



Development of a Cooperative Monitoring and
Assessment Framework for Pastureland Health
Mongolia: Opportunities for New Synergies?

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MSRM, HMI (Hydrometeorological Institute) and
other organizations

USDA-ARS Jornada Experimental Range
Las Cruces, New Mexico USA



“Several proposals ... referred to the need to take the potential of land and soil into account”

- H.E. Mrs. Gerda Verburg, UN Commission on Sustainable Development Planning Meeting, Feb. 09.

“Build capacity for land use planning aimed at managing land within ecological capacity taking into account long-term potential, soil information and integrating scientific and indigenous knowledge”

- Final recommendation, UN Commission on Sustainable Development 17, May 09.

Relationship to National Needs

- Support multiple national needs by increasing quality, consistency and ability to interpret of monitoring and assessment data
- All require an understanding of land potential
- And the capacity to house, share, and utilize long-term data within the national government

Monitoring & Assessment (M&A): What is Required?

| | Current | HMI+ |
|---|---------|------|
| (1) Consistent reference (benchmarks) for comparison based on land's potential | - | + |
| (2) M&A design (ground sampling & remote sensing) guided by science-based predictions of land degradation/stability/recovery | Some | + |
| (3) Standard indicators Sensitive to long-term change Repeatable | Some | + |
| (4) Infrastructure (human resources, data management systems) | Yes | + |
| (5) Interpretation system (based on integration of scientific and local knowledge) for decision making. | Some | + |

| | Current | HMI+ |
|---|--|--|
| (1) Consistent reference based on land's potential | None(?) | Potential-based (soil and climate) land classification system allows data and interpretations to be extrapolated |
| (2) M&A design | Key areas selected based on forage requirements | Supplement with ground/remote-sensing based on predicted patterns of degradation/stability/recovery |
| (3) Standard indicators | Some, but existing ocular estimates difficult to standardize across observers and more sensitive to short-term changes | Long-term indicators: -Line-point intercept (LPI) for more precise estimates of cover, including basal cover -Basal gap for changes in spatial structure |
| (4) Infrastructure | + IMH has national network + standard data storage system | Add LPI, basal gap and basic soil/ecological site data |
| (5) Interpretation system | Some with emphasis on forage availability | Assessment + predictions relative to soil/climate-based potential |

High precision, repeatable, simple monitoring methods



Indicators of ecological processes at monitoring sites for interpretation of trend data



A horizon thinning



Pedestalling



Channel width expansion and denuded hillslopes



Plant basal cover buried by sand

Potential- and process-based land classification system via climate and landform-stratified inventory



**Loamy slope,
Forest steppe ecoregion**

**(changes in species
composition, but
resilient)**



**Mountain meadow loam,
Forest steppe ecoregion**

(susceptible to erosion)



**Loamy sand plain,
Typical steppe ecoregion**

(susceptible to A horizon loss)



**Calcareous gravelly loam upland,
High mountain ecoregion**

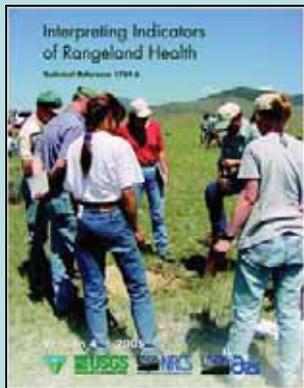
**(susceptible to soil sealing and loss
of productivity)**

US – National Assessment and Monitoring Example for Rangelands

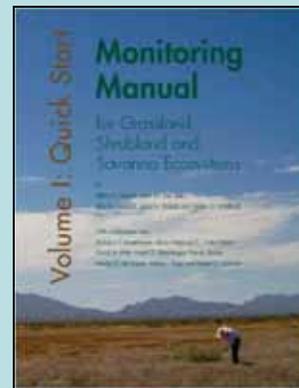
Determination of land potential for each soil/climate combination (integration of local and scientific knowledge)

Definition of potential for 17 indicators

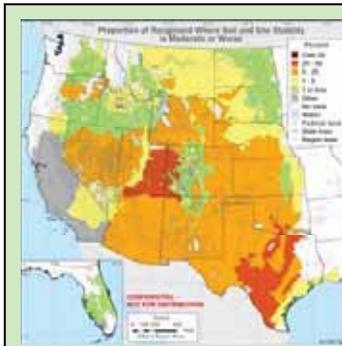
Remote sensing stratification for land cover + field visits to ~2000 plots/year



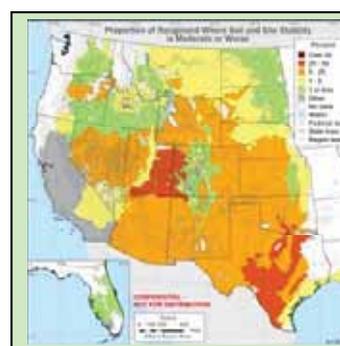
Qualitative assessment of 3 attributes of ecosystem health attributes based on 17 indicators relative to potential



Quantitative measurement (line point intercept, gap intercept, others)

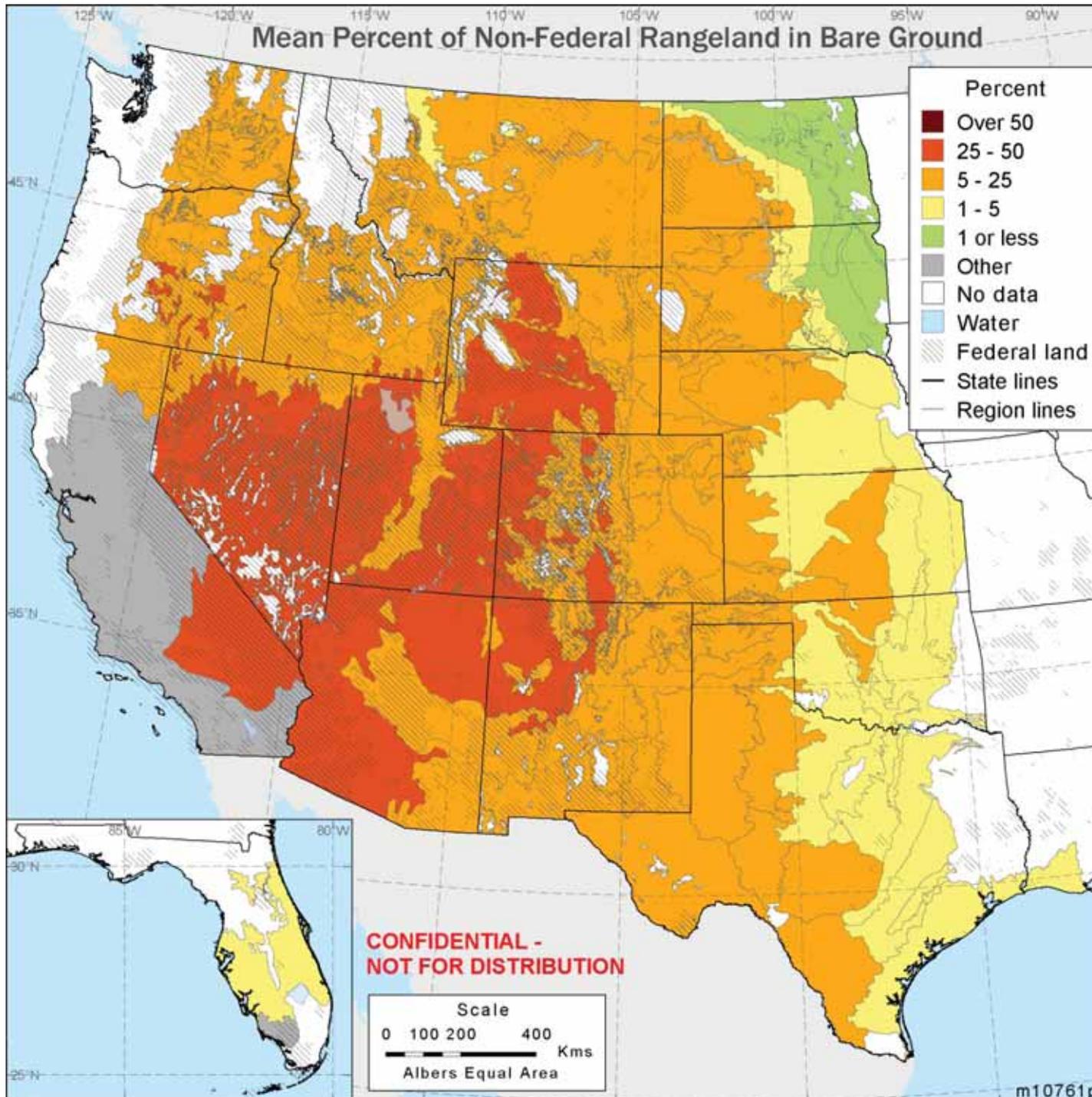


Short-term assessment of current status



Baseline for long-term monitoring

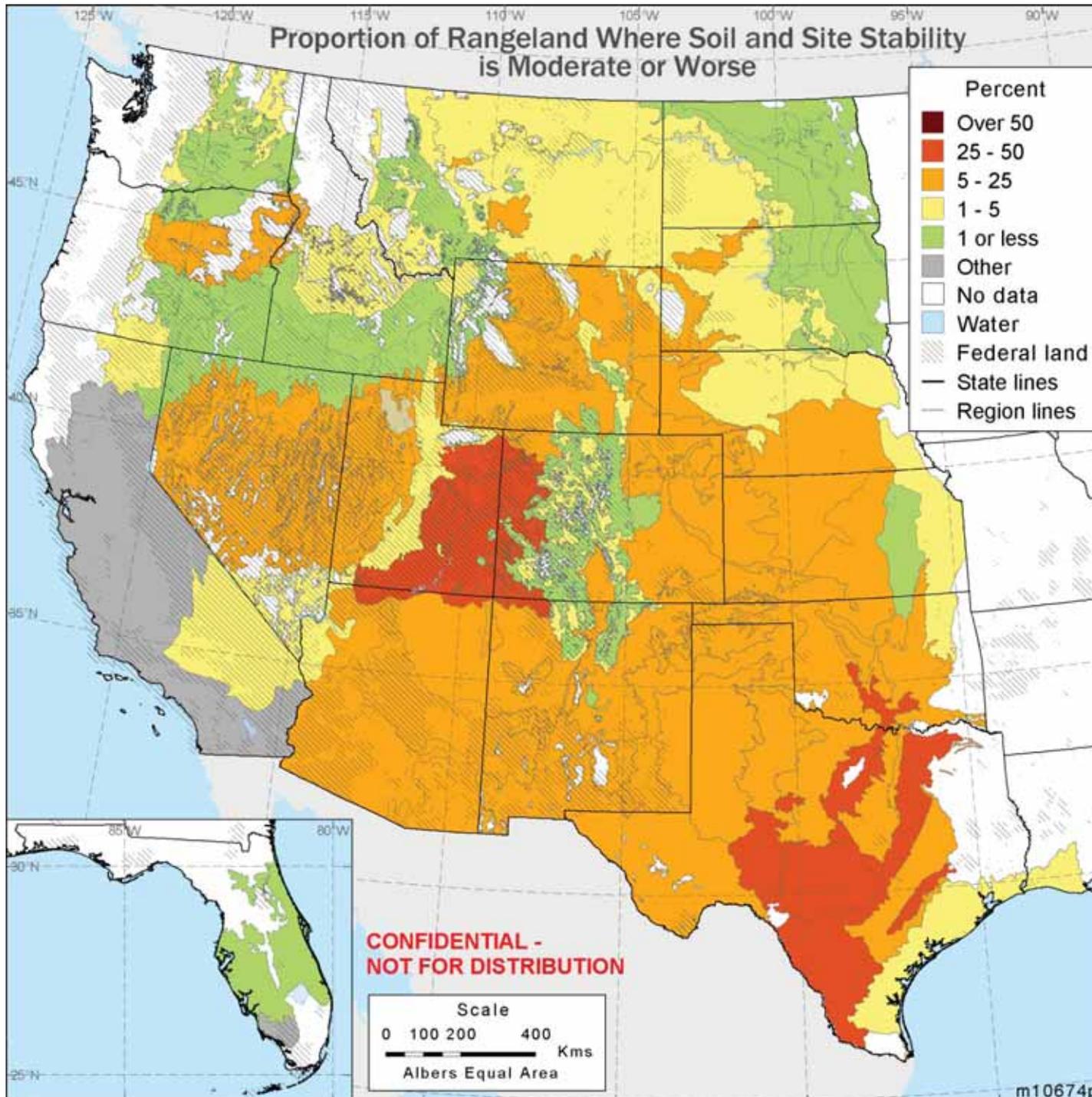




Monitoring

example: precise estimates of bare ground.

- Basis for long-term monitoring (guided by science-based predictions of land degradation/stability/recovery)
- Can't use for short-term assessment because reference data unavailable



Assessment: soil and site stability (erosion) relative to soil/climate potential based on qualitative indicators (Rangeland Health)

-Darker orange = more degraded

-Note that areas with highest bare ground (previously slide) are not necessarily most degraded due to differences in potential.

Relationship to LADA

- LADA is a global assessment
- HMI+ provides quantitative, repeatable, accessible data that can be used to support LADA and other interpretation frameworks that may come along

Future work

- (1) Continue to provide science-based support of MHI's monitoring system together with MSRM and other collaborators
 - (a) Data quality, storage, and accessibility
 - (b) Capacity to derive meaningful interpretations from data for policy decisions
- (2) Provide support for improving quality of national assessments through integration of land potential- and process-based interpretations of monitoring data

Contact information

USDA-ARS Jornada Experimental
Range

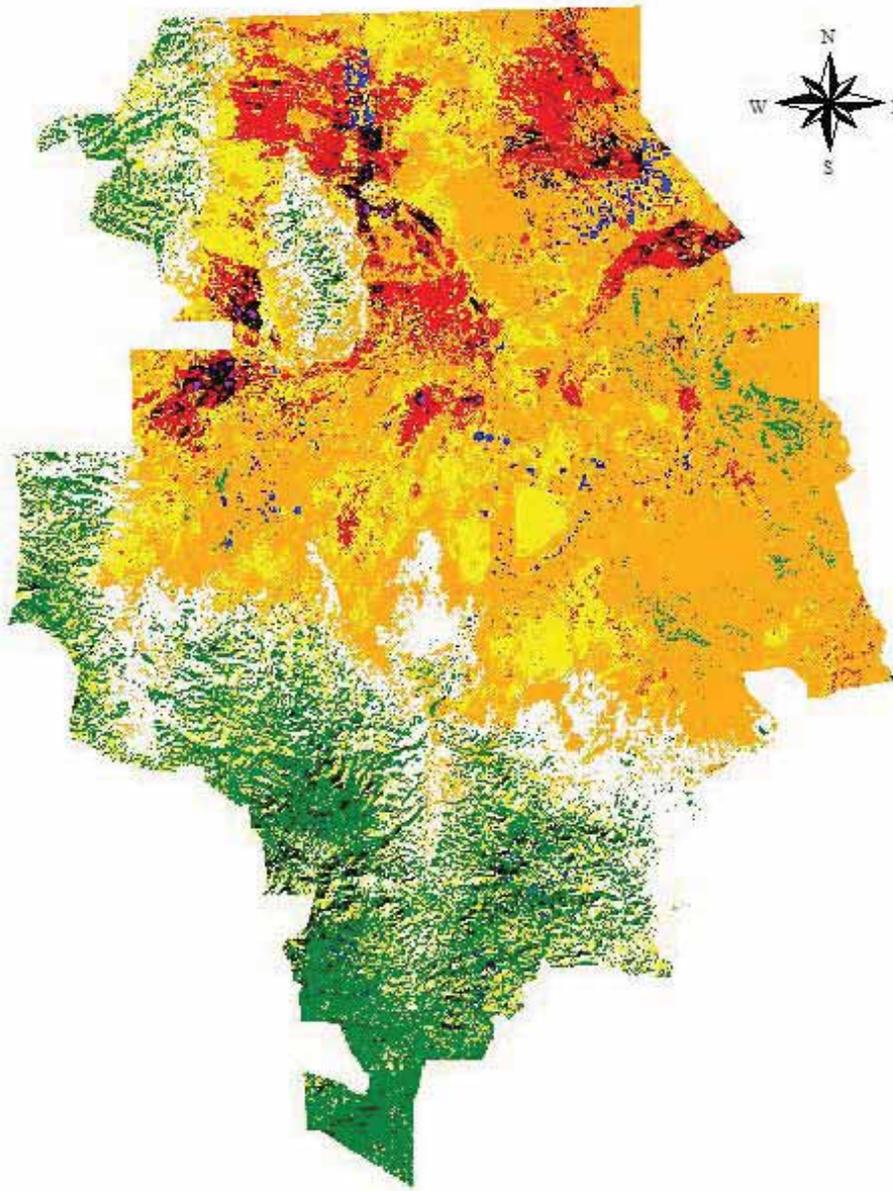
Las Cruces, New Mexico, USA

<http://usda-ars.nmsu.edu>

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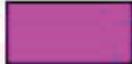
Regional Rangeland Health Assessment for north-central Mexico



Degradation class

 Slight-Moderate

 Moderate

 Moderate-Extreme

 Extreme

 (Cultivated)

 (Forest)

Additional information: relationship to LADA

- **Spatial framework:** with continuing improvements in sampling, IMH+ could provide assessments on the ‘type, relative extent, degree and rate of land degradation’ within the context of LADA’s ‘Land Use Systems’. It could improve these assessments by generating assessments relative to the land’s potential (further discussion with LADA representatives required).
- **Indicators:** LADA encourages local adaptation to address local conditions. Mongolia is unique in part because most land is unfenced rangeland. IMH+ indicators specifically designed for this rangelands and the ecosystem services they provide (particularly livestock production).
- **Note:** LADA is, by design, focused primarily on a general “global assessment of land degradation”. IMH+ is specifically designed to provide the Mongolian people with information on the extent and patterns of rangeland degradation and recovery at regional to national levels, relative to the local potential.



- Land Use System (LUS)

- Type
- Area trend
- Intensity trends



- Degradation per LUS

- Type (soil, vegetation and water)
- Relative extent (area)
- Degree and Rate
- Impact on ecosystem services (type and level)
- Trend in provision of ecosystem services
- Direct causes of land degradation
- Indirect causes (population pressure, tenure, poverty)

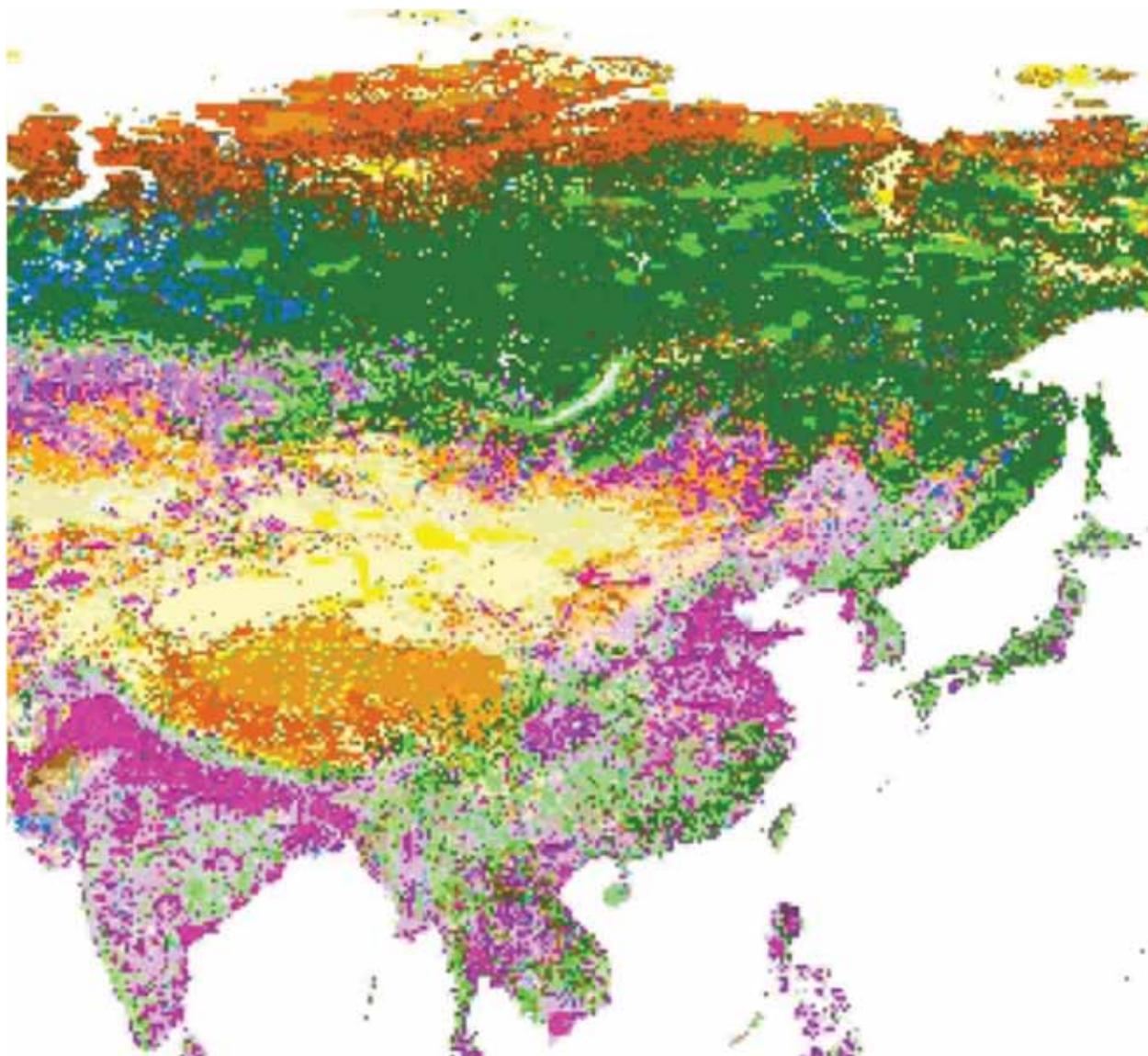
- Sustainable Management per LUS

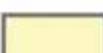
- Name / SWC category
- Relative extent (area)
- Impact on ecosystem services (type and level)
- Trend in provision of ecosystem services.





Land use systems of the world



-  13 Rainfed Agriculture (Subsistence / commercial)
-  14 Agro-pastoralism Mod. Intensive
-  15 Agro-pastoralism Intensive
-  16 Agro-pastoralism mod. intensive or higher with Large scale irrigation
-  24 Bare areas no use / not managed (Natural)
-  25 Bare areas Protected areas
-  26 Bare areas Extensive pastoralism
-  27 Bare areas Mod. Intensive pastoralism or higher