.02</td>
<td>-0.07, 0.04</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.01</td>
<td>-0.06, 0.05</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Observations: 966
R²: 0.30
Adjusted R²: 0.27

Note: *p<0.1; **p<0.05; ***p<0.01
Findings about location

- Positive increase in NDVI
- 25 km of protected area
- Low density
- Variable characteristics
- Some without forest cover
Causal tree

NDVI
Findings: NDVI

Less effective near urban areas

Time required

Multifocal

Initial conditions

Environmental and social characteristics

Findings: NDVI
Findings: Forest cover

- 4.5 years after Population density
- More effective near urban areas
GEF land degradation project valuations
Findings

43.52 tons of carbon sequestered per hectare

108,800 tons of carbon sequestered per project location

$7,500,000 contributed by sequestration alone
Use a learning-based approach as an initial screening tool for project planning.

Collect the exact geographic information of GEF land degradation activities on an ongoing basis.

Need to mainstream proposed by the UNCCD’s Land Degradation Neutrality Framework.

Suggestions
Thank you