

## A CURRENT AND PREDICTION CONDITION ON PASTURE OF THE GOBI REGION, MONGOLIA

D.Ariungerel, PhD. D.Enkhzaya, D.Enkhbat and G. Udval

Mercy Corps Mongolia. P.O. Box 761, Ulaanbaatar -49, Mongolia,

E-mail: [arvingerel@yahoo.com](mailto:arvingerel@yahoo.com), [ariungerel@mn.mercycorps.org](mailto:ariungerel@mn.mercycorps.org), [enkhbat.sb\\_edu@yahoo.com](mailto:enkhbat.sb_edu@yahoo.com),  
[enkhbat@mn.mercycops.org](mailto:enkhbat@mn.mercycops.org), [enkhzaya\\_1@yahoo.com](mailto:enkhzaya_1@yahoo.com), [enkhzaya@mn.mercycorps.org](mailto:enkhzaya@mn.mercycorps.org),  
[udval@mn.mercycorps.org](mailto:udval@mn.mercycorps.org)

**KEY WORDS:** pasture map, forage, Gobi region, pasture quality,

**Abstract:** This study aims to develop risk management technologies to provide drought and winter disaster early warning to improve rural business in the livestock sector of the Gobi region and of whole territory of Mongolia. The study is conducted under "**Gobi Forage**" project, funded from USAID, USDA and World Bank Household Livelihoods support program and managed by Texas Agricultural Mechanics University, has being implemented by Mercy Corps in Mongolia since 2004. From 2009, Gobi Forage project areas are extended under LEWS (Livestock Early Warning System) project, the continuation of Goby Forage project for whole territory of Mongolia.

### INTRODUCTION:

In the period from 1999 to 2002, Mongolia experienced a series of droughts and severe winters that lowered livestock numbers by approximately 30% countrywide. In the Gobi region, livestock mortality reached 50% with many households losing entire herds (Siurua & Swift 2002). In March 2004, a program was initiated by the USAID through the Global Livestock Collaborative Research and Support Program (GLCRSP) to provide early warning of drought and winter disasters. The program has to develop a communication infrastructure to provides herders with forage condition information to assist in making timely and specific management decision.

Gobi forage project established 302 pasture monitoring sites in eight aimags of Gobi Region includes Gobi-Altai, Gobi-Sumber, Bayanhongor, Ovorhangai, Omnogobi, Dundgobi, Dornogobi and Tuv aimags. LEWS project running by Mercy Corps, in partnership with Texas AgriLife Research, reached all territory of Mongolia and established 501 monitoring points since 2009 and now covered all *aimags* in Mongolia and the system will effectively deliver early warning to respective *aimags*, *soums* and herders in those areas. The national, *aimag* and *soum* capacity to respond to warnings and mitigate risk from very low forage and extreme drought conditions is being developed.

### METHODOLOGY:

- In 2004-2008, 302 monitoring sites were selected in eight aimags (Gobi-Altai, Bayankhongor, Dundgobi, Dornogobi, Umnogobi, Ovorhangai) in the Gobi Region and Tuv aimag.
- In 2009-2012, 501 monitoring sites were selected in thirteen aimags (Arkhangai, Bulgan, Selenge, Dornod, Sukhbaatar, Khentii, Khovd, Bayan-ulgii, Uvs, Zavkhan, Orkhan, Darkhan and Khuvsgol) and now has 803 monitoring points across Mongolia (Figure1).
- During the first visit to each site, vegetation, soil, and grazing data (cattle, sheep, goats, camels and horses) were collected to parameterize the PHYGROW forage production model and to calibrate the model.
- Sites were randomly selected from an 8 x 8 km grid. The grid size matched the resolution of the CMORPH precipitation data used in the forage modeling.
- Vegetation measurement included basal cover of grasses, relative frequency of forbs,

- and relative shrub cover. Herbaceous standing crop was estimated by clipping biomass within ten 0.25 or 0.50 m<sup>2</sup> frames at each site.
- The PHYGROW model can simulate plant communities grazed by multiple kinds of livestock. The model was driven by near real-time climate data acquired from the National Oceanic & Atmospheric Administration's (NOAA) CMORPH system.
  - For validated sites, the forage model outputs were coupled with NDVI data using the geostatistical method of cokriging to create interpolated maps of forage biomass. Cross validation was used to assess the performance of cokriging.

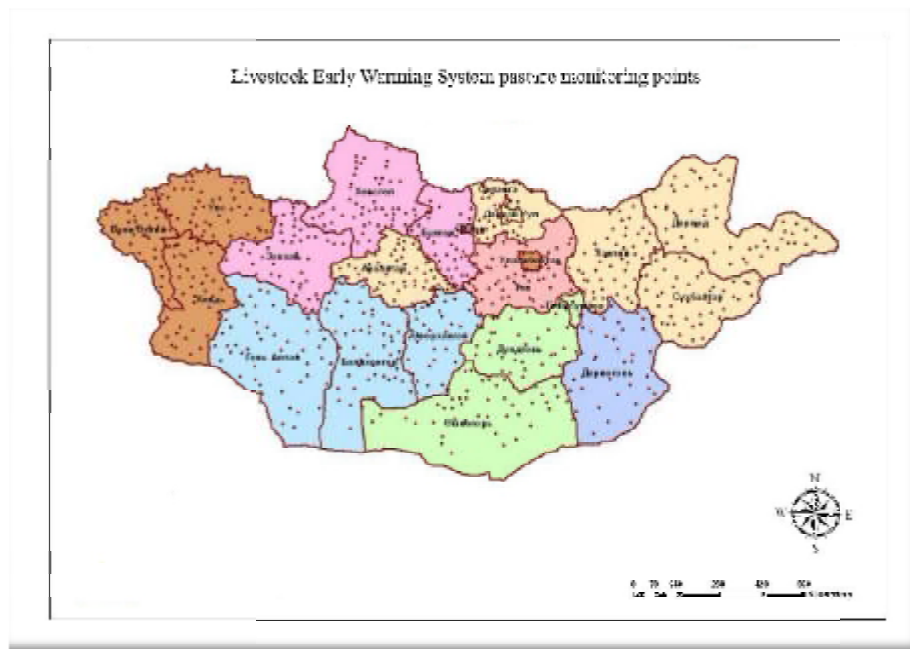


Figure 1. 803 pasture monitoring points in 21 aimags.

## RESULT

- PHYGROW model is a technology to set up database and estimate the current and prediction condition of pasture on huge territory.
- The maps on current forage available (kg/ha) (Figure2), current forage deviation (Figure4) from long term average , 60 day forage forecasting (Figure 3) and 60 day forage deviation (Figure5) from long term average are very useful tools for local administration and herders to make decision on their movement and update their pasture plan and reduce the risk for livestock.
- Dissemination of LEWS information on web page <http://glews.brc.tamus.edu/mongolia/> and broadcasts by Mongolian national radio and TV and prints on the newspaper "Onoodor" bimonthly.
- The LEWS informs government and rural residents or livestock herders of impending drought and/or severe winter and thereby improve response capacity to mitigate the impacts. Approaches of the planning are risk forecasting, contingency planning, and grazing and pasture management.

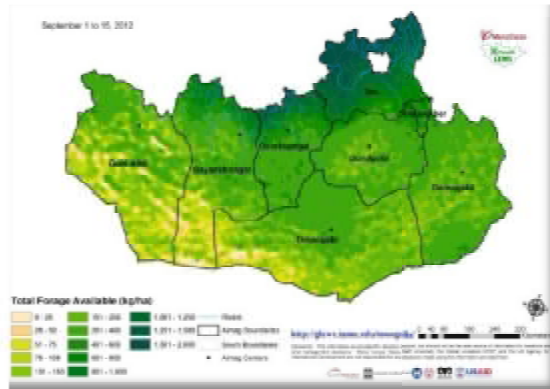


Figure 2. The current forage

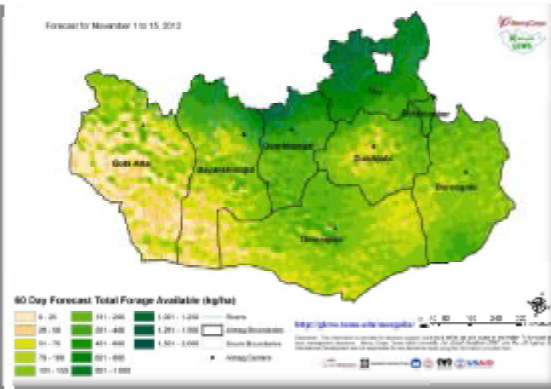


Figure 3. 60 days forecast forage

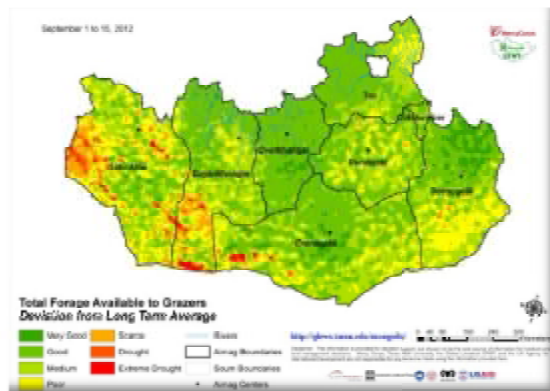


Figure 4. The current forage deviation

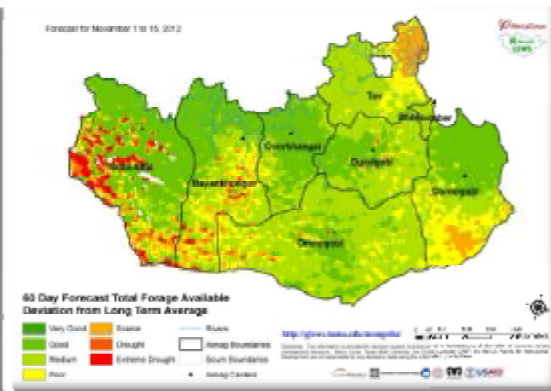


Figure 5. 60 days forecast forage deviation

## DISCUSSION

LEWS as science-based grazing management tool and disaster preparedness decision support system that can be used to improve the use of Mongolian pastureland. It also can be used as a tool to monitor climate change impact on pastureland; climate change vulnerability and adaptation of pasturelands.

## CONCLUSIONS&RECOMMENDATIONS

LEWS provides an early warning for below normal forage conditions or catastrophic winter conditions to reduce risk of livestock mortality and protect the ecological stability of rangeland resources, and to improve animal nutrition. Forage monitoring technology helps herders and local and national government officials organize themselves to better cope with risk and improve rangeland management.

Pasture condition information can easily be accessed through internet, newspaper, radio and TV sometimes even on mobile phones.

The only challenge remaining is now how these data can be appreciated, understood and used by all level decision makers and ordinary herders.

## REFERENCES:

1. Angerer J.P., Bolor-Erdene L., Tsogoo D., Urgamal M., Granville-Ross S. 2006. Forage monitoring technology to improve risk management decision making by herders in the Gobi region of Mongolia //The 2nd International conference on Land cover /Land use study using

- Remote Sensing /GIS and the GOFCC-GOLD regional capacity building meeting in Mongolia. 08-09th June, 2006, Ulaanbaatar, Mongolia. p.22-23
2. Angerer J.P., Sean Granville-Ross, Stewart T., Tzolmon N., Urgamal.M. //GOBI FORAGE: Forage Monitoring Technology to Improve Risk Management by Herders in the Gobi Region of Mongolia. World Bank Regional Director for Rural Development, Ulaanbaatar, Mongolia, 2006.
  3. Bolor-Erdene L., Jay Angerer, Sean Granville-Ross, Urgamal M., Narangerel D., Tsogoo D., Tim Stewart, and Dennis Sheehy. An early warning system for livestock in the Gobi region of Mongolia. //International Grassland Congress, Khukhhot, CHINA, June, 29 - July, 05, 2008. P.656
  4. Jay Angerer, Bolor-Erdene L. and Urgamal M. Verification of Simulation Model and Landscape Map Results for Near Real Time Forage Monitoring in the Gobi Region of Mongolia. //Global Livestock CRSP, University of California, USA, January, 2007, 07-03.
  5. Jay Angerer, Bolor-Erdene L., Urgamal M. and Tsogoo D. Verification of a Forage Simulation Model used for a Livestock Early Warning System in the Gobi Region of Mongolia. //International Grassland Congress, Khukhhot, CHINA, June, 29 - July, 05, 2008. P.648
  6. Jay Angerer, Bolor-Erdene L., Urgamal M. and Tsogoo D. Verification of a Forage Simulation Model used for a Livestock Early Warning System in the Gobi region of Mongolia //Abstract: Global Livestock CRSP End of Program Conference, 16-19, June 2009, Lake Naivasha, Kenya, p.65
  7. Urgamal M., Bolor-Erdene L., Narangerel D. and Jay Angerer. Implementation of a Livestock Early Warning System in Mongolia //Abstract: Global Livestock CRSP End of Program Conference, 16-19, June 2009, Lake Naivasha, Kenya, p.76
  8. Mongolian LEWS project (Livestock early warning system), 2004-2010, Ulaanbaatar, Mongolia
  9. Livestock early warning system map explanation, 2007, Ulaanbaatar