Assessment of soil erosion risk in different cropping systems of the Inle Lake watershed area, Nyaung Shwe Township, Southern Shan State, Myanmar

Presented by: Thin Nwe Htwe
Deputy Officer
Land Use Division
DOA, MOAI
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» Background

Upland cultivation
Problems / Challenges

- Increasing population
  - Deforestation
  - Shifting cultivation
  - Intensive agriculture
  - Urbanization

- Soil erosion & sedimentation
  - Land degradation
  - Inle Lake

- Climate change
Objective

To investigate the effects of different cropping systems on soil erosion risk in space and time
Methodology

- **GPS data**: Geographic information and the total area of farmers' cultivated land \( (n = 301) \)

- **Rainfall data** (4 stations)

- **Soil data** (128 soil samples)

- **Risk of soil erosion**: A GIS-based soil erosion model using the Revised Universal Soil Loss Equation (RUSLE) (Renard et al., 1997)

\[
A = R \times K \times LS \times C \times P
\]

- \( A \) - average annual soil loss (t ha\(^{-1}\) yr\(^{-1}\))
- \( R \) - rainfall-runoff erosivity (MJ mm ha\(^{-1}\)h\(^{-1}\)yr\(^{-1}\))
- \( K \) - soil erodibility (t ha h ha\(^{-1}\)MJ\(^{-1}\)mm\(^{-1}\))
- \( LS \) - slope length and steepness
- \( C \) - cover management
- \( P \) - support practice
Location of weather stations and soil samples
Predicted soil erosion risk
## Results & discussion

Land cover changes from 1989 to 2009 and estimated soil losses for each land cover class

<table>
<thead>
<tr>
<th>Land cover class</th>
<th>Average soil losses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (t ha(^{-1}))</td>
<td>Soil loss (%)</td>
</tr>
<tr>
<td>Agroforest</td>
<td>7.2</td>
<td>6.8</td>
</tr>
<tr>
<td>Barren land</td>
<td>112.0</td>
<td>85.4</td>
</tr>
<tr>
<td>Cropland</td>
<td>25.9</td>
<td>4.5</td>
</tr>
<tr>
<td>Fallow land</td>
<td>0.7</td>
<td>0.3</td>
</tr>
<tr>
<td>Forest</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Paddy fields</td>
<td>0.6</td>
<td>0.1</td>
</tr>
<tr>
<td>Shrubland</td>
<td>1.8</td>
<td>2.5</td>
</tr>
<tr>
<td>Urban</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
» Results & discussion

Soil losses in the three agricultural zones

<table>
<thead>
<tr>
<th>Agricultural zone</th>
<th>Mean (t ha$^{-1}$)</th>
<th>Soil loss (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>LL</td>
<td>3.59</td>
<td>1.54</td>
</tr>
<tr>
<td>UP</td>
<td>26.25</td>
<td>13.43</td>
</tr>
</tbody>
</table>
Results & discussion

Soil losses in different zones, Eastern and Western parts of Inle Lake region
Results & discussion

Soil losses in different cropping systems for 2009

![Bar chart showing soil losses in different cropping systems for 2009](image)
» General discussion & conclusions

- Population density, policies, market factors
- Topography, climate conditions, soil types, cultivation practices

Land cover changes

Soil erosion risk

Land use systems / Livelihood strategies

- Environment
- Productivity
- Food security

- Environmental factors
- HH characteristics
- Technologies
Recommendations

Government, INGOs & LNGOs

- Appropriate land use management strategies should be supported to prevent further environmental degradation

- Suitable extension staff need to be employed through the public private partnership

- Eco tourism, skilled jobs and small enterprises as additional income sources should be promoted to sustain wetland ecosystem
Stakeholders involved/ existing partnership

- Interviewed farmers (301 households, 30 villages) in the Inle Lake region
- Prof. Dr. Myo Kywe, Rector of Yezin Agricultural University
- Dr. Katja Brinkmann and Prof. Dr. Andreas Buerkert, Organic Plant Production and Agroecosystems Research in the Tropics and Subtropics, University of Kassel, Witzenhausen, Germany
- Department of Agriculture and Department of Irrigation, Ministry of Agriculture and Irrigation, Nyaung Shwe Township
- Meteorology and Hydrology Department, Taunggyi
- Land Use Division, Department of Agriculture, Ministry of Agriculture and Irrigation, Nay Pyi Taw
- Local NGO “Inle watershed development”, Nyaung Shwe Township
- German Academic Exchange Service (DAAD)
Thank you for your attention
Results & discussion

Land cover and land use changes

Feb 1989  Feb 2000  Feb 2009
Results & discussion
Urbanization, deforestation and crop expansion from 1968-2009

- Floating gardens
- Lowland cultivation
- Upland cultivation