Development and co-design of a Land Degradation Neutrality software tool

GEO-LDN Competition: Sneak Preview Event, 10 December, 2020
Proposal L: Vanja Westerberg, Luis Costa, Simon Reynolds, Ronel Lefranc & Daniel Banuoko
Our team

• Team Leaders
  - Vanja Westerberg
  - Simon Reynolds
  - Luis Costa

• Representative(s) of a (sub-)national stakeholder group:
  - PDL, Haiti - Ronel Lefranc - Responsible for M & E
  - CIKOD, Ghana - Daniel Banouko – Deputy director
    - Zakari Issah - Physical Land Use Planner: Lawra and Nandom Municipal Assemblies

• International collaborators:
  - Groundswell International – Steve Brescia, Executive Director;
  - Christopher Sacco, Director of Programmes
  - Peter Gubbels - Director for Action Research and Advocacy West Africa for Groundswell International
Land in Haiti is in high demand for housing, infrastructure, mining, tourism and farming. Urgent need for an **effective monitoring framework to help inform land use planning decisions**, make optimal trade-off and meet LDN targets.

PDL & CIKOD want to increase the impact of the interventions and see the effects of previous interventions.

- **Improve resilience to climate change impact**
  - Restore vulnerable mountain ecosystems – reducing run-off, flash floods and land slides.

- **Demonstrate** to local, regional and national decision makers that agro-ecological farming contributes to objectives of land degradation neutrality and disaster risk resilience using **objective metrics**.

- Secure policy support and finance for these interventions.
Regenerate degraded farmland & ensure high returns on land use investments
  - Permanence of sustainable interventions (management of fire risks).
  - Food security
    Farmers are reducing farm sizes, but not able to obtain the levels of productivity needed to support their livelihoods.
  - Climate change adaptation
    - Increase soil moisture retention to adapt to drought/dry spells
Minimize and counteract, cattle herder & farmer conflicts
  - Plan for grazing corridors and management of transhumance cattle mobility
Policy level
  - Advocate for the inclusion of SLM in the successor policy of the Food and Agricultural Sector Development Programme in Ghana.
• Groundswell supports farmers’ groups through a practical “learning by doing” approach. Farmers test ecological farming principles and practices, adopting those that work best on their farms.

  • Farmers spread these approaches through farmer-to-farmer learning networks.

• Groundswell supports this process with our network of carefully selected local partner organizations and allies (10).

• Help strengthening methodologies and capacities & making critical investments to ensure ongoing innovation & continuous learning that can be scaled up.

• The tool can allow Groundswell to better monitor and evaluate progress of their partners and help create an enabling policy context to scale-up the best innovations.
What is the tool?
What is the tool?

• **Visualisation** of land degradation trends & successes

• **Identify** areas to intervene
  • Degrading, stable and improving...

• **Plan interventions**
  • **Navigate trade-offs** while securing the well-being of land users.
User journey: Visualise (step 1: funding secured)

LDN Analysis Tool

Please select a Country, Start and Target Year, or upload your saved settings file to start where you left off.

Country

Start Year
2015

Target Year
2019

Time-horizon: 2015 - 2019
User journey: Visualise (step 2: find region)

Haiti LDN Analysis

Please click on a region on the map to begin analysis.

Key Indicators
SDG 15.3.1 (Degraded Land / Total Area): 0.05 %
National Net Change / Total Area: -0.16 %

Analysis Layers
- Land Cover Pixel Layer
- Fire Frequency Layer

Settings

Select region, based on degradation status.
They click to retrieve more detail information.
User journey: Visualise (step 3: regional data)

Haiti LDN Analysis
Saint-Raphael

Key Indicators
SDG 15.3.1 (Degraded Land / Total Area): 0.05 %
National Net Change / Total Area: -0.16 %
Selected Region Net Change / Total Area: -0.13 %
User journey: Identify (step 4: zoom in)
User journey: Identify (step 5: add risk layers)

- Look at new layer

Key Indicators
- SDG 15.3.1 (Degraded Land / Total Area): 0.05 %
- National Net Change / Total Area: -0.16 %
- Selected Region Net Change / Total Area: -0.13 %
User journey: Identify (step 6: add base layers)

Examines terrain and satellite images...
User journey: Planning (step 7: plan 2030)

Create a scenario.

Saint-Raphael

Land Cover Transitions
- Tree_Cover to Grassland
- Tree_Cover to Cropland

Land Types by Year
- Artificial
- Bare_Land
- Croplands
- Grasslands
- Tree_Cover
- Water_Bodies
- Wetlands

Net Change
-150
-100
-50
0

2015
2019
2019_Scenario

Pixel Count
10
50
100
500
1,000
5,000
User journey: Planning (step 8: adjust changes)

Haiti LDN Analysis
Saint-Raphael

<table>
<thead>
<tr>
<th>ADM2_NAME</th>
<th>Tree_Cover to Grasslands</th>
<th>Tree_Cover to Croplands</th>
<th>Tree_Cover to Artificial</th>
<th>Grasslands to Croplands</th>
<th>Grasslands to Artificial</th>
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<tbody>
<tr>
<td>Saint-Raphael</td>
<td>-127.427</td>
<td>-149.58</td>
<td>0</td>
<td>-28.706</td>
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**LDN scenario**

<table>
<thead>
<tr>
<th>Property</th>
<th>2015</th>
<th>2019</th>
<th>LDN scenario</th>
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<tbody>
<tr>
<td>Artificial</td>
<td>11</td>
<td>11</td>
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<tr>
<td>Bare_Land</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Croplands</td>
<td>782.89</td>
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<tr>
<td>Grasslands</td>
<td>132.718</td>
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<td>Tree_Cover</td>
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<tr>
<td>Water_Bodies</td>
<td>0</td>
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<tr>
<td>Wetlands</td>
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</table>

Adjust predicted changes…

User views raw data…

Make adjustment according to desired objectives
User journey: Planning *(step 9: Trade-off matrix)*

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<tr>
<th></th>
<th>BAU</th>
<th>LDN S1</th>
<th>LDN S2</th>
<th>Global /External source</th>
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<tbody>
<tr>
<td>Crop yields (t/ha)</td>
<td>-10%</td>
<td>+20%</td>
<td>+50%</td>
<td>G / E</td>
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<tr>
<td>Total crop production (M tonnes)</td>
<td>+++</td>
<td>+++</td>
<td>++</td>
<td>G / E</td>
</tr>
<tr>
<td>Crop revenues ($/ha)</td>
<td>$100/ha</td>
<td>$150/ha</td>
<td>$300/ha</td>
<td>G / E</td>
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<tr>
<td>SLM implementation costs ($/ha)</td>
<td>$0/ha</td>
<td>$200/ha</td>
<td>$500/ha</td>
<td>G / E</td>
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<td>Pay-off period</td>
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<td>2</td>
<td>5</td>
<td>G / E</td>
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<tr>
<td>Natural tree cover (hectares)</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>G</td>
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<tr>
<td>Soil Organic Carbon</td>
<td>-</td>
<td>++</td>
<td>+</td>
<td>G</td>
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<tr>
<td>Erosion and flood risk</td>
<td>-</td>
<td>+</td>
<td>0</td>
<td>G</td>
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<tr>
<td>Drought risk</td>
<td>-</td>
<td>+</td>
<td>0</td>
<td>G</td>
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<tr>
<td>Soil water retention</td>
<td>+</td>
<td>++</td>
<td>+</td>
<td>G</td>
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<td>Neutrality</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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</table>
User journey: PDL’s Thoughts

Haiti LDN Analysis
Saint-Raphael

Key Indicators
SDG 15.3.1 (Degraded Land / Total Area): 0.05%
National Net Change / Total Area: -0.16%
Selected Region Net Change / Total Area: -0.13%
Functionalties of the tool beta version

- Global Coverage
- Historical Data Visualisation
- Key Indicators
- Analysis Layers
- Scenario Planning
Functionalities to be added to arrive at the final tool prototype

• Forecasted Data (SOC, NPP, Land Cover)
• Additional Analysis Layers
  • Flood & Erosion Risk
  • Drought Risk
  • Crop yields
  • Population density
• Import and Export Functionality
• Enhanced Trade Off Analysis
Our project plan and status

Proof of Concept
- Historical Data Visualization
- Scenario Planning
- Calculation of Trade-Offs

Minimum Viable Product
- Forecasted Data
- Filter Layers
- Import and Export of Neutrality Mechanism Balance Sheets
- Refinement of Trade-Off Calculations

2021 Roadmap
- Support for Private Datasets
- Enhanced Frontend
Thank You
User Journey: PDL (further steps in slides 10 to 16)

Motivation for using the LDN tool
Land in Haiti is in high demand and for competition purposes.

PDL's mission is to regenerate degraded farmland and sustainably intensify.

Step 1:
New funding secured, PDL want to widen their communes covered and has pledged to ensure “no net loss” and at best “net positive impact” within the landscape where they work.

Step 2:
They use the LDN tool to find new communes to work with.

Channels

Action points

Next steps (see slides 10 to 16)
Off-system + on the tool

Pain points
Poor internet connectivity.
- Calculations within google earth servers
- Only data being looked at is loaded.

Ability to select appropriate scale.