

# LTER activities and initiatives of ecological data management in Mongolia

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# Overview

- The activities of Mongolian Long Term Ecological Research (MLTER) Network since Government of Mongolia approved the establishment of the MLTER Network in 1997.
- A single designated LTER site in Mongolia, namely Hövsgöl National Park in northern Mongolia and future research directions at this ILTER site
- **ONGOING CHANGES IN THE MLTER NETWORK:** A recent national activities to expand and re-vitalize the MLTER Network activities.
- **INITIATIVES OF ECOLOGICAL DATA MANAGEMENT IN MONGOLIA:** National Geo-Information Center (NGIC) for Natural Resource Management in Mongolia, a three-year Dutch Government-funded project.

The Government of Mongolia approved establishment of the Mongolian Long Term Ecological Research (MLTER) Network in December 1997.

The MLTER Network Steering Committee is organized in 1998 under auspices of the Mongolian Academy of Sciences with institutional support from the National University of Mongolia, the Ministry of Nature and Environment of Mongolia and the Academy of Natural Sciences in Philadelphia of the USA.

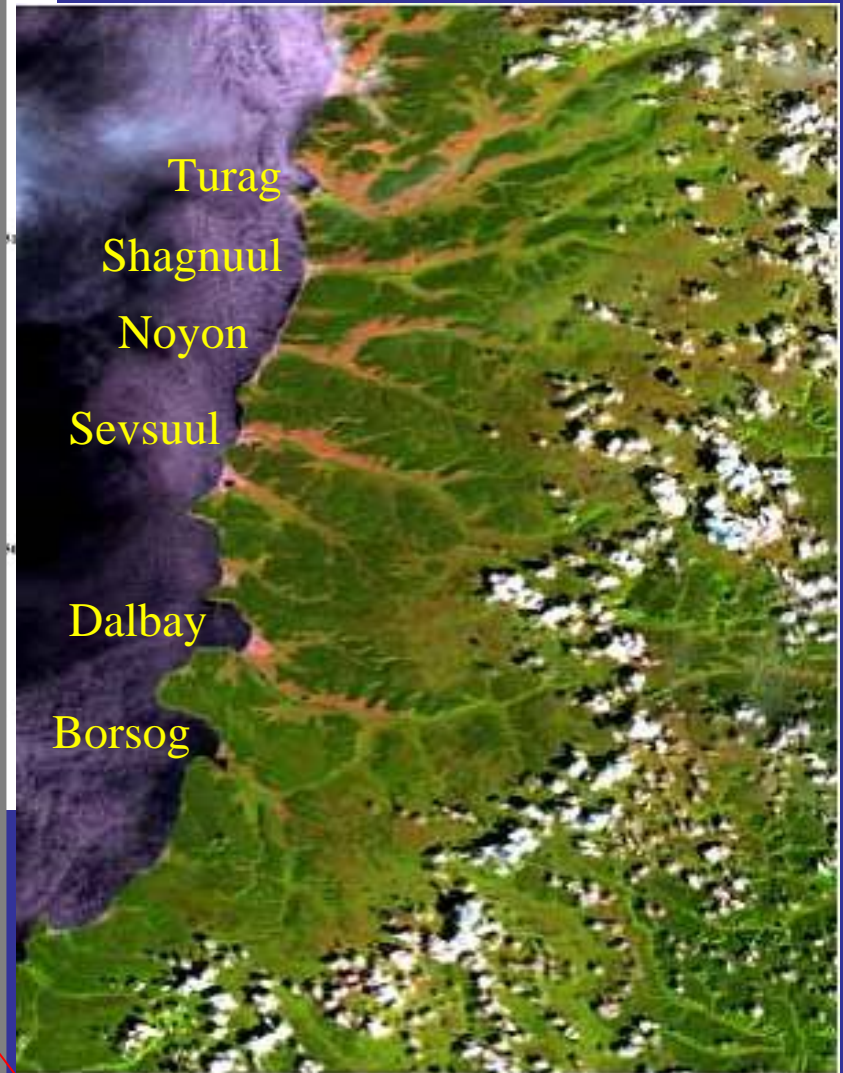
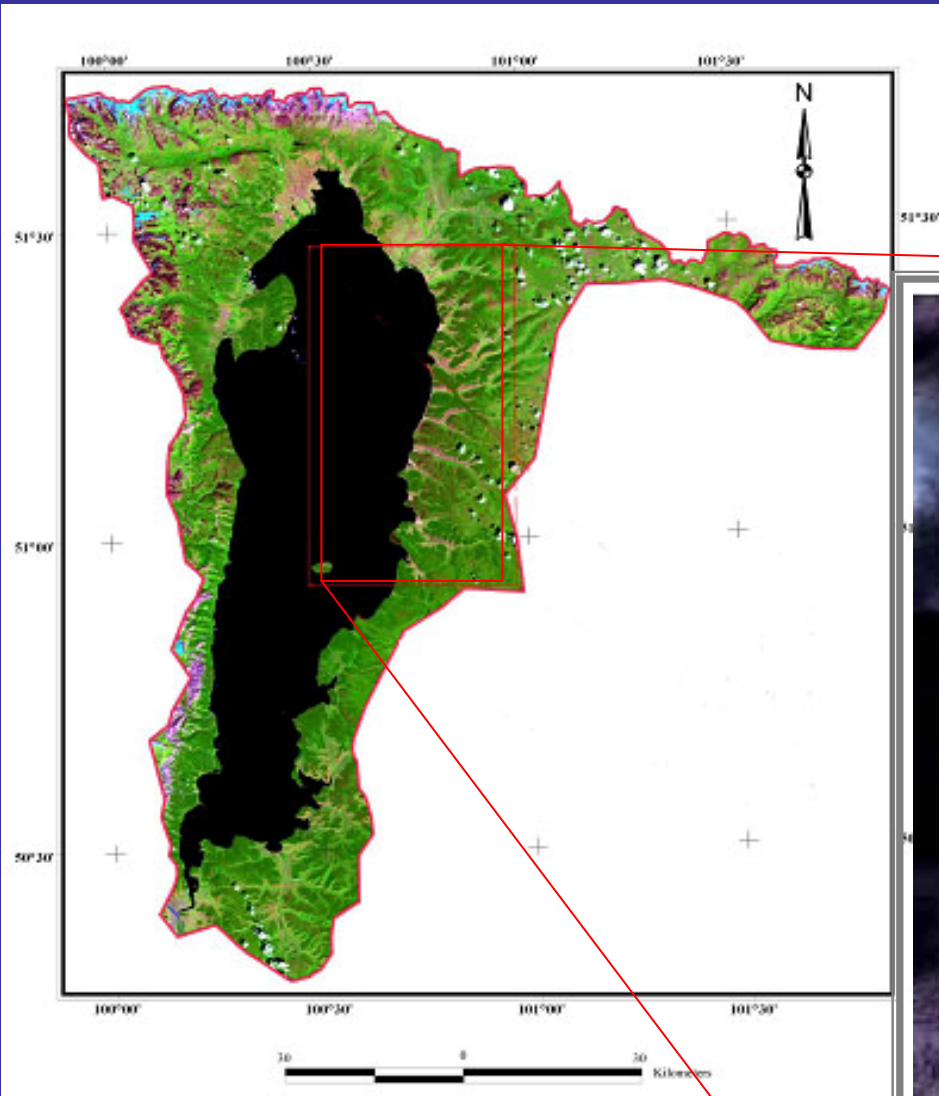
Several candidate sites and develop a network of sites that are representative of the country's major biomes as the baseline data already existed.

THE FISRT MLTER Network site in 1998 was designated. The next phase of the first MLTER project implementation of a five-year project funded by the Global Environmental Facility (GEF) called "Dynamics of Biodiversity Loss and Permafrost Melt in Lake Hövsgöl National Park, Mongolia" (hereafter the Hövsgöl GEF project) starting in 2002.

# Climate Change and Grazing Impacts at the Mongolian ILTER Network Site, Lake Hovsgol, Mongolia ([WWW.hovsgolecology.org](http://WWW.hovsgolecology.org))

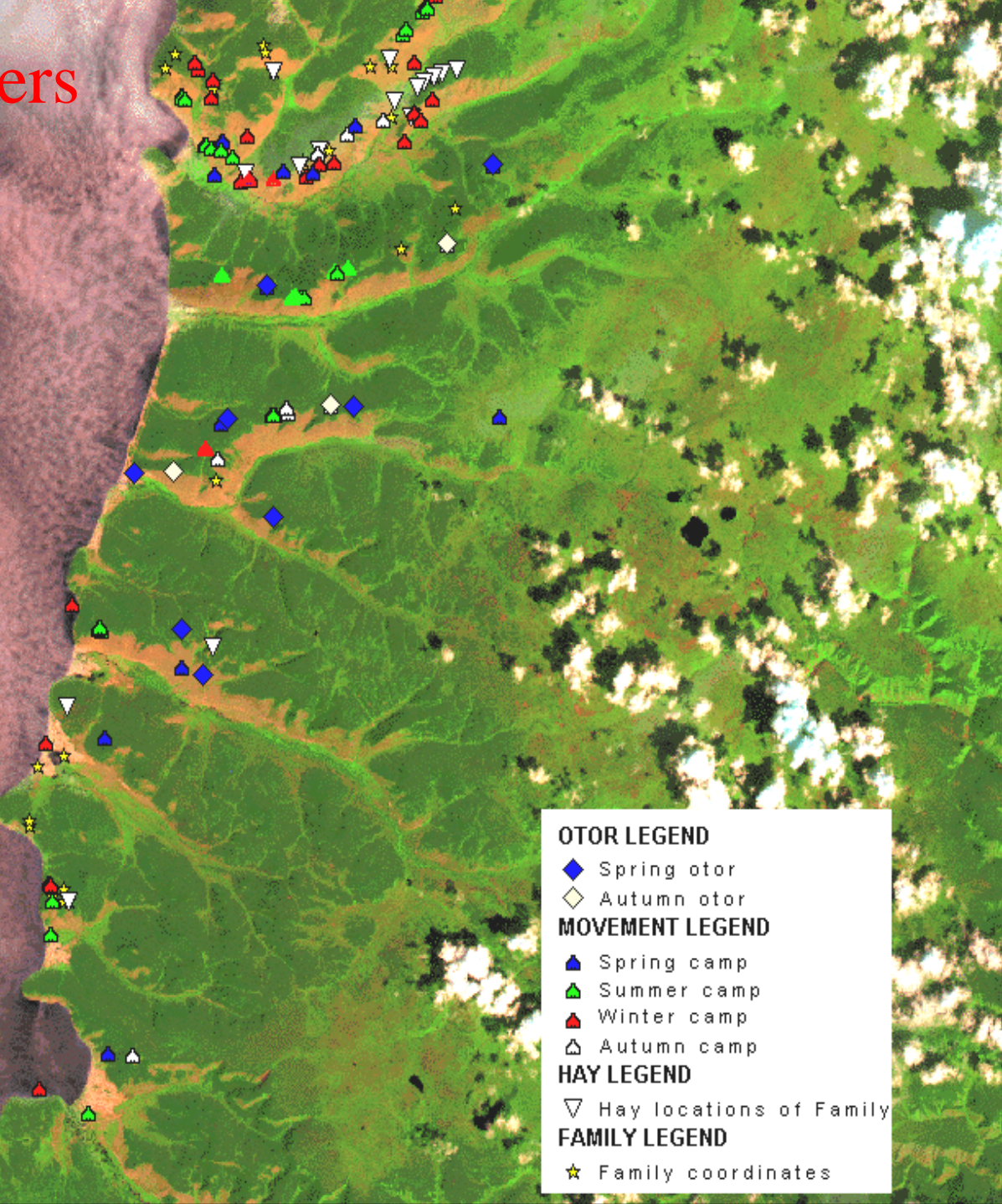


# ILTER Research Site



135 km long x 20 km  
Wide, 262 m deep.  
51° N

# Distribution of Herders In Valleys



## OTOR LEGEND

- ◆ Spring otor
- ◇ Autumn otor

## MOVEMENT LEGEND

- ▲ Spring camp
- ▲ Summer camp
- ▲ Winter camp
- △ Autumn camp

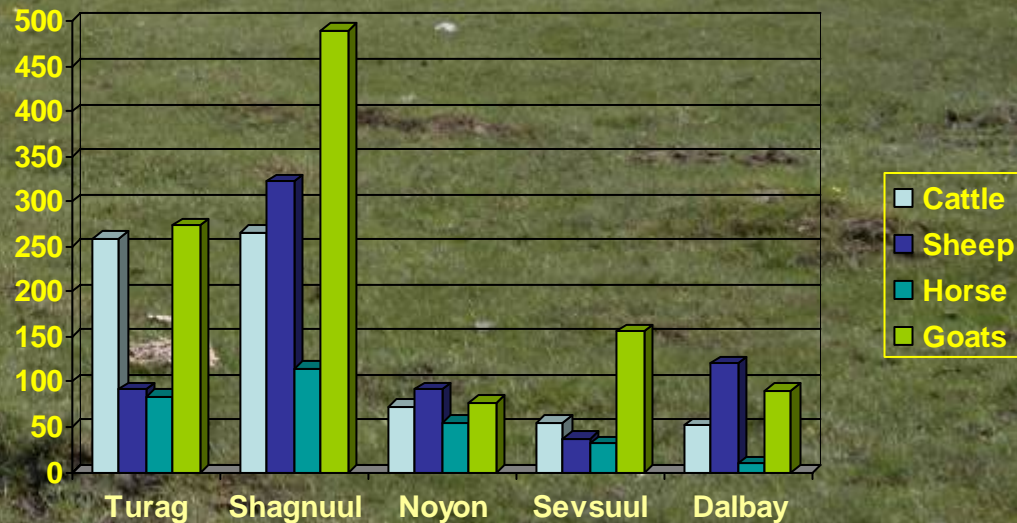
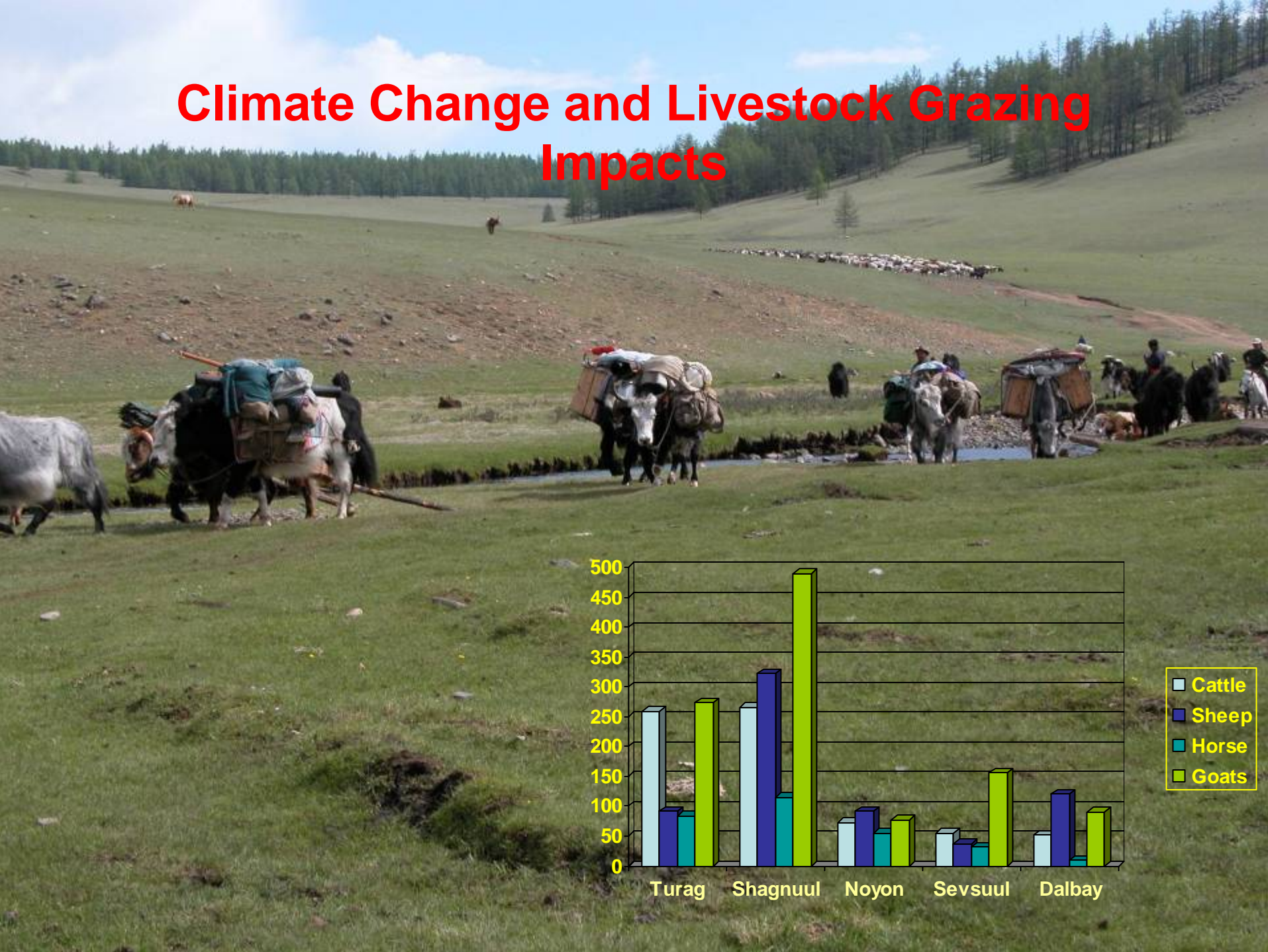
## HAY LEGEND

- ▽ Hay locations of Family

## FAMILY LEGEND

- ★ Family coordinates

# Climate Change and Livestock Grazing Impacts



# Hövsgöl GEF Research Team



- Capacity building—training young scientists to solve environmental problems and provide policy advice

# Workshops

## Capacity Building



Ecosystems



Biostatistics



Insects



English

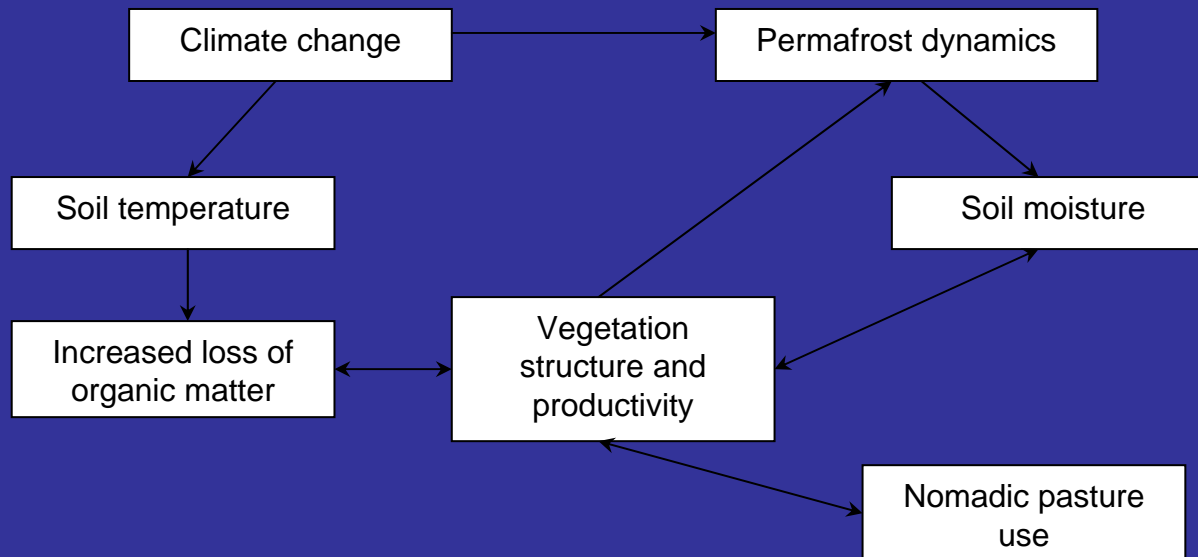
# Hövsgöl GEF Watershed Studies

Mixed forest/steppe at southern boundary of Siberian taiga forest

- Valleys have steppe on south-facing slopes and forests on north-facing slopes and mountain ridges.
- Permafrost on north-facing slopes and riparian zones.

Research efforts at the Lake Hövsgöl LTER site have been discussed elsewhere: Nandintsetseg and Goulden 2003, Goulden et al. 2005, Schaefer et al. 2005, Batkhishig 2006, Etzelmüller et al. 2006, Heggem et al. 2006, Nandintsetseg et al. 2007.

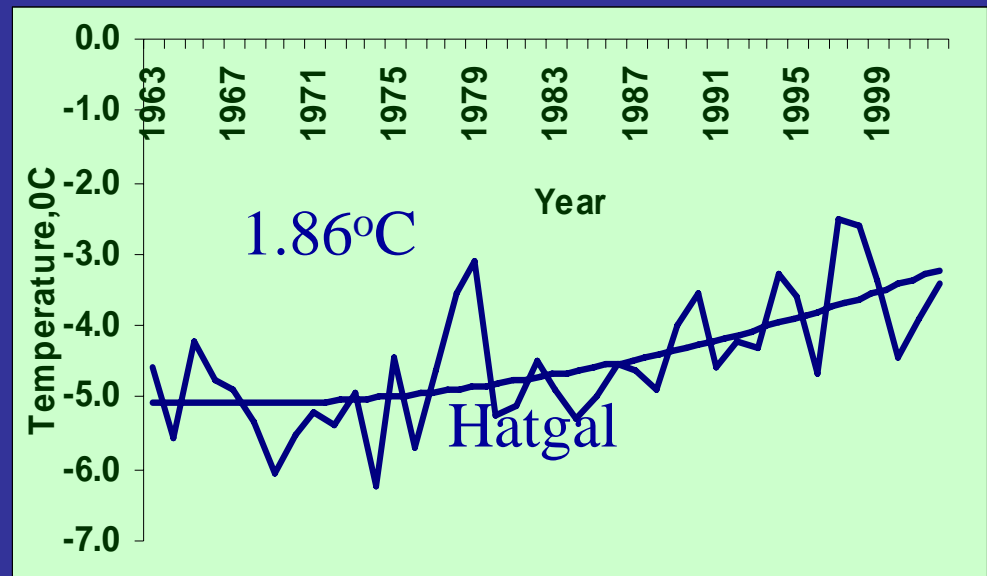
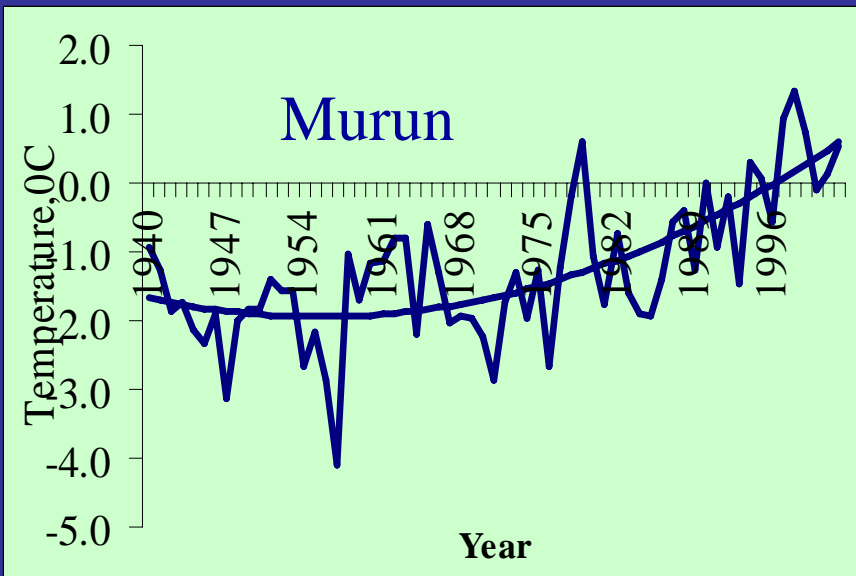
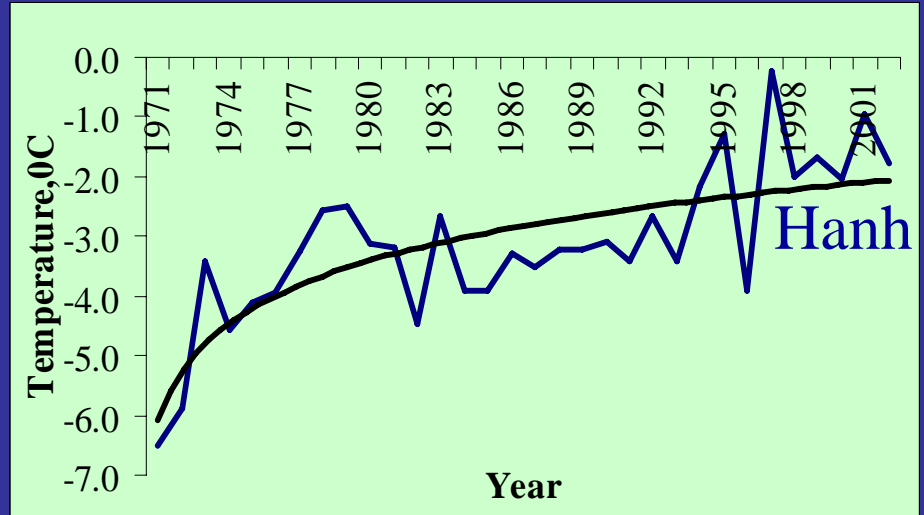
## Major Findings:



# Climate Change of the Hovsgol Basin Area

Gradual warming has occurred since the 1960s in the Hovsgol area that is similar to reported changes throughout the southern Siberian region.

Extreme changes—Nandintsetseg et al. 2006, Int. J. Climatology.



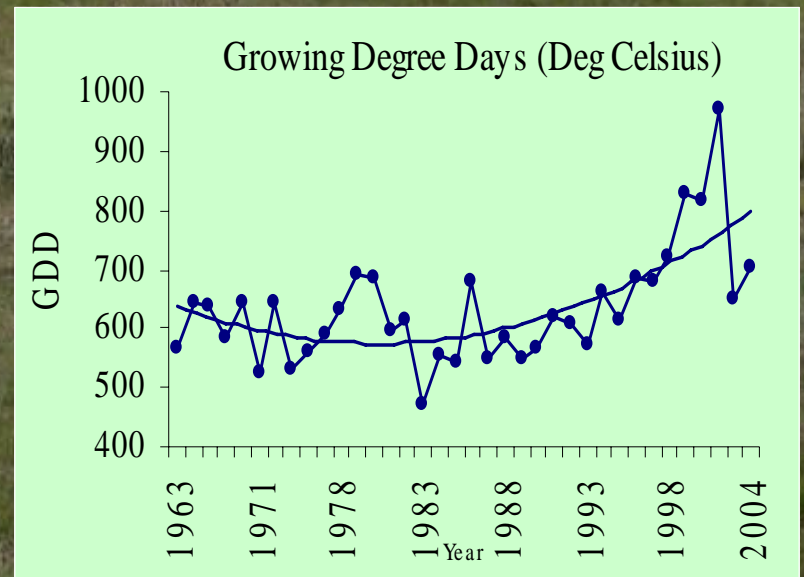
# Climate Change: Impacts on Growing Season

*Why is it Important?*

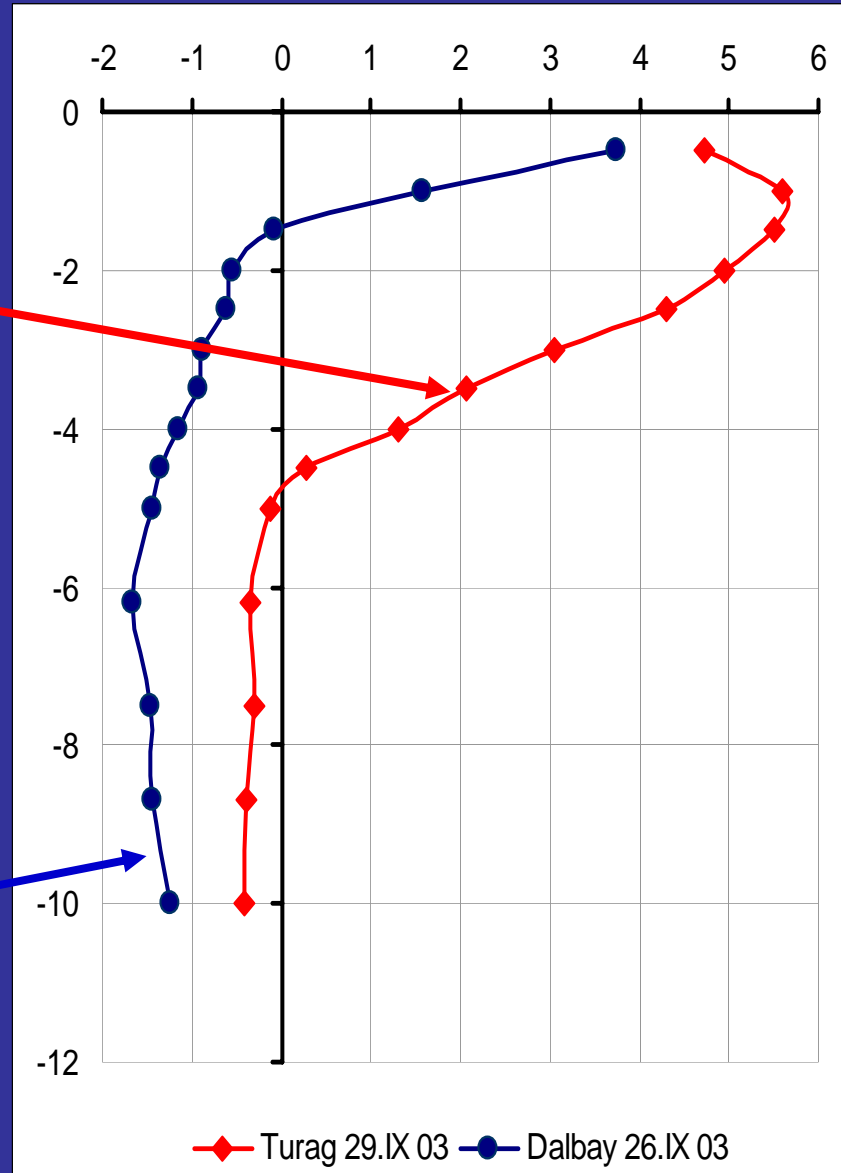
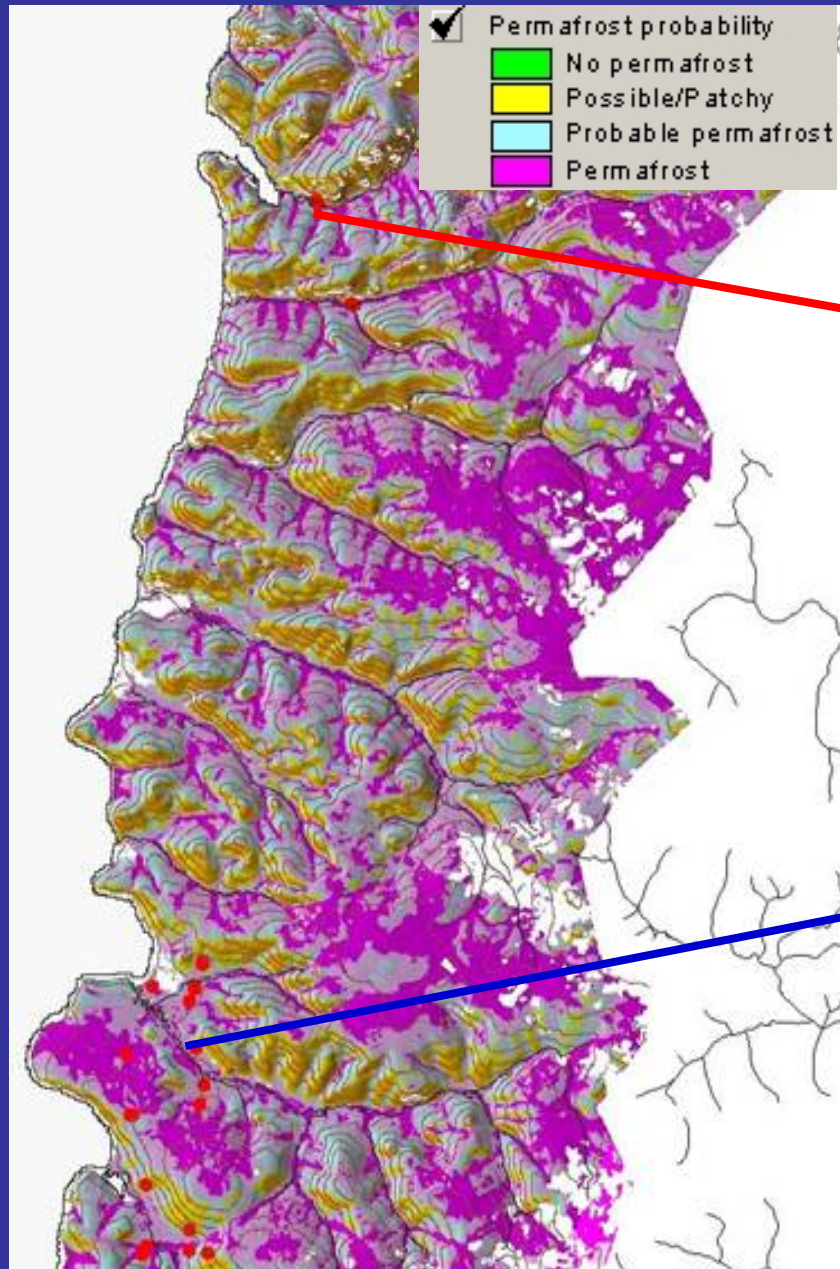
The annual number of Growing Degree Days (GDD) influences agricultural productivity and the types of plants that grow in a region.

The GDD has significantly ( $p < 0.05$ ) increased by 30% between 1963 and 2003.

Increased ETO



# Borehole Temperature: Grazed vs. Ungrazed Valley

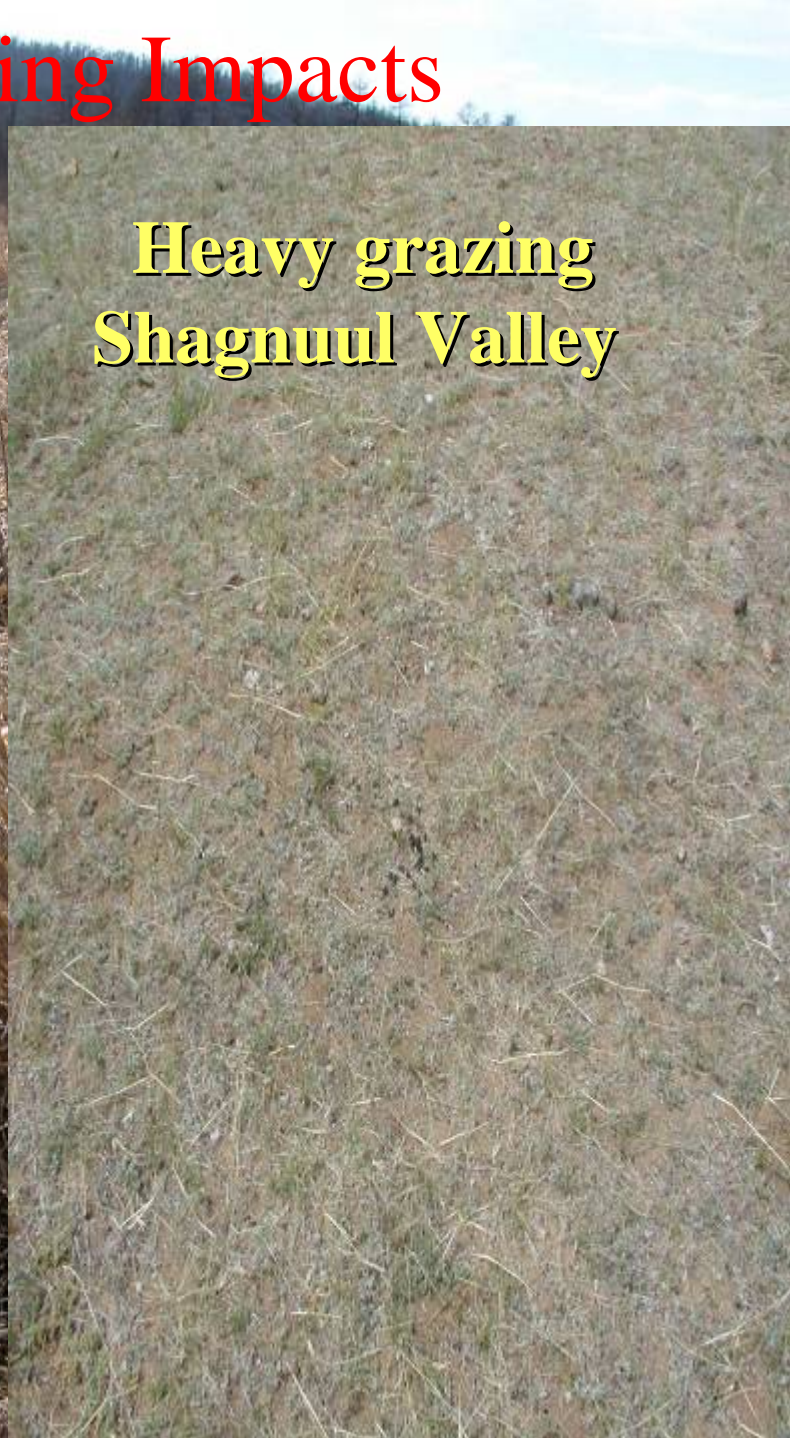
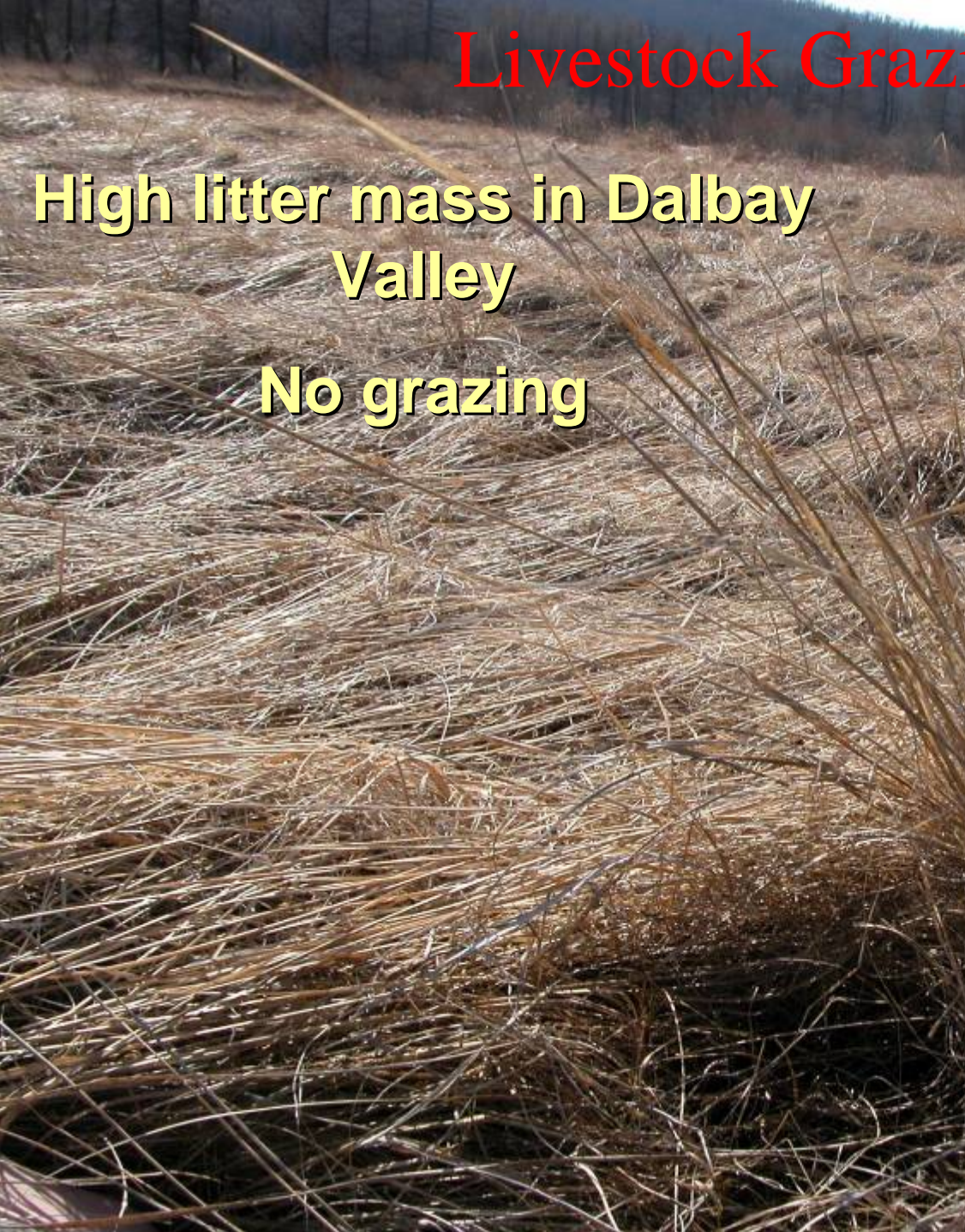


# Livestock Grazing Impacts

**High litter mass in Dalbay Valley**

**No grazing**

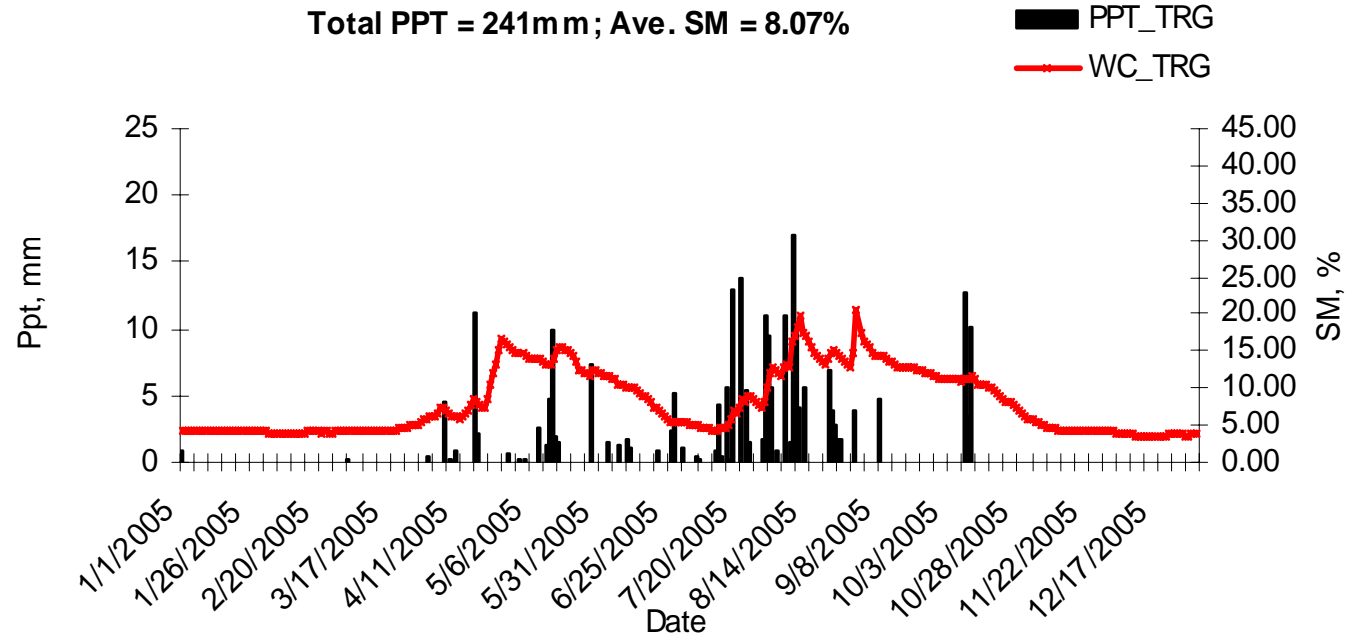
**Heavy grazing  
Shagnuul Valley**



# Heavy grazing

## Precipitation & Soil Moisture, High Grazing Turag Valley

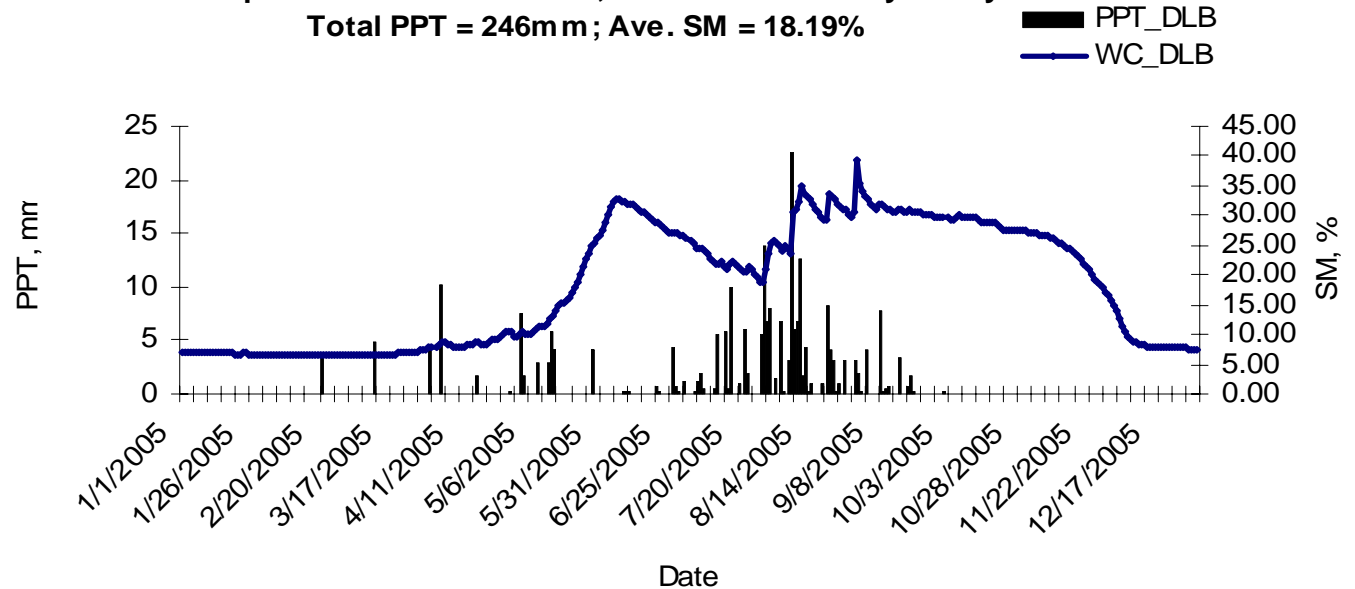
Total PPT = 241mm ; Ave. SM = 8.07%



# Light grazing

## Precipitation & Soil Moisture, Low Grazed Dalbay Valley

Total PPT = 246mm ; Ave. SM = 18.19%



# Litter Experiment: Design



## Replaced Litter

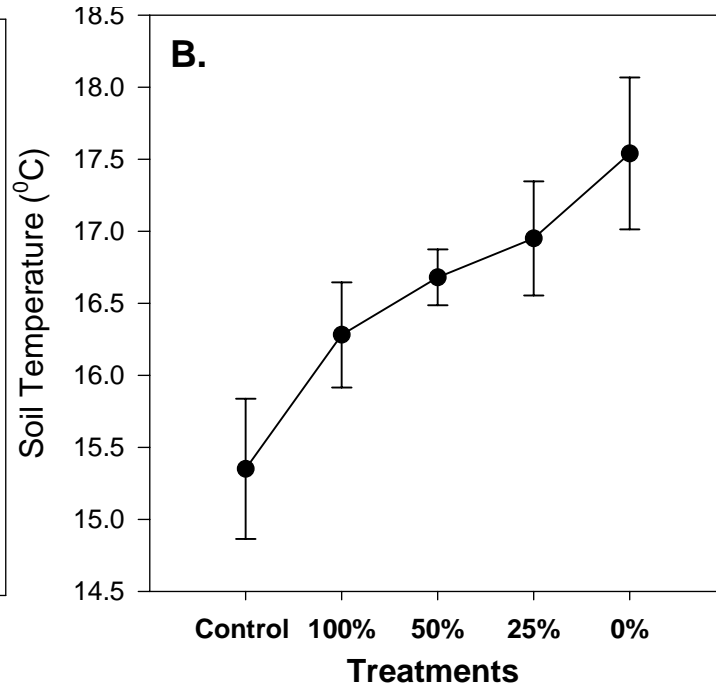
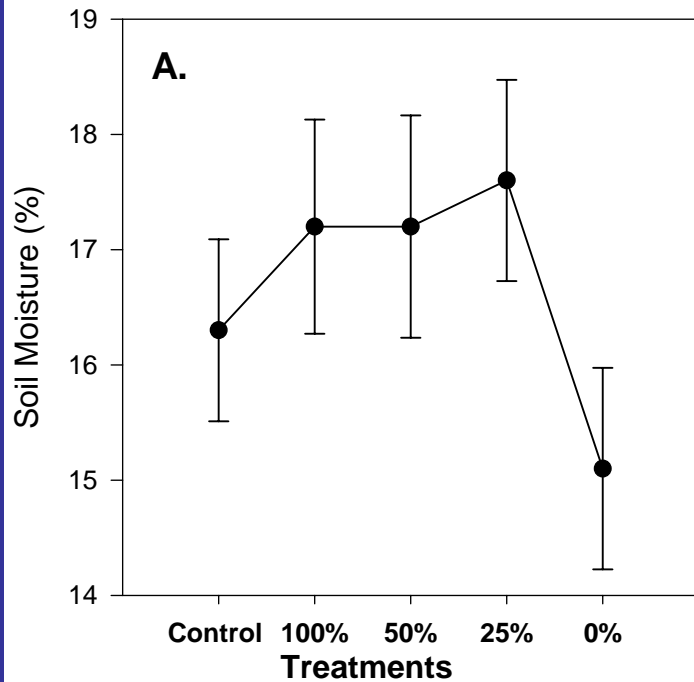
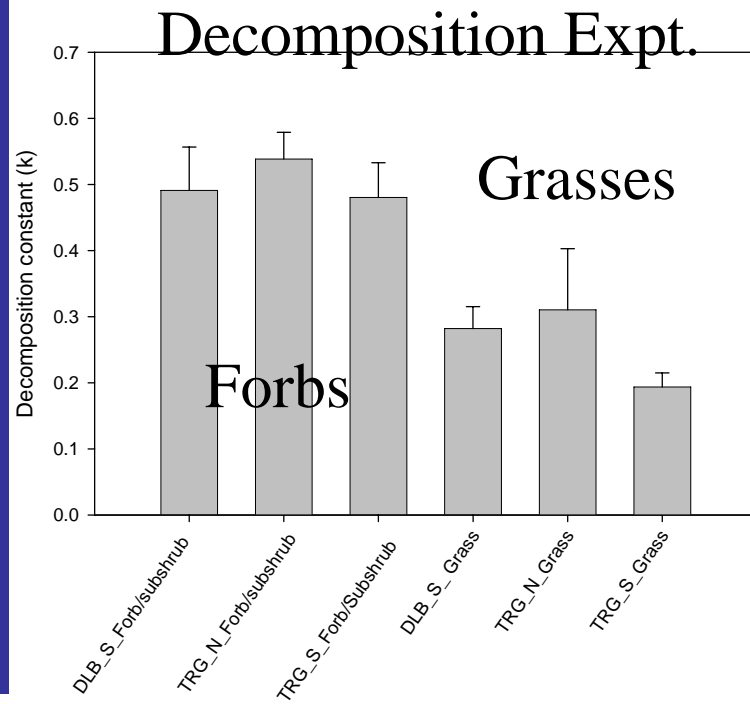
100% - 96.23g/0.25m<sup>2</sup>

50% - 40.26g/0.25m<sup>2</sup>

25% - 22.47g/0.27m<sup>2</sup>

0% - 0.00g/0.25m<sup>2</sup>

# Plant Litter Experiments: Decomposition and Insulation of Soil Temperature and Moisture: Preliminary Analysis



To better understand the relationships between temperature and precipitation changes, soil moisture and plant growth and the impacts of livestock grazing and climate change on the vegetation, the project is developing an Ecosystem model.

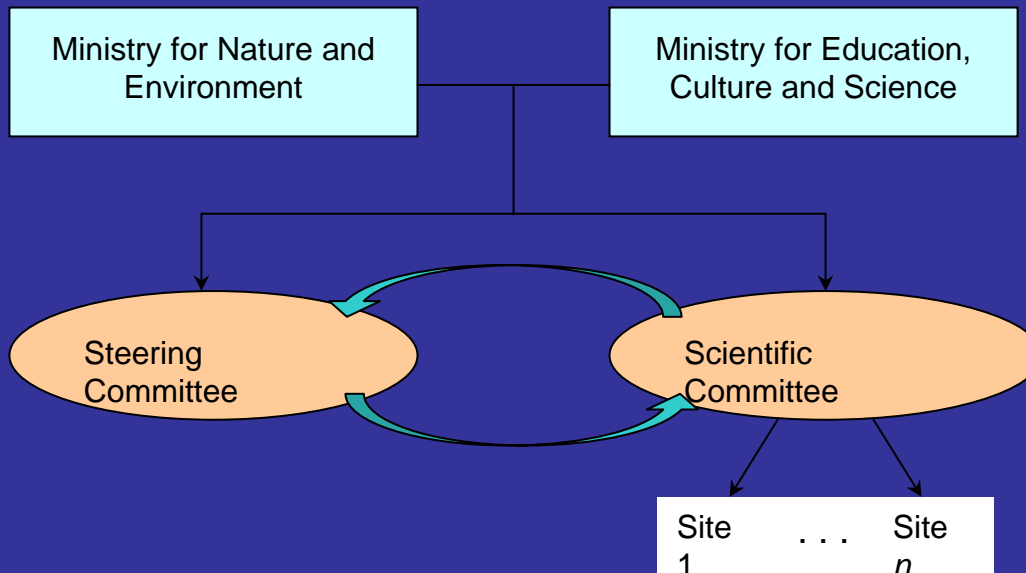
The next phase: Five-year research grant from the Partnership in International Research and Education (PIRE) program of the National Science Foundation of the USA (NSF) **TO STUDY** the combined ecological consequences of global climate change and grazing pressures by nomadic herders in northern Mongolia.

Collaborators: University of Pennsylvania  
Academy of Natural Sciences of Philadelphia  
National University of Mongolia (NUM)

# ONGOING CHANGES IN THE MLTER NETWORK

A conference titled “National Network for Long Term Ecological Research” was held on January 4, 2007 by the NUM.

- To expand and re-vitalize the MLTER Network activities
- A new governing body of the MLTER Network



The new MLTER Network Steering Committee will work together with National Geo-Information Center for Natural Resource Management Project (hereafter NGIC Project) funded by the Government of the Netherlands.

The main goal: To support the environmental policy and decision-making and contribute to the environmental research and sustainable natural resource use in Mongolia.

# Component I.

Develop models with use of GIS and RS for support of decision and policy making in

- Expansion of the PA network
- Forest resources management
- Water allocation
- Environmental impact assessment
- Desertification trend assessment

## Component II

Natural resource geodata and information management (development of database and meta-database of georeferenced information)

## Component III

RS-based decision support system for environmental management (forecasting of natural catastrophes such as wildfire, drought and dzud, environmental monitoring and rangeland management);

## Component IV

Human capacity strengthening (development of curriculum, establishing operational training laboratory and digital library, training courses and public outreach program).

The NGIC Project is currently developing the basic concept of integrated database for ecological studies and appropriate natural resources management.

*1. Need for a national geoinformation standard*

- *Law drafting*
- *Metadata standard development*
- *Database design*

*2. Training on database development*

*3. Workshop on metadata and geoinformation*

- *On May 2, 2007, a workshop entitled “National Standard for Geoinformation Metadata”*
- *On May 4, 2007, a workshop entitled “Current Situation, Demand and Requirements for Environmental Information”*

- Environmental and natural resources database development

  - Design of the conceptual model

  - Logical model

  - Physical model

- Hardware and software selection for implementation of the databases

- *Update of the databases by RS data*

THANK YOU FOR YOUR ATTENTION