# Forage monitoring technology to improve risk management decision making by herders in the Gobi region of Mongolia

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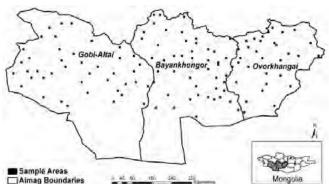**Keywords:** drought, Mongolia, forage monitoring

**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 United States Agency for International Development (USAID) through the Global Livestock Collaborative Research and Support Program (GLCRSP). The goal of this program is to develop forage monitoring technologies that provide early warning of drought and winter disaster to improve livestock herder decision making in the Gobi region. The program has two major objectives: (1) to develop a regional forage monitoring system that provides near-real time spatial and temporal assessment of current and forecasted forage conditions, and (2) to develop a communication infrastructure that provides herders with data on forage conditions to assist them in making timely and specific management decisions.

**Materials and methods**  The protocol for the forage monitoring was similar to that used in East Africa and the USA (Stuth *et al.,* 2003). In May 2004, 120 monitoring sites in the Gobi Region (Figure 1) were selected in 3 aimags (Gobi-Altai, Bayankhongor, and Ovorkhangai). At each site, vegetation, soil, and grazing data were collected for input into the PHYGROW forage production model (Stuth et al. 2003). PHYGROW is driven by near real-time climate data acquired from the National Oceanic & Atmospheric Administration's (NOAA) CMORPH system (Joyce *et al.,* 2004). The forage model outputs for the monitor sites are then coupled with satellite data for Normalized Difference Vegetation Index (NDVI) using geostatistics to create surface maps of forage yield and deviations from long-term average. Statistical forecasting (Autoregressive Integrated Moving Averages (Stuth *et al.,* 2003)) is used to project forage conditions for 90 days into the future.

**Results**  Vegetation parameter collection has been completed at each monitor site. Grassland communities being monitored range from mountain steppe to desert grasslands. Livestock being monitored include cattle, sheep, goats, yaks, camels and horses. NOAA CMORPH climate data is being archived and data extraction tools have been developed to provide data visualization and inputs into the PHYGROW model. Communication protocols are being developed to provide herders in the region with current forage conditions and 90-day forecasts on a 14-day cycle. The Rural Business News unit of Mercy Corps in Mongolia will publish the data in their weekly newspaper and radio broadcasts to herders. The data will be available on WWW also.
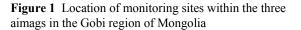
**Conclusions**  A forage monitoring system is being developed to provide early warning for below normal forage or catastrophic winter conditions on grasslands in the Gobi region of Mongolia. Information from this system will allow herders to have near real-time information to reduce risk of livestock mortality and protect the ecological stability of the grassland resources. This information will also help herders in the region to better cope with risk and market access.



**Figure 1** Location of monitoring sites within the three aimags in the Gobi region of Mongolia

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