Early Warning Systems to Combat Desertification

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Relevance of EWSs in the context of UNCCD

- A key component of disaster reduction strategies and action plans at all levels. The need for strengthening EWSs related activities has been identified (Art. 10 (3) UNCCD)
- EWSs provide a useful framework for promoting comprehensive data collection and analysis as well as the formulation and implementation of intervening measures for drought and desertification
- Under auspices of UNCCD several initiatives have been promoted for the development and implementation of Desertification early Warning Systems in the action programmes
EARLY WARNING SYSTEM: DEFINITION

The provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response

Key points to be identified:

The spatial and time scale of the process
The target population
Chart 3: Early warning systems in Mongolia: Institute of Metrology and Hydrology, Azzaya 2003
Desertification Early Warning Systems

COMPONENTS

- Assessment and monitoring of land degradation
- Vulnerability analysis
- Dissemination of information
- Preparedness to prevent, control and mitigate land degradation
Grouping of existing modules in various Early Warning Systems:

1. **Modules on monitoring and analysis of data** (GIS online, crop models, weather analysis, vegetation analysis, crop calendar, streamflow model)

2. **Risk analysis** (spatial distribution of hazards, risk maps including vulnerability analysis)

3. **Exchange and diffusion of information** (Clearing House Mechanism, mailing lists, data bases online, bulletins, reports)

4. **Modules on decision support** (risk map analysis and development of emergency scenarios, module of contingency and response planning)
Summary trends and constraints
(results from Ad-hoc panels reviews)

• Existing EWs in the context of desertification are still deeply focused on drought and food security
• Significant technical improvement (data collection and modelling)
• Low progress in enhancing effective use of EWSs
• Several weaknesses have been detected
Summary trends and constraints (weak points)

- MONITORING AND VULNERABILITY ANALYSIS
  - Assessments procedures have so far largely empirical and focused on the symptoms of desertification rather than on the underlying drivers and processes.
  - Temporal data analysis remains scarce
  - There is still not commonly used, and accepted, indicators and data format system
  - Data accessibility is still subject to several constraints.
  - No exists a baseline for monitoring desertification at global scale.
Summary trends and constraints (weak points)

• INFORMATION DISSEMINATION AND PREPAREDNESS
  – The information is not always efficiently disseminated because of the little credibility of ill-designed warning messages and/or the fail of dissemination systems
  – There is a lack of genuine partnership between the main stakeholders. Political and biased uses of the information by a few stakeholders have tended to render EWSs a tool for political and selfish uses
  – The co-ordination between EWSs and decision makers is poor.
Summary trends and constraints (Conclusions)

- A clear call for expanding the scope of traditional practices of EWSs, focused on monitoring and warning of hazards, to broader issue of risk assessment and management

- There exist no operational Desertification Early Warning Systems to be successfully implemented in strategies, plans and programmes to combat desertification.

- There still exist knowledge gaps and pending questions to translate broadly accepted principles on EWSs into action-oriented modalities (NAPs and RAPs)
Towards a DEWS: Land degradation and desertification characteristics

- Absence of a precise and universally accepted definitions
- Slow-onset natural hazard: a creeping phenomenon
- Non-linear process and presence of hysteresis
- Difficult to know when it begins
Towards a DEWS

Define spatial and temporal framework

Figure 2.1 The process of desertification placed in a hierarchical scheme. Items at the bottom of the figure occur at finer spatial scales and those at the top at coarser scales. See text for details.
Table 1. Characteristics of early warning/monitoring systems for drought and desertification (ICCD/COP(5)/CST/4)

<table>
<thead>
<tr>
<th></th>
<th>Drought</th>
<th>Desertification monitoring and assessment</th>
</tr>
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<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>Operational warning of impending crises of drought and food security in order to propose immediate response</td>
<td>Forewarning of land degradation in order to have proof of land degradation process and to provide decision-making support for policy making</td>
</tr>
<tr>
<td><strong>Time scale</strong></td>
<td>Short term: seasonal</td>
<td>Long term: several years</td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td>Immediate action</td>
<td>In practice: project/program approach</td>
</tr>
<tr>
<td><strong>Level</strong></td>
<td>Small scale</td>
<td>Large scale</td>
</tr>
</tbody>
</table>
| **Information needed on** | · Rainfall  
   · Aridity  
   · NDVI  
   · Vegetation cover  
   · Population pressure | · Land information  
   · Socio-economic issues  
   · Human activities |
| **Harmonization of indicators** | More or less common understanding of indicators to be used among major systems | At present no agreeable set of common benchmarks and indicators |

- NDVI: Normalized Difference Vegetation Index
Towards a DEWS

1. What contributions can be expected from a DEWS? → ACTIONS

2. How can a DEWS fulfill these expectations? → INSTRUMENTS

3. Which updated resources are available to accomplish the expectations? → RESOURCES
<table>
<thead>
<tr>
<th>WHAT can be expected? ACTIONS</th>
<th>HOW fulfil expectations? INSTRUMENTS</th>
<th>WHICH resources available? RESOURCES (EC Projects)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange of information (1)</td>
<td>• Clearing House Mechanism</td>
<td>CLEMDES, DESERTSTOP, LUCINDA</td>
</tr>
<tr>
<td>Assessing (2)</td>
<td>• Environmental indicators, updated spatial evaluation of areas using GIS</td>
<td>AID-CCD, LADAMER, DSURVEY</td>
</tr>
<tr>
<td>Monitoring (3)</td>
<td>• Environmental indicators</td>
<td>AID-CCD, DESERTLINKS, LADAMER DSURVEY, INDEX</td>
</tr>
<tr>
<td>Predicting (4)</td>
<td>• Modelling of scenarios, hazard analysis</td>
<td>GEORANGE, DSURVEY</td>
</tr>
<tr>
<td>Warning (5)</td>
<td>• Control of thresholds, risk analysis</td>
<td>DSURVEY</td>
</tr>
<tr>
<td>Support decisions (6)</td>
<td>• Use of Decision Support Systems</td>
<td>MEDRAP, REACTION, SCAPE, MEDACTION, RECONDES DSURVEY</td>
</tr>
</tbody>
</table>
CONCLUSIONS

The development and use of Early Warning Systems have being encouraged as promising tools to prevent and mitigate desertification. Nevertheless, it does not exist yet any early warning systems of desertification fully implemented in the action-oriented instrument of the UNCCD.

Desertification is a complex phenomenon, triggered by low-frequency processes whose detection requires a larger spatial and temporal scale than those used in conventional approaches to drought and food security warning.

In order to develop efficient Desertification Warning Systems the following limitations need to be overcome:
CONCLUSIONS

• Assessment of desertification must be based on underlying driving forces and processes rather than symptoms.

• Long-term monitoring network must be maintained, and new facilities established, for providing data to detect changes in desertification trends and to establish reference values of state variables.

• Information transfer mechanisms and procedures must be improved for reaching the target population in an efficient way and on time.

• A closer coordination between warning and decision-making elements is needed
The outcomes of several initiatives provide user-support technologies and capacity building upon which implement an early warning system as an instrument to combat desertification.
Research needs

- Detect and distinguish *desertification* from desertification *risk at all scales*
- Identify and detect *thresholds* beyond which dryland productivity change irreversibly
- Decouple effects of *desertification* from effect of dryland’s *low productivity on poverty*
- Quantify the feedback loops between desertification and *climate change*
THANK YOU FOR YOUR ATTENTION