LADA

Land degradation assessment in drylands

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Outline

- Overview of LADA
- What is land degradation?
- The importance of land degradation in dryland areas
- Previous global assessments of land degradation
- Development of LADA methodologies
- Current status of LADA
- Conclusions
Overview of LADA

Project: global assessment of land degradation

- Exploratory workshop (December 2000)

Partly GEF Funded through UNEP
700k (B) - 4 Million US$(C)

- in direct support of the UNCCD
- executed by FAO with numerous partners
LADA partnership

At national and regional levels:
National CCD focal institutions, land and water depts.,
Regional bodies of UNCCD, ..

At International level:

[Logos of various organizations]
What is land degradation?

**Degraded land**
Land which due to natural processes or human activity is no longer able to sustain properly an economic function and/or the original ecological function (ISO, 1996).

**Vegetation degradation**
Implies reduction in biomass, decrease in species diversity, or decline in quality in terms of the nutritional value for livestock and wildlife (Eswaran et al, 2000).
What is land degradation?

“Soil” degradation

Decline in soil qualities commonly caused through improper use by humans (ISSS, 1996). This includes physical, chemical and/or biological deterioration.

• loss of organic matter; decline in soil fertility,
• decline in structural conditions; erosion
• adverse changes in salinity, acidity or alkalinity
• the effects of toxic chemicals, pollutants or excessive flooding
What is land degradation?

.... encompasses the whole environment but includes individual factors:

- **Soils**
- **Water resources** (surface, ground)
- **Forests** (woodlands)
- **Grasslands** (rangelands)
- **Croplands** (rainfed, irrigated)
- **Biodiversity** (animal, vegetative cover, soil).
What is land degradation?
Land degradation in drylands

Aridity Index
(P/PET)
(Grid Resolution 30° x 30°)

DRYLANDS: home & livelihood for over 2 billion people

Previous global assessments

- **GLASOD** - only usable source of global data despite known limitations
  - ISRIC (commissioned by UNEP in 1988; in preparation for UNCED 1992; extent of human-induced soil degradation; published in 1990)

- Expert judgement of degradation status (type, extent, degree, rate and cause) for individual polygons on a national/sub-national level

- Regional data: ASSOD (1997); SOVEUR (2000)
  - more detailed than GLASOD
Previous global assessments

Estimate for each physically-homogeneous mapping unit

- **Type of degradation**: (water/wind erosion; chemical/physical deterioration)
- **Degree of degradation**: (light, moderate, strong, extreme)
- **Relative extent of degradation** (% of mapping unit affected)
- **Causes**: (deforestation, overgrazing, agricultural activities, over-exploitation of vegetation, industrial activities)

<table>
<thead>
<tr>
<th>Degree of degradation</th>
<th>Extent of degradation (% of mapping unit affected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>light</td>
<td>0-5% 5-10% 10-25% 25-50% 50-100%</td>
</tr>
<tr>
<td>moderate</td>
<td></td>
</tr>
<tr>
<td>strong</td>
<td></td>
</tr>
<tr>
<td>extreme</td>
<td></td>
</tr>
</tbody>
</table>

Degradation severity classes:
- light
- moderate
- severe
- very severe
Previous global assessments

Soil degradation

- Very degraded soil
- Degraded soil
- Stable soil
- Without vegetation

GLASOD mapping scale 1:10m
Previous global assessments

Severity of soil degradation in Latin America
Previous global assessments

Total human-induced degraded area (%)

Area of land with severe and very severe human-induced land degradation.
Previous global assessments

Legend
- None
- Light
- Moderate
- Severe
- Very Severe
- Not Classified

Actual Extent Affected

<table>
<thead>
<tr>
<th>Extent</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrequent</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Common</td>
<td>5 - 10</td>
</tr>
<tr>
<td>Frequent</td>
<td>10 - 25</td>
</tr>
<tr>
<td>Very Frequent</td>
<td>25 - 50</td>
</tr>
<tr>
<td>Dominant</td>
<td>&gt; 50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Severity</th>
<th>Mapped (km²)</th>
<th>Mapped Population</th>
<th>Population %</th>
<th>Population density</th>
<th>Wasteland (km²)</th>
<th>Infrequent (km²)</th>
<th>Common (km²)</th>
<th>Frequent (km²)</th>
<th>Very frequent (km²)</th>
<th>Dominant (km²)</th>
<th>Degraded (km²)</th>
<th>Degraded %</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>611.0</td>
<td>617,113</td>
<td>4.9</td>
<td>5.26</td>
<td>617,113</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Light</td>
<td>27.1</td>
<td>270,171</td>
<td>6.1</td>
<td>15.06</td>
<td>-</td>
<td>0.754</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6.754</td>
<td>0.66</td>
</tr>
<tr>
<td>Moderate</td>
<td>2.5</td>
<td>253,854</td>
<td>0.9</td>
<td>13.52</td>
<td>-</td>
<td>-</td>
<td>0.99</td>
<td>3.012</td>
<td>-</td>
<td>-</td>
<td>3.702</td>
<td>0.37</td>
</tr>
<tr>
<td>Severe</td>
<td>0.5</td>
<td>54,279</td>
<td>0.2</td>
<td>82.2</td>
<td>702.3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11,863</td>
<td>-</td>
<td>11,863</td>
<td>1.17</td>
</tr>
<tr>
<td>Very Severe</td>
<td>1.9</td>
<td>17,980</td>
<td>0.8</td>
<td>720.32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>13,305</td>
<td>12,906</td>
<td>12,906</td>
<td>1.24</td>
</tr>
<tr>
<td>Not Classified</td>
<td>0.3</td>
<td>3,000</td>
<td>0.0</td>
<td>130.11</td>
<td>3,000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>TOTALS</td>
<td>100.0</td>
<td>998,255</td>
<td>100.0</td>
<td>0.754</td>
<td>0.754</td>
<td>0.99</td>
<td>14.065</td>
<td>0</td>
<td>13,393</td>
<td>35,604</td>
<td>35,604</td>
<td>3.50</td>
</tr>
</tbody>
</table>
GLASOD LIMITATIONS

- Small scale: not appropriate for national breakdowns
- Expert judgement: qualitative & subjective
- Visual exaggeration: each polygon which is not 100% stable shows a degradation colour, even if only 1 to 5% of the polygon is actually affected
- Extent classes (5) rather than percentages
- Complex legend: combined extent and degree (severity) for four major degradation types (water and wind erosion, physical and chemical deterioration)
- Only “dominant” main type of degradation is shown in colour; Degradation sub-types only shown by codes
- Only “bad news”

Source: GLASOD  http://lime.isric.nl/index.cfm?contentid=158
LADA: Major objectives

- Develop technical approaches to land degradation assessment at different spatial & temporal scales
- Establish links between land degradation status & causes/pressures (biophysical & socio-economic)
- Provide standardized, objective data/information on land degradation
- Assess impacts of land degradation on human society & the environment
## LADA: potential assessment tools

<table>
<thead>
<tr>
<th>METHODOLOGY</th>
<th>Pros</th>
<th>cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert opinion</td>
<td>Rapid, low cost</td>
<td>subjective</td>
</tr>
<tr>
<td>Remote sensing</td>
<td>Mod. rapid, Mod, low cost, objective</td>
<td>Focus on land cover</td>
</tr>
<tr>
<td>Field monitoring</td>
<td>Direct observation of land condition, objective</td>
<td>Slow, high cost</td>
</tr>
<tr>
<td>Productivity (e.g. yield)</td>
<td>Direct observation of LD impact</td>
<td>Variations also influenced by other factors</td>
</tr>
<tr>
<td>Participatory (e.g. farmers’ opinions)</td>
<td>Grass-roots view on impact, driving factors</td>
<td>Slow, subjective</td>
</tr>
</tbody>
</table>
Rising demands
Agriculture sector: products / inputs
- over grazing
- nutrient mining
Waste disposal

Poverty & migration
Reduction in products & services
- Carbon sequestration
- Water quality; biodiversity
Habitat destruction

Macro-economic policies
Growth in population, income
Land use
Land tenure
Poverty
Natural disasters

Macro-economic policies
Land tenure policies
Conservation/
rehabilitation
Early warning systems
Investments

Ecosystem Approach
- spatial scales
- temporal scales

Driving forces
Pressures
Impacts
State
Reponses

LADA analytical framework - PSIR
LADA approach & methodologies

**DRIVING FORCES**
- Macroeconomic policy
- Lack of markets
- Population growth
- Poverty
- Ignorance
- Land tenure laws
- Climate change
- No institutional co-operation on land issues

**PRESSURES**
- demand for food and fibres
- Urban pressure for land & infrastructure
- Livestock pressure
- Drought; Fires
- unsuitable land use & mgmt.
- Lack of inputs nutrient, water
- Unfavourable soil and terrain conditions

**RESPONSES**
- Macroeconomic policy
- Land tenure policy
- Monitoring
- Early Warning Systems
- International Conventions
- Investment in Land and Water inputs
- Education
- Infrastructure
- Farmer Field Schools
- Conservation
- Rehabilitation

**IMPACTS**
- Less food produced
- Poverty & Migration
- Habitat destruction
- Loss of vegetation
- Silting of dams
- Salinization

**State**

- Land Productivity Decline
- Soil Nutrient Decline
- Soil pollution
- Soil deformation, erosion
- Soil compaction
- Salinization and Sodification
- Decline of vegetative cover
- Decline of biodiversity
- Drop of groundwater level
- Loss of water quality
- Carbon storage decline
- Soil moisture storage decline
Potential indicators: Pressure

1. Percentage of agricultural land under exploitation
2. % of agricultural land used for crops (annual/ permanent)
3. Number of hectares of agricultural land per farmer; arable land per capita
4. Ratio of cultivated to cultivable land
5. Ratio of cultivated land to fallow land
6. Increase in cropping intensity (harvested areas/total cropland)
7. Increase in percentage irrigated area to cropland area
8. Percentage of cultivation on open access land, common property and private property
9. Land use (e.g. cultivated areas) in areas of high erosion potential
LADA: national assessment

Suggested steps

1. Participative identification of land degradation problems and users needs
2. Establishment of a LADA (National) Task Force;
3. Stocktaking exercise/ Preliminary Analysis;
4. Develop Stratification and Sampling strategy ;
5. Local Assessment, Baseline for monitoring and RS Analysis ;
6. Information integration, dissemination and use : (development of Land Policy Decision Support Tools)
7. Development of a LADA monitoring tool;
LADA: pilot study - Senegal

LC/LU changes - Kaolack 1988-1999

- LC/LU trends (Landsat)
- NDVI trends (AVHRR)
- SMI (Meteosat)
LADA: Current status & next steps

• Pilot studies undertaken/ being finalized
  • Argentina, China, Senegal
• Capacity building TCP projects
  • Ethiopia, Mali, Namibia, Lesotho, Caribbean, ..
• TAC & Steering Committee - April 2004
  • stakeholders (countries; experts, CCD, GM, UNEP, UNDP, GEF, institutions, donors,..)
  • Review of LADA Phase-B (2 years)
  • Finalization of PDF-A document (4 years)
• Financial, institutional & implementation aspects
• Technical issues - network on indicators
LADA: networks

http://lada.virtualcentre.org/pagedisplay/display.asp

http://www.fao.org/ag/agl/agll/lada/default.stm
Conclusions

• LADA will provide improved methodologies for land degradation assessment at various scales (wider scope & objective basis for remedial actions) & statistical data

• Opportunities for countries to participate in LADA

For more information …..

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