Development of biodiversity database and its current situation in Mongolia

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WG2 ASIA-PACIFIC BIODIVERSITY OBSERVATION NETWORK (AP-BON)

2-4 April, 2012
Tokyo, Japan

Contents

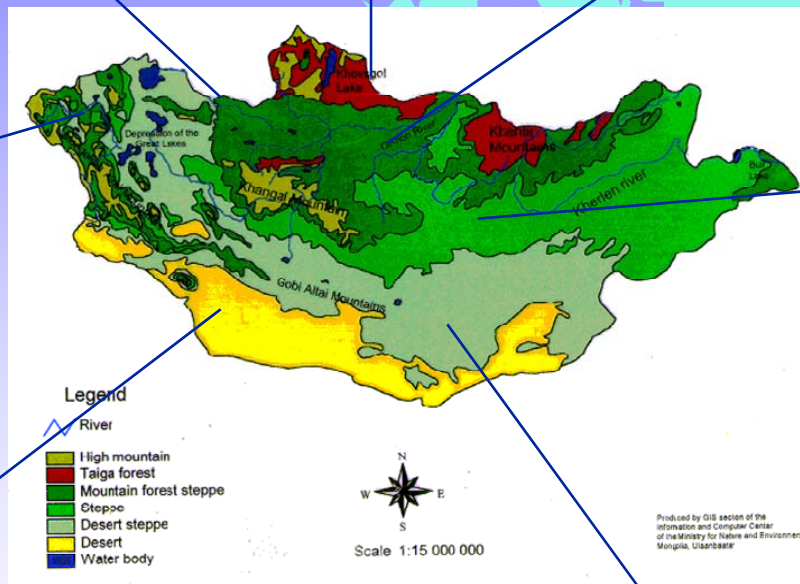- Introduction
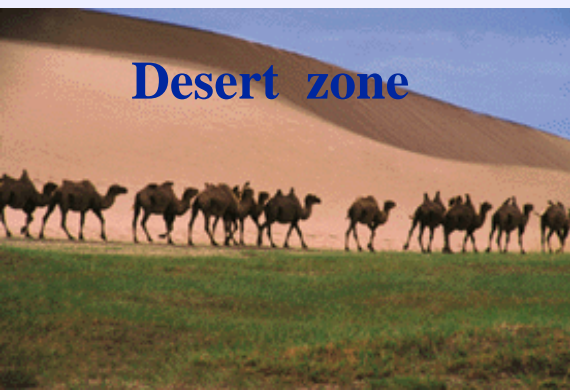- Analysis
- Results
- Discussion

Mountain forest steppe zone

Taiga
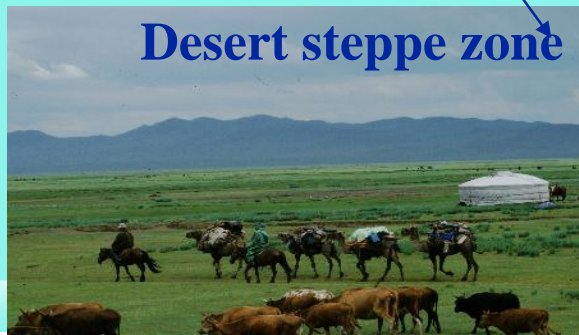
Steppe region

High mountain zone

Desert zone

Desert steppe zone

Legend

River

High mountain
Taiga forest
Mountain forest steppe
Steppe
Desert steppe
Desert
Water body

Scale 1:15 000 000

Produced by GIS section of the
Information and Computer Center
of the Ministry for Nature and Environment
Mongolia, Ulaanbaatar

Mongolian Gazelle

Specifications of Mongolia

Air temperature

January: -15 °C ...... -34°C

July: +15°C ...... +30°C

- Land locked
- Different Natural zones
- Severe Continental Climate (4 seasons, long winter, short summer)
- Economy based on Agriculture/ Animal Husbandry (> 40 mln livestock, pasture > 90%)
- Less industry (mining)
- Low density of human population

2.7 million/1,565 mln sq.km

50% - in capital city (UB)
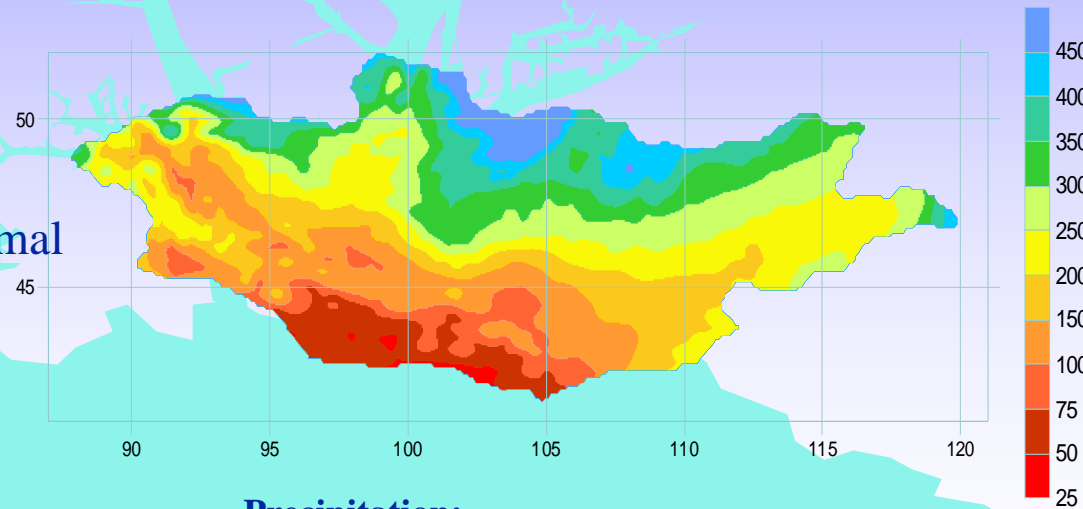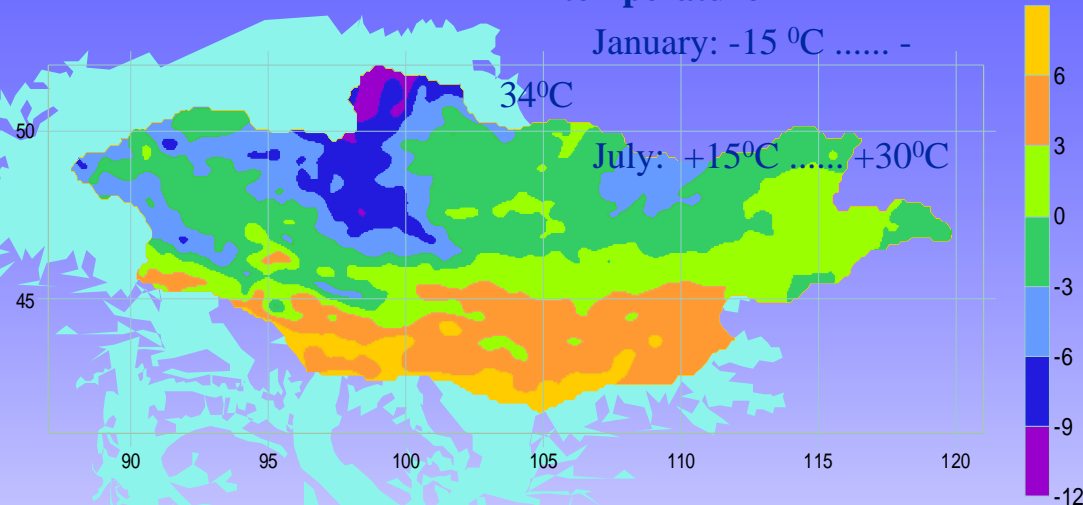
Precipitation:

300-600 mm – mountain

150-300 mm – forest st., steppe 50-150

Monitoring Environmental issues

DESERTIFICATION

Deforestation

PASTURE LAND DEGRADATION

DROUGHT

Application of Remote Sensing Society/GIS

GLACIER

FORESTRY AND FOREST STEPPE FIRE

AIR POLLUTION

Land Cover/Use Change

SEVERE WINTER CONDITION (ZUD)
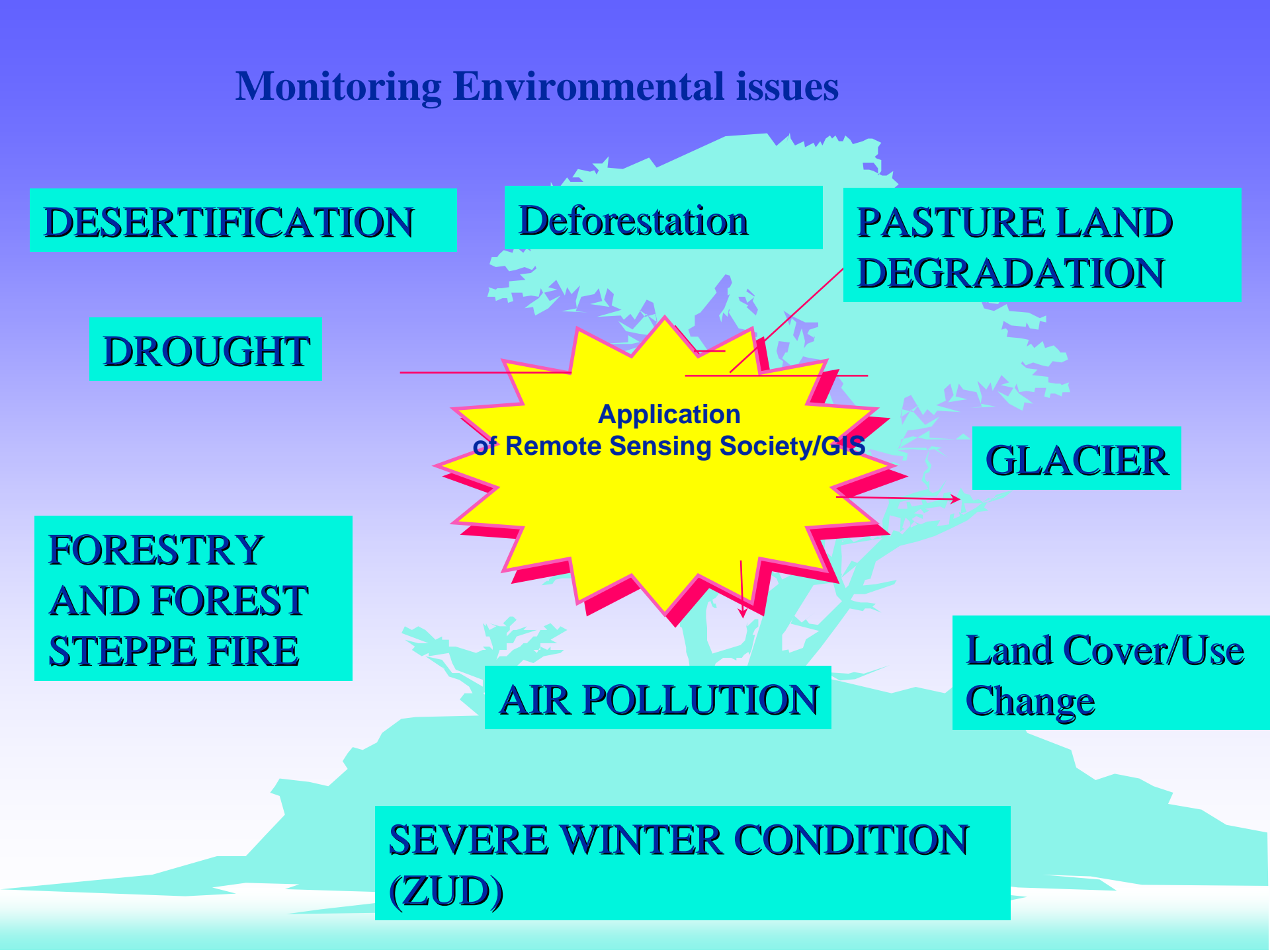
Contribution to Land Degradation

Land degradation has been identified as one the priority concerns. Causes of land degradation can be divided into two categories natural and human induced .
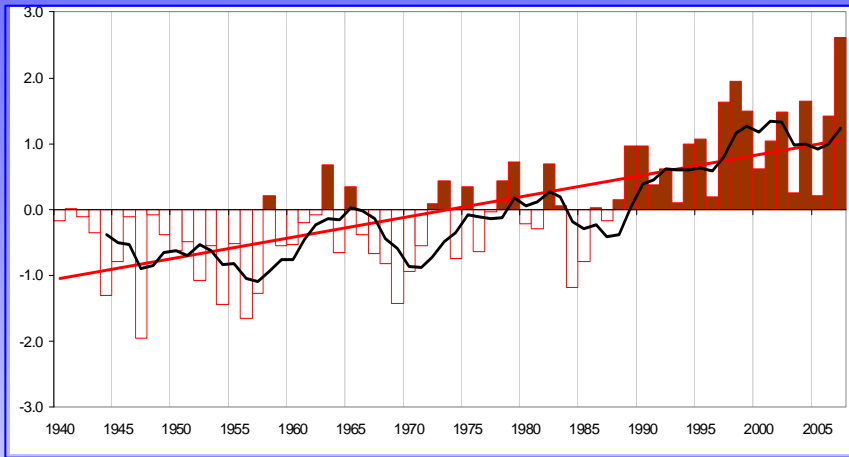
Natural cause: - Climate changes
                        - Dust and sand storms

Human induced: - Mining
                        - Pasture Degradation
                        /Overgrazing/

Climate Change in Mongolia

CURRENT SITUATION:

Annual mean Air temperature change trend since 1940
Increased in 2.1degree C

PRISM 1961 - 1990 Mean Annual Precipitation, Mongolia

120 60 0   120 Kilometers

Map Created: November 2002

Precipitation (mm)

< 50	100 - 125	175 - 200	250 - 275	325 - 350
50 - 75	125 - 150	200 - 225	275 - 300	350 - 400
75 - 100	150 - 175	225 - 250	300 - 325	> 400

Copyright (c) 2000 - 2002 OSU Spatial Climate Analysis Service

The Climate Source, Inc.
www.climatesource.com
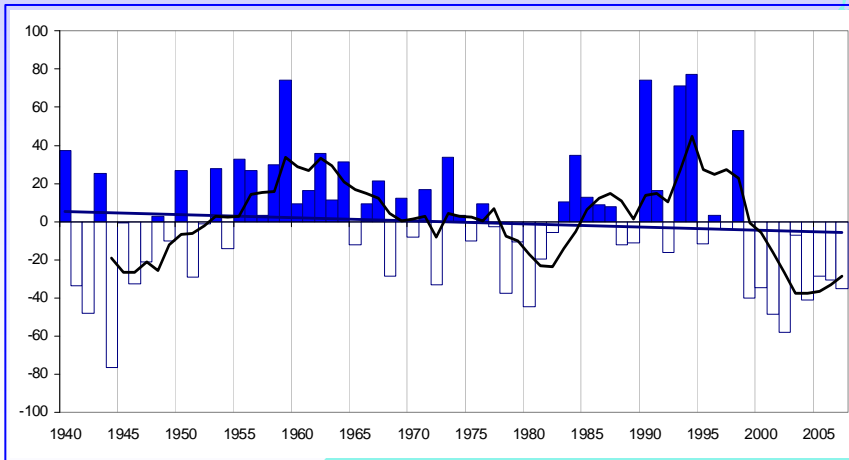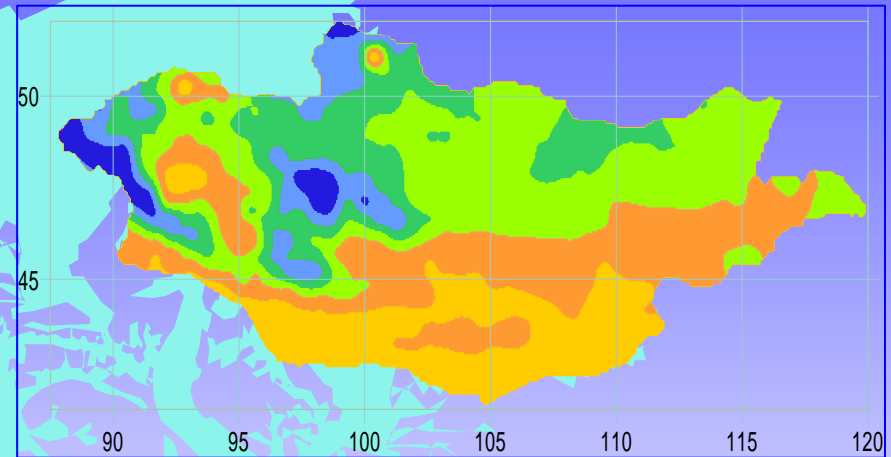
Annual precipitation change trend since 1940
Decreased in 7%
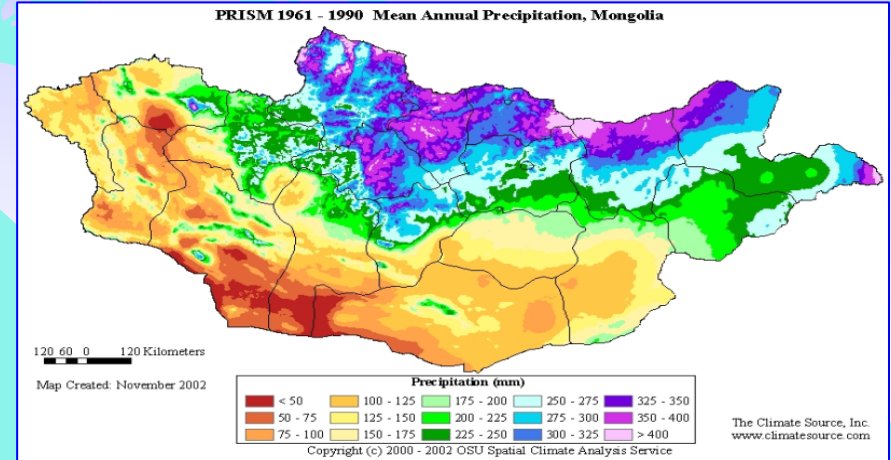
Land Degradation/Desertification Assessment using RS

Environmental Information Center/NRSC

Land cover maps of Mongolia, 2006 & 2008   MODIS/NDVI, 250 m

Seasonal Landcover Map of Mongolia (2006)

Seasonal Landcover Map of Mongolia 2008

Scale 1:2.000.000
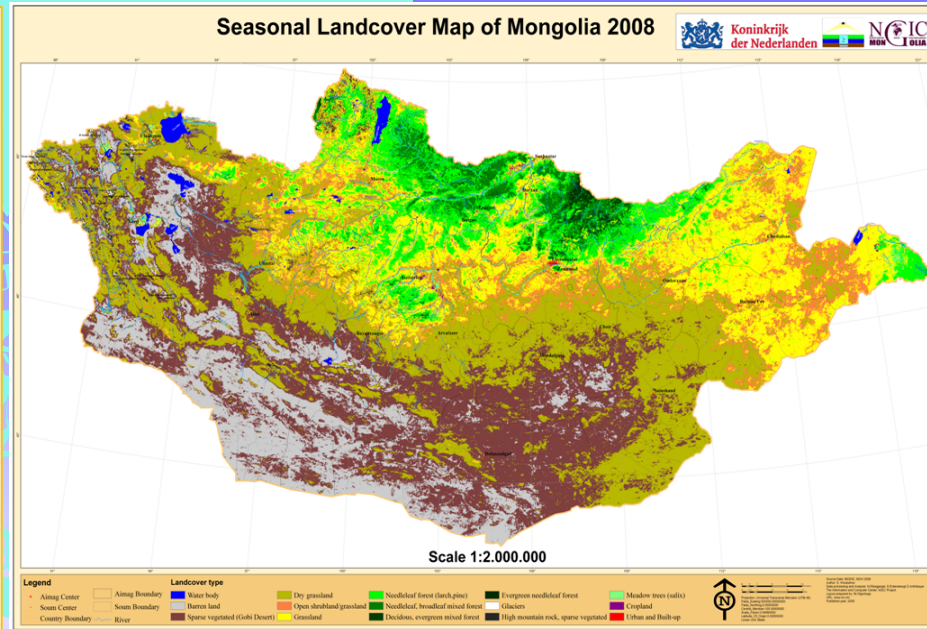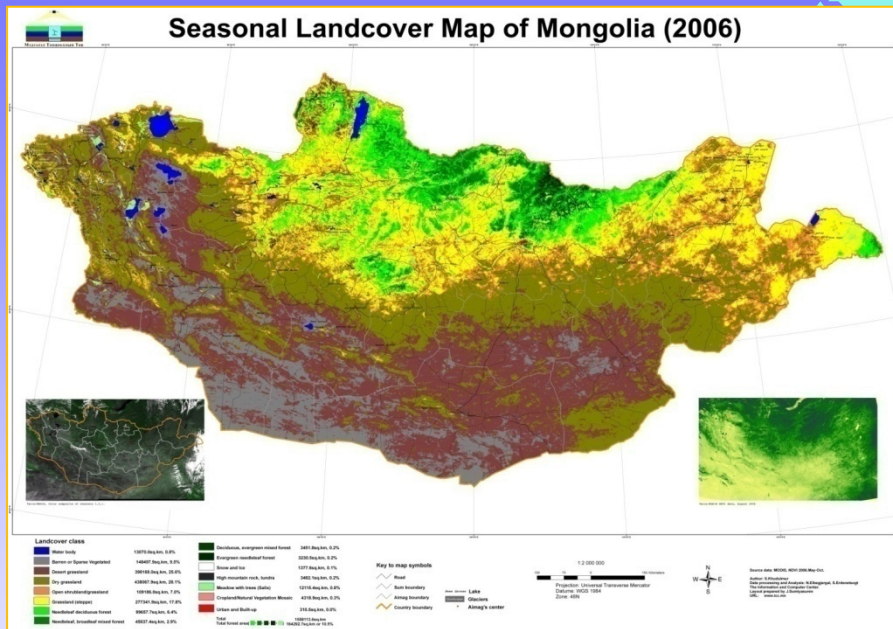
	Class name	Area (sq.km) 2006	Area (sq.km) 2008			Area (sq.km) 2006	Area (sq.km) 2008
1	Water body	13069.96	12924.0	9	Deciduous, evergreen mixed forest	3451.76	4004.4
2	Barren or Sparsely Vegetated	149762.0	193451.9	10	Evergreen needle leaf forest	3230.5	2471.7
3	Desert grassland	396903.9	364007.6	11	Snow and ice	1377.6	1682.1
4	Dry grassland	438067.8	412762.0	12	High mountain rock, tundra	3482.12	4268.9
5	Open Shrubland/grassland	109186.0	104516.7	13	Meadow with trees	12115.4	9943.1
6	Grassland	277341.9	273629.6	14	Cropland mixed with natural veg.	4318.88	2120.7
7	Needle leaf forest (larch, pine)	99657.7	129351.7	15	Urban and Built-Up	310.54	236.9
8	Needle leaf, broadleaf mixed forest	45837.4	42856.7		Total	1558113.4	1558113.4

Many lakes have been disappeared

APPROACH
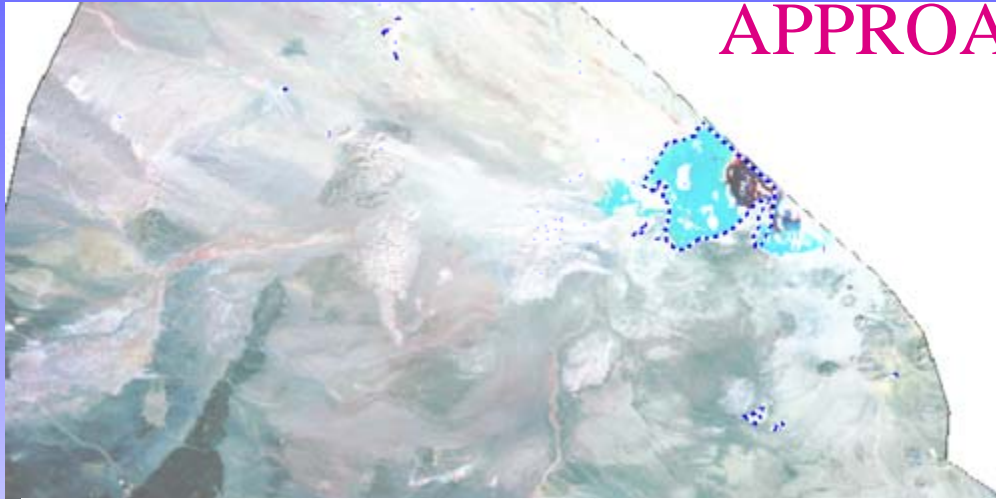
Uvs Lake and Tes River Protected Area

Snow Cover

MODIS

Snow cover between from
June to July, 2006
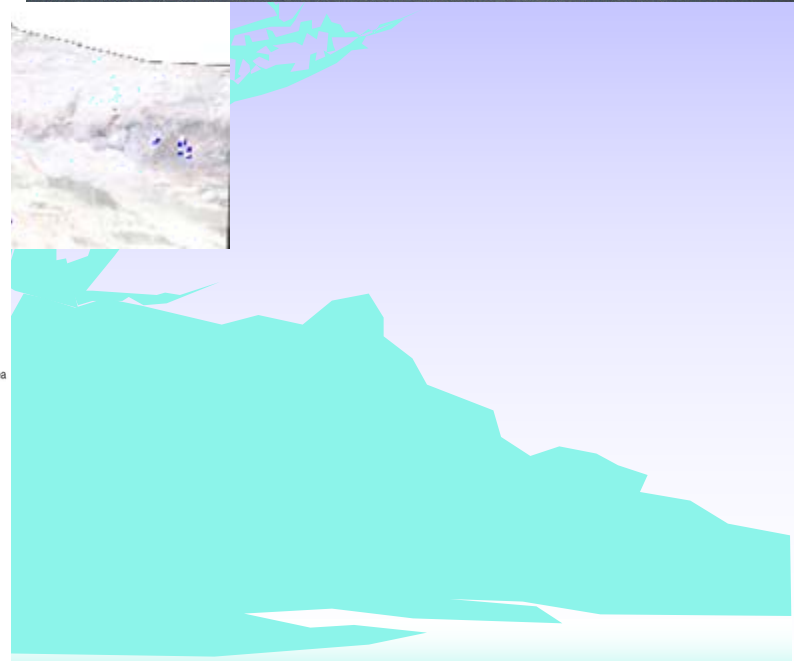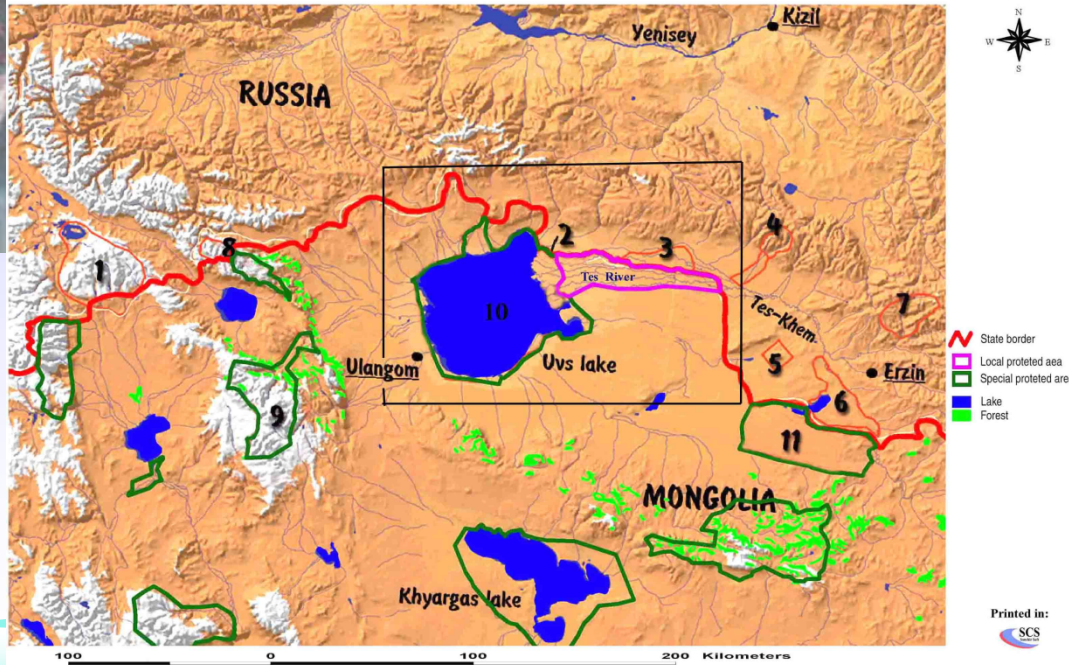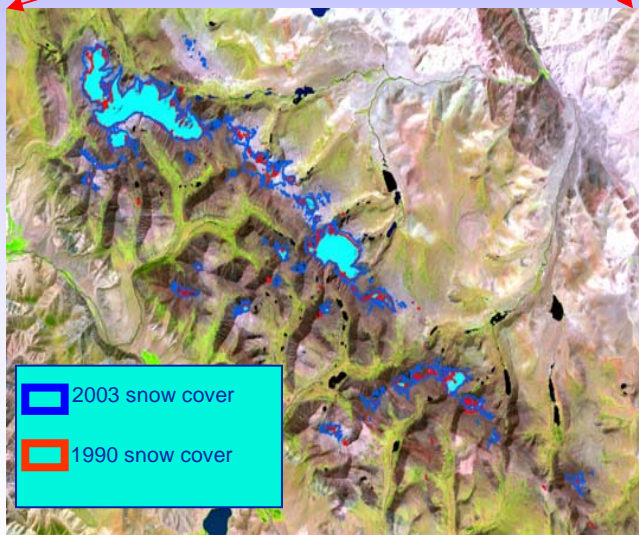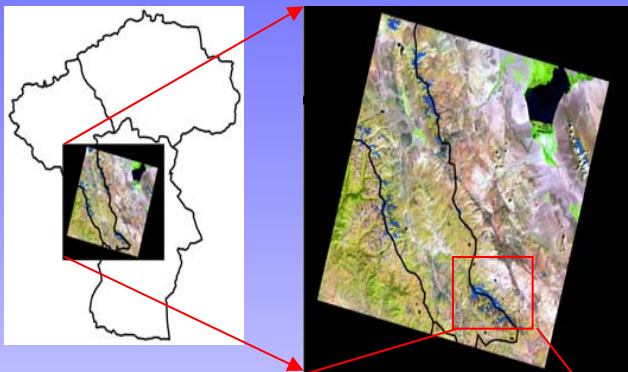
Result of Landsat satellite

2003 snow cover
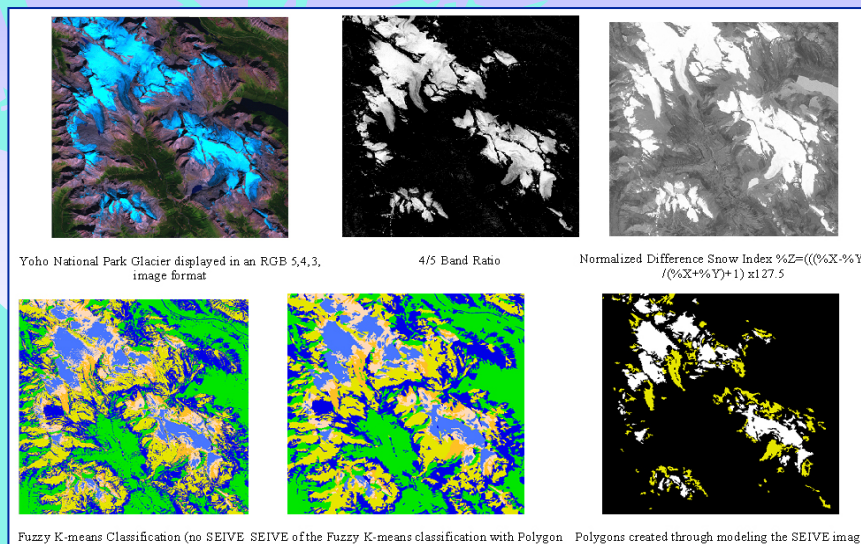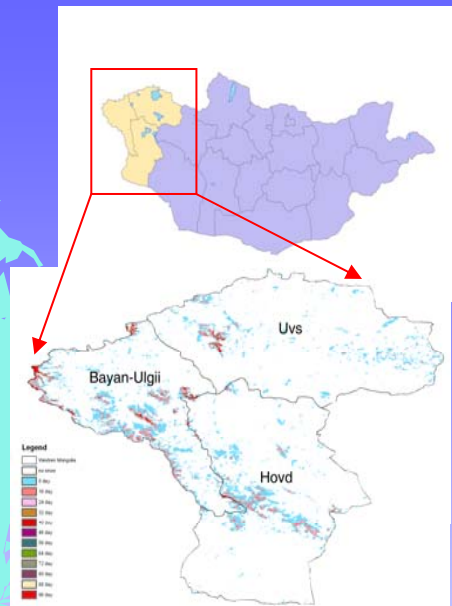
1990 snow cover

Snow cover classification

LAND COVER MAP by MODIS Terra

1390.11 (ha)

1397.92 (ha)

127.38 ha

1535.6 ha
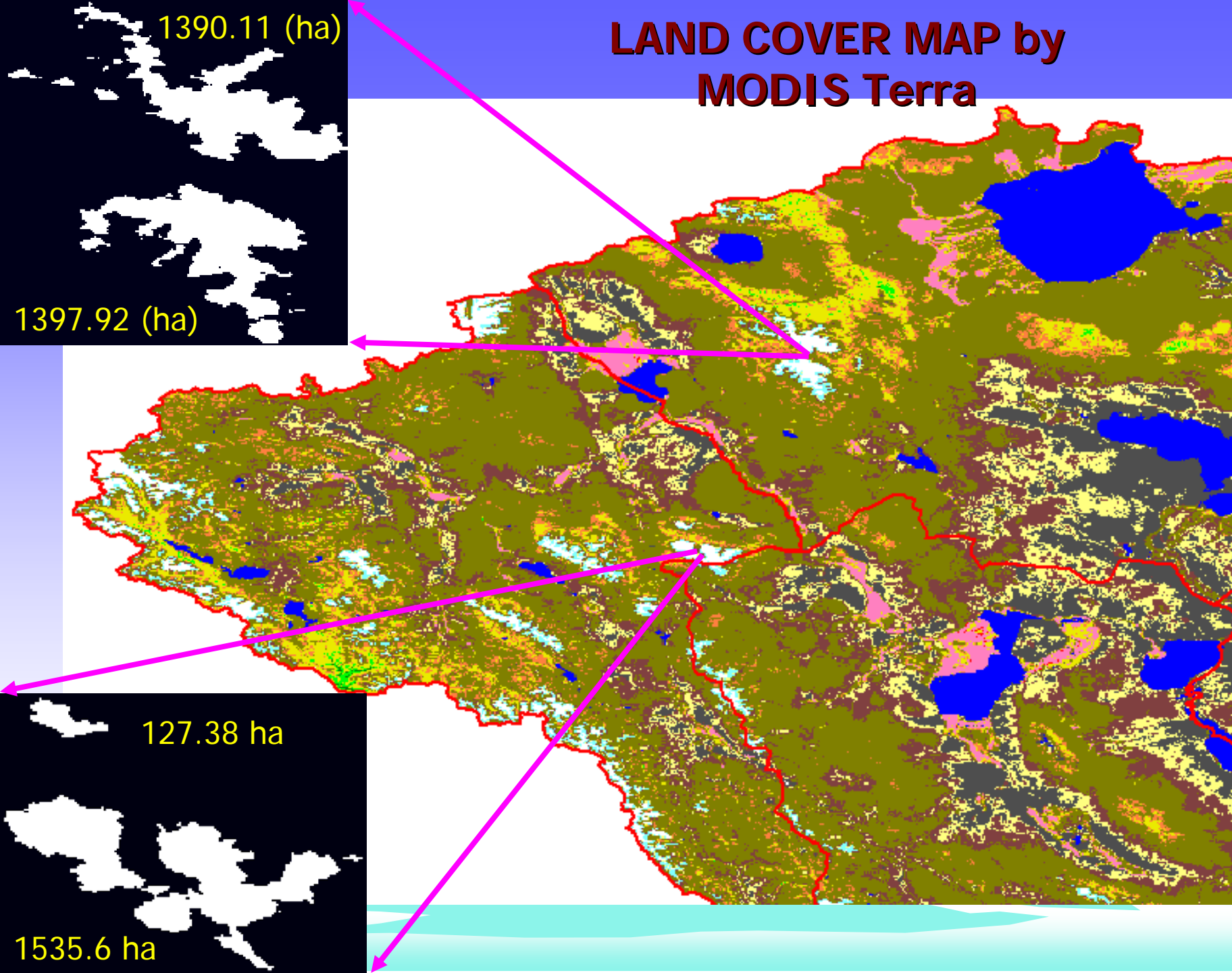
PASTURE and FORESTRY LAND DEGRADATION

- **Overgrazing in the dry region, degraded pasture exists primarily as a result of livestock concentration around the water sources and settlement areas.**

- **Overgrazing can occur under continuous grazing. It can be caused by having too many animals by not properly controlling their grazing activity.**
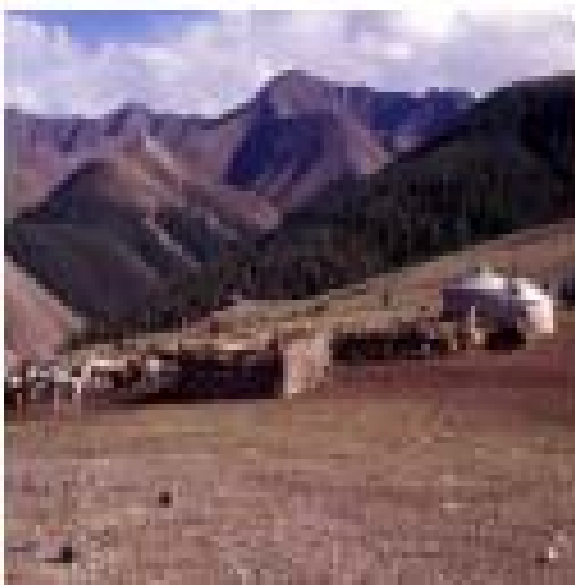
During Mongolia's transition to a free market, socio-economic factors such as poverty and profit-seeking mining exploitation of the environment have contributed to its deterioration, and consequently, the loss in regional biodiversity, land degradation and vulnerability.

Approximally 60 thousand people and over one million livestock who one living around Ongi river one getting defective of drink water and pasture because of Ongi river and Ulaan lake's evaporation.

Mining activities

Hand level mining contributes to land degradation,

Increased small to large-scale mining, as well as illicit activity resulting in exploitation of the country's mineral resources.

Mining
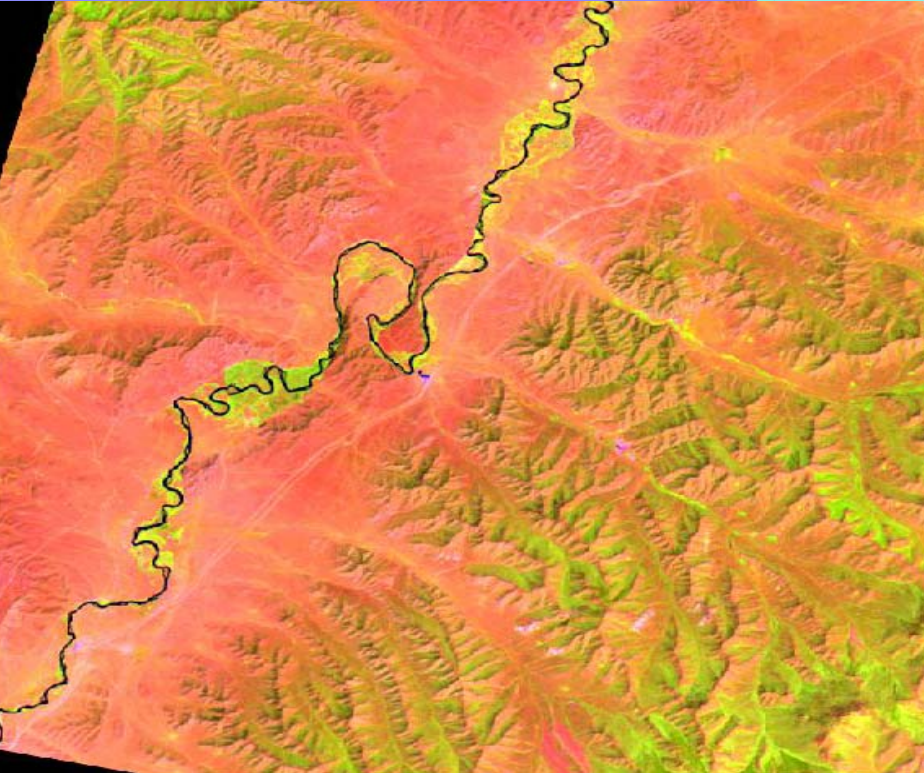
Landsat, August 2003
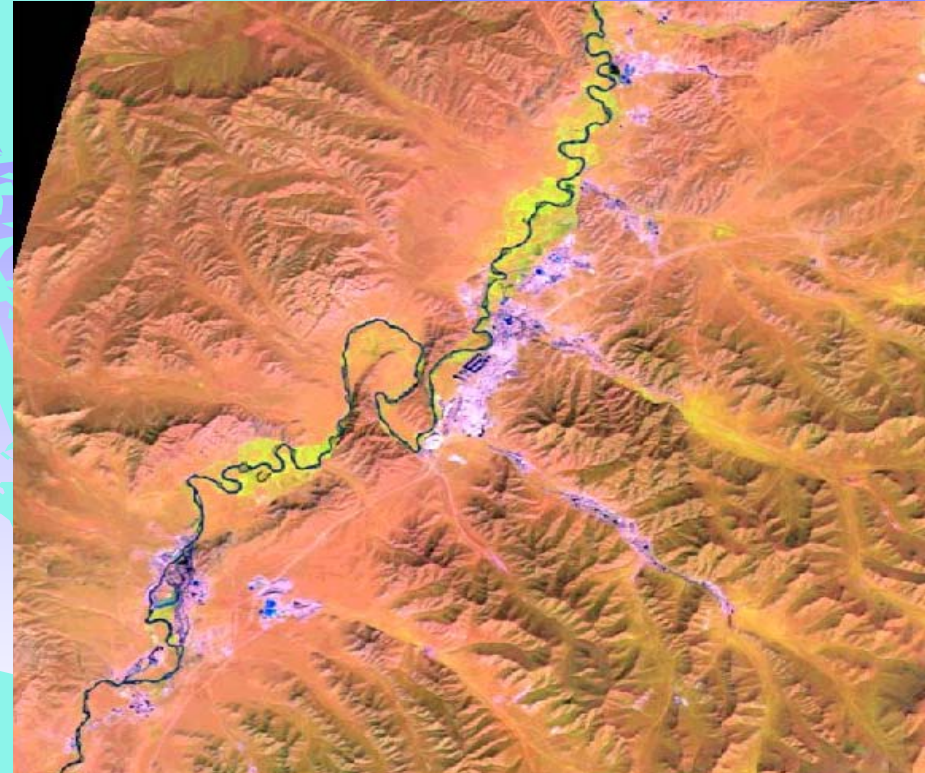
LandsatTM
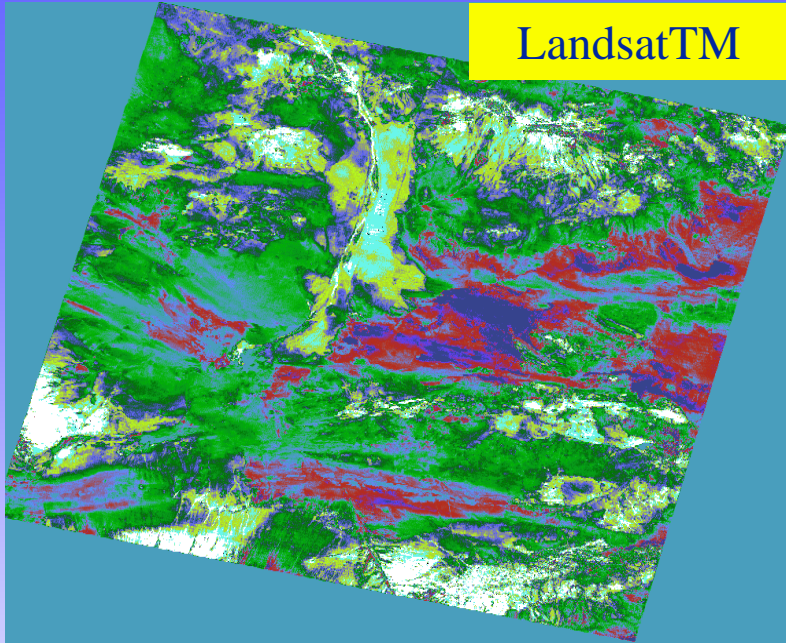
Landsat ETM
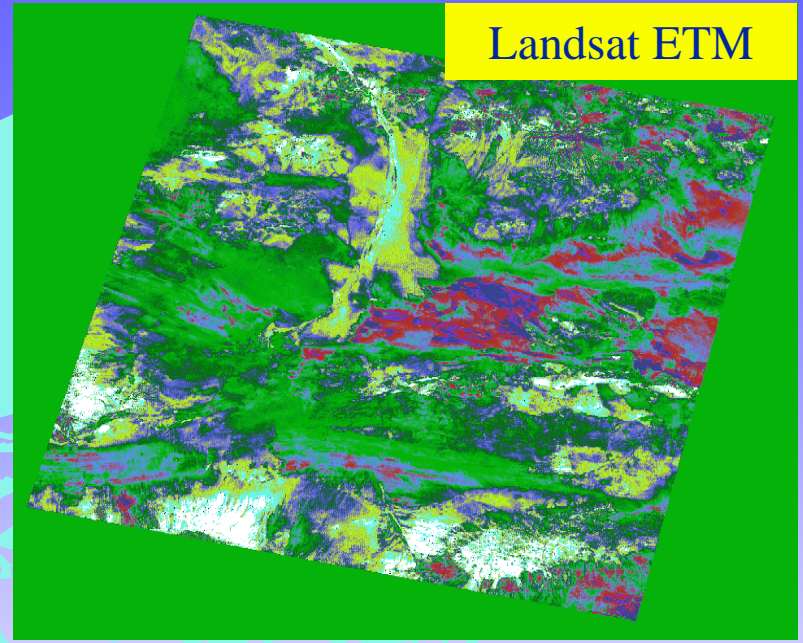
TM 1991
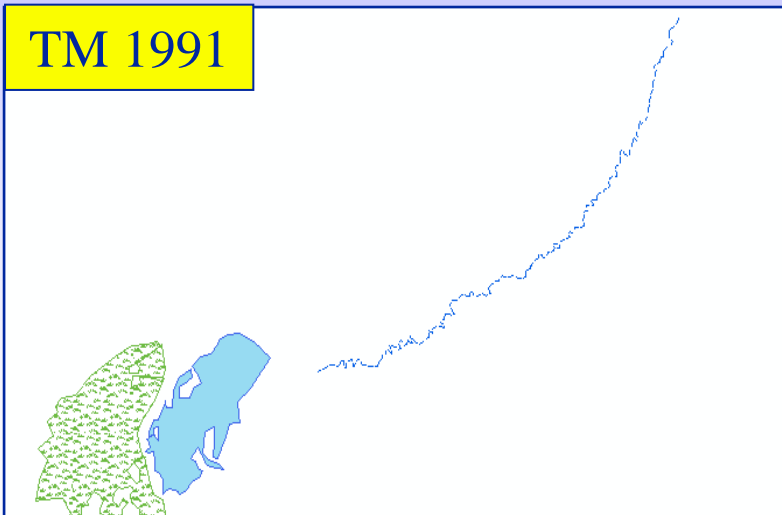
ETM 2000
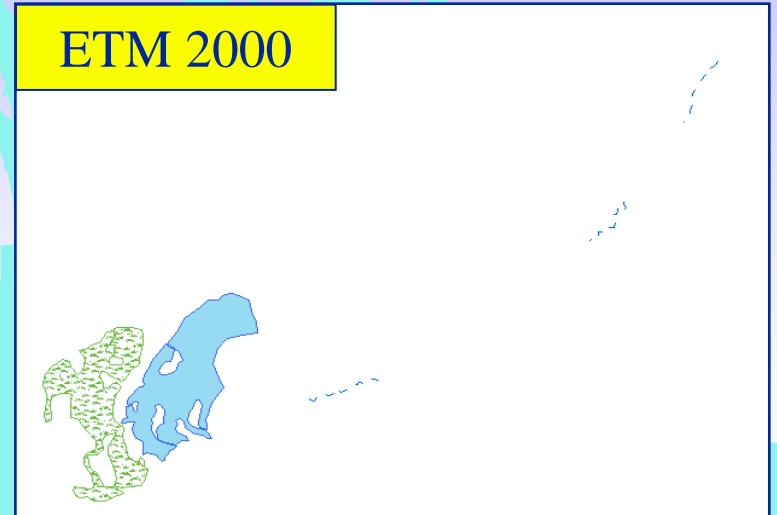
Onggi river&Ulaan lake, Landsat Image
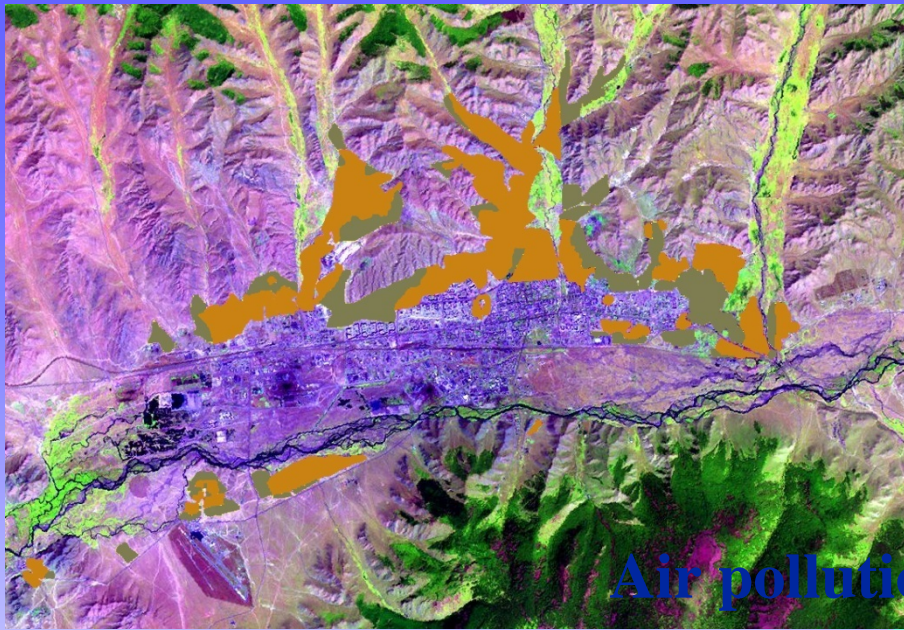
Air pollution in Ulaanbaatar city

Ulaanbatar city 1990   Ulaanbatar city 2007

Ger area 1990

Ger area 2007

Land use change
Urban area expantion
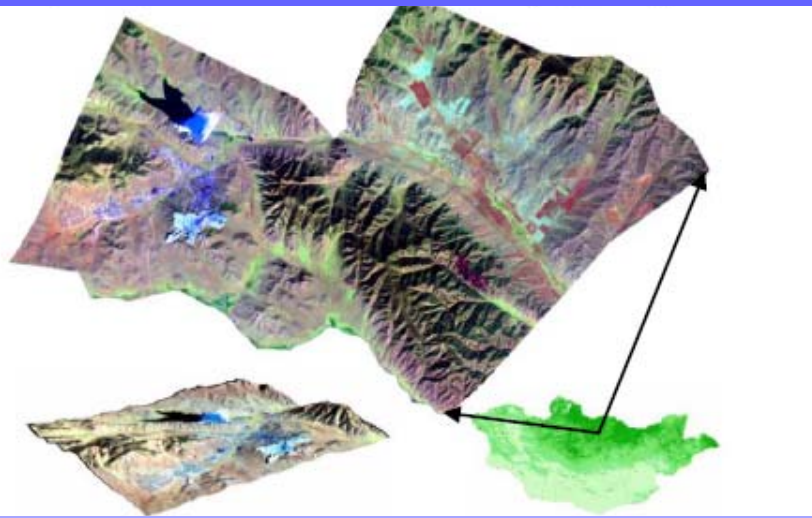
1973-7.07% Developed
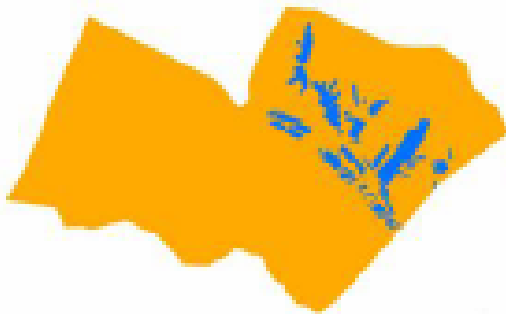
1983-8.02% Developed

1992-25.13% Developed
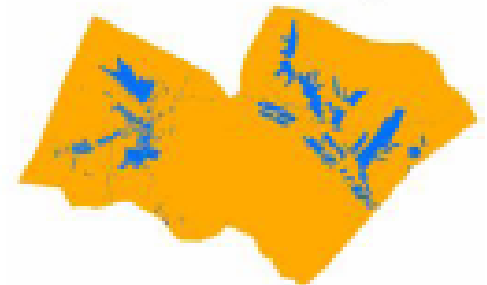
2000-28.69% Developed
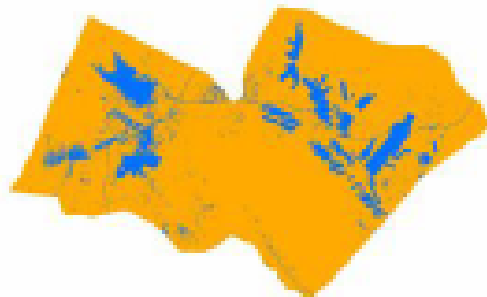
2004-29.88% Developed

Legend

Undeveloped land

Developed land
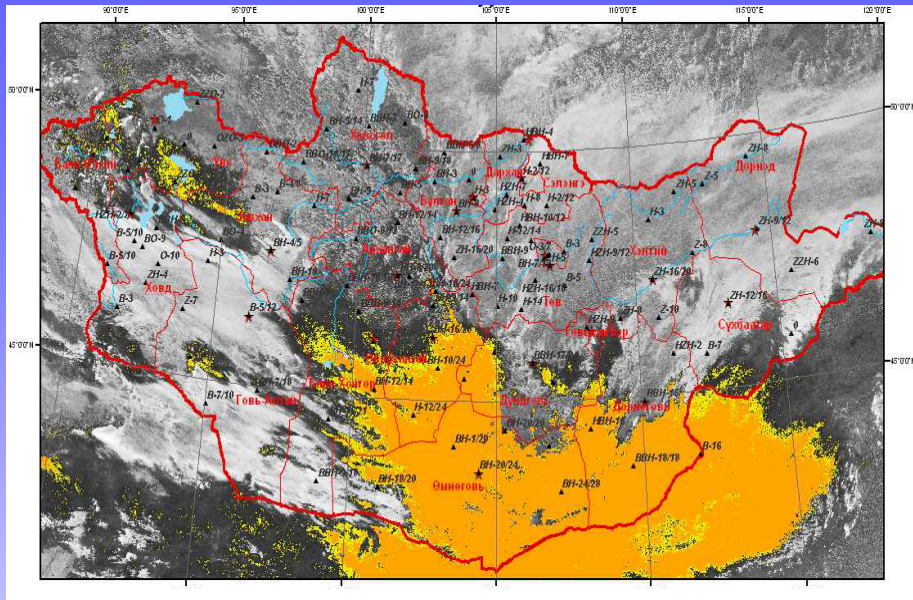
2006.03.06 AVHRR/NOAA
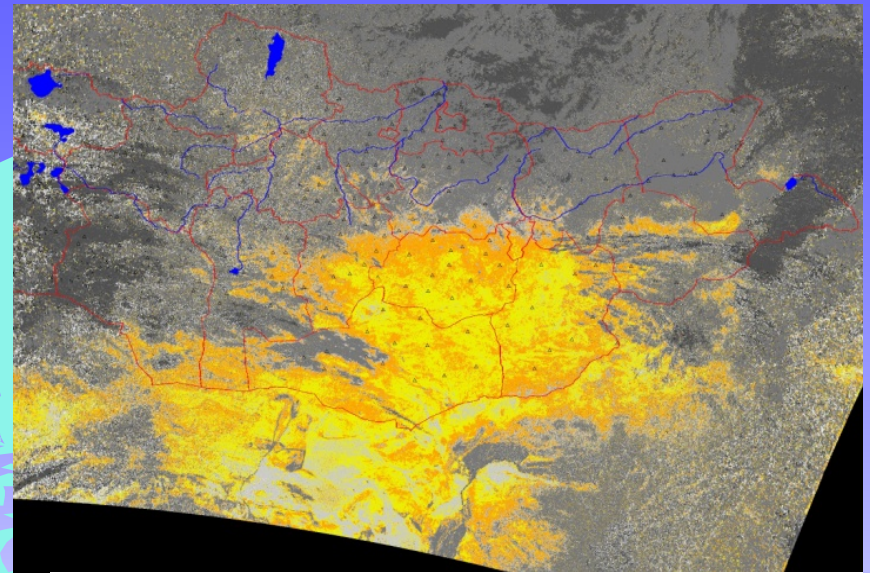
b) 2006.03.06 MODIS/TERRA
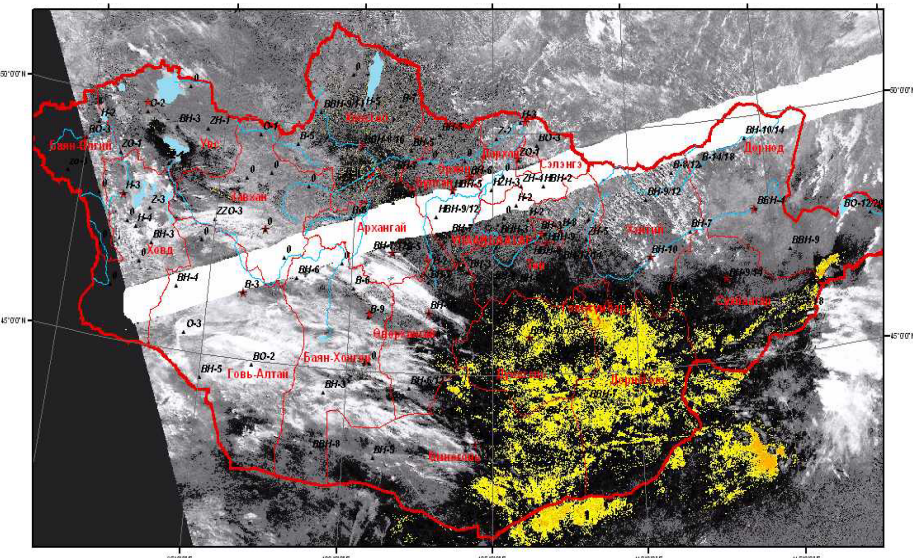
2006.03.09 AVHRR/NOAA
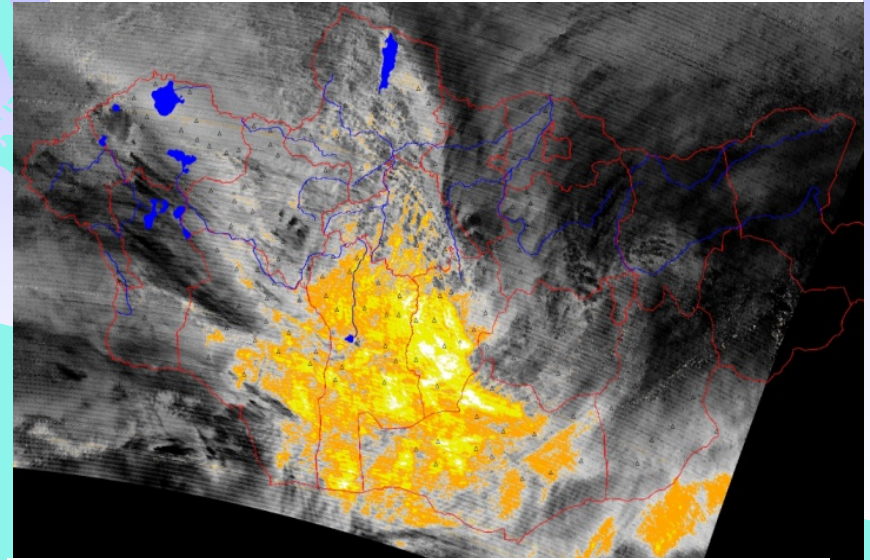
d) 2006.03.09 MODIS/TERRA

Forestry

over 8 percent of the country covered by closed forests and forming a transition zone between the Great Siberian boreal forest and the Central Asian steppe desert. In Khentii and Khovsgol, the mountain slopes are clothed with boreal taiga forest.

Монгол орны ойн зураг

Forest map of Mongolia

Таних тэмдэг
Legend

Аймгийн хил Boundary
Гол мөрөн   River

Шинэс   Larch
Нарс   Pine
Жодоо   Spruce
Гацуур   Fir
Хус   Birch
Шатсан   Fire damaged
Заг   Saxaul

Монгол улсын ойн сангийн нийт талбай 18 291 800 га.

Forest total area 18 291 800 ha

Масштаб 1:10 000 000
Scale 1: 10 000 000
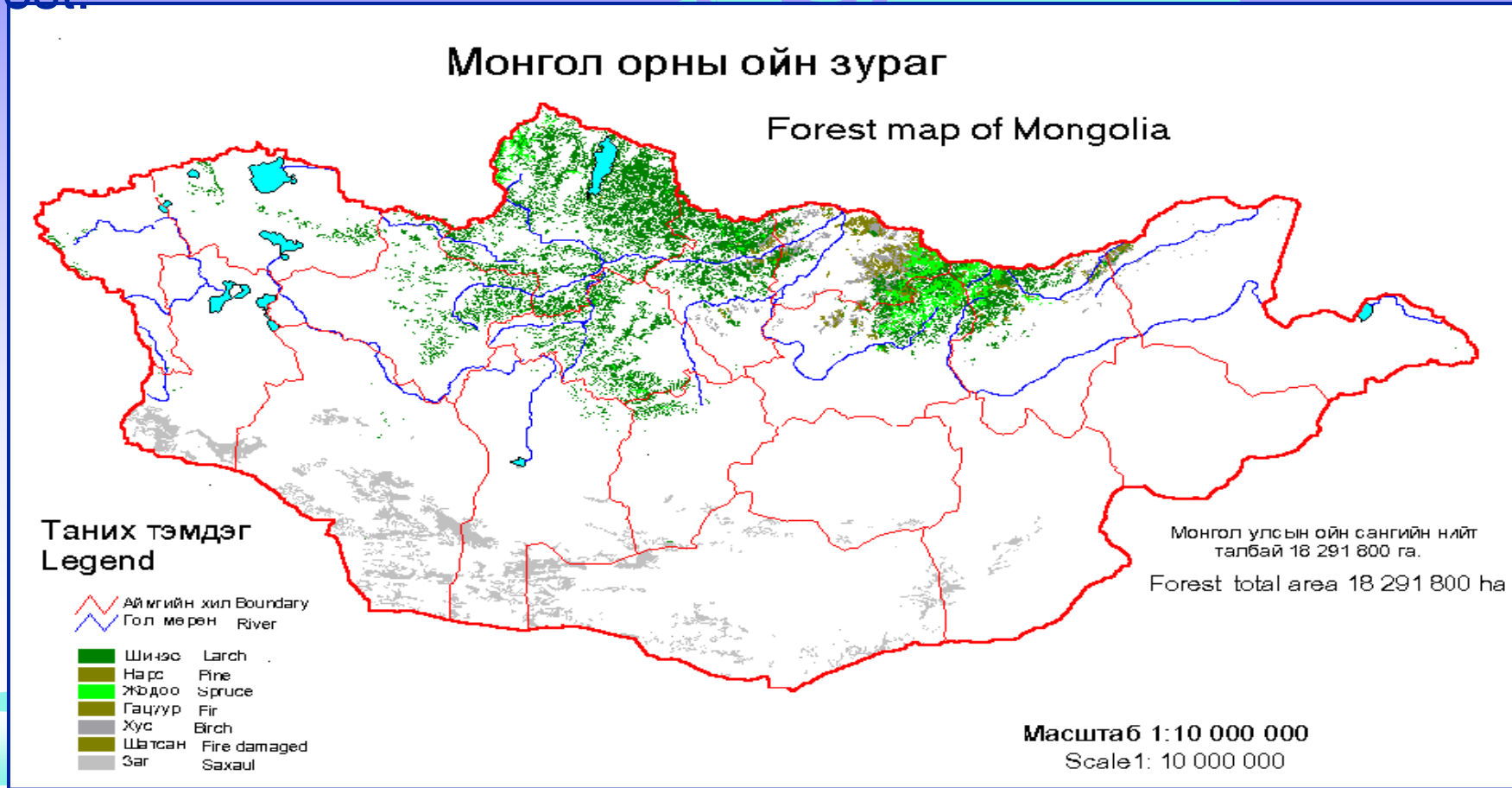
Deforestation

Between 1990 and 2005   60,000 ha of forest have been lost;

- Recent rapid deforestation is primarily due to fire, improper commercial and illegal logging inadequate enforcement of forest rules and regulations

- Grazing and browsing of young trees by livestock, and insect infestations

Causes

-Incorrect policies

-infrastructure support for sustainable logging regimes

-Increasing domestic demand for fuel wood and timber

Causes

-Incorrect policies

-infrastructure support for sustainable logging regimes

-Increasing domestic demand for fuel wood and timber

Illegal logging practices

Forestry monitoring

Bayanlig soum of Bayankhongor province
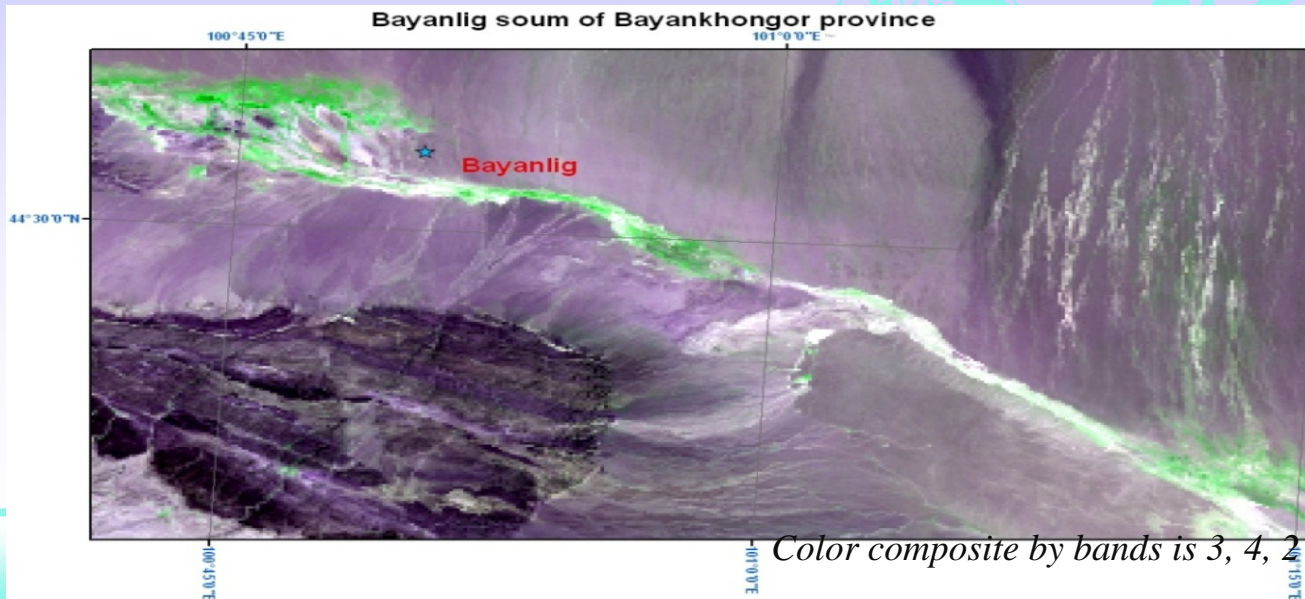
Color composite by bands is 3, 4, 2 (Landsat TM satellite, 1994)

Change forest biomass of the study area between years 2003 -2007

N52º, E98º

2003

N48º, E102º
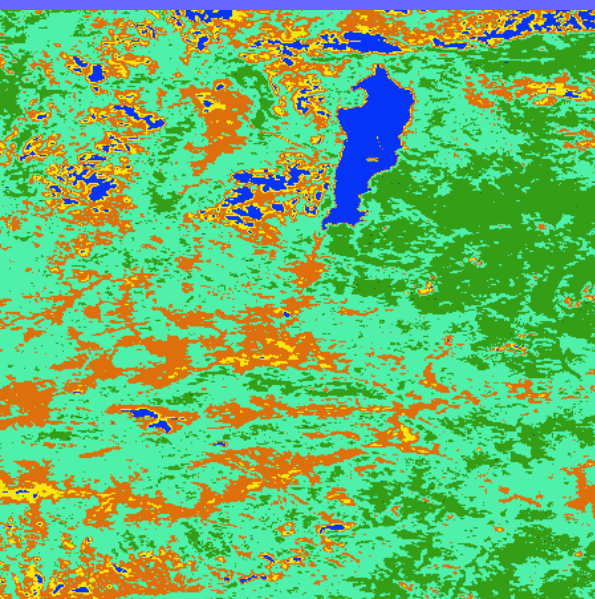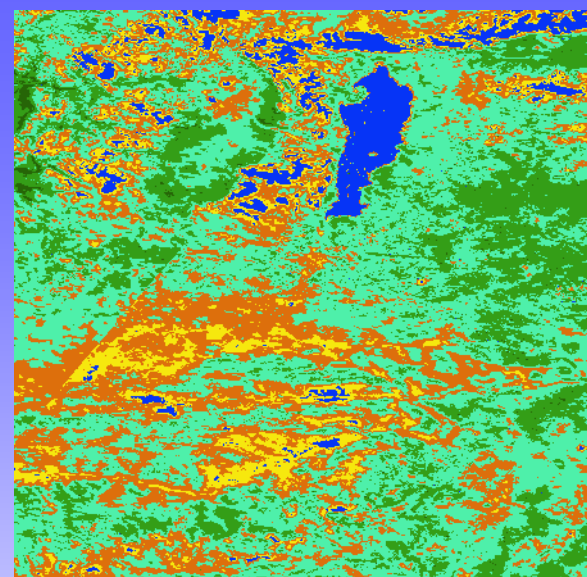
2004
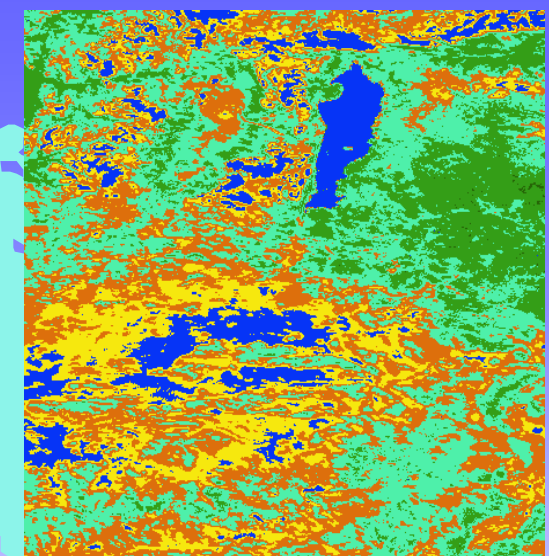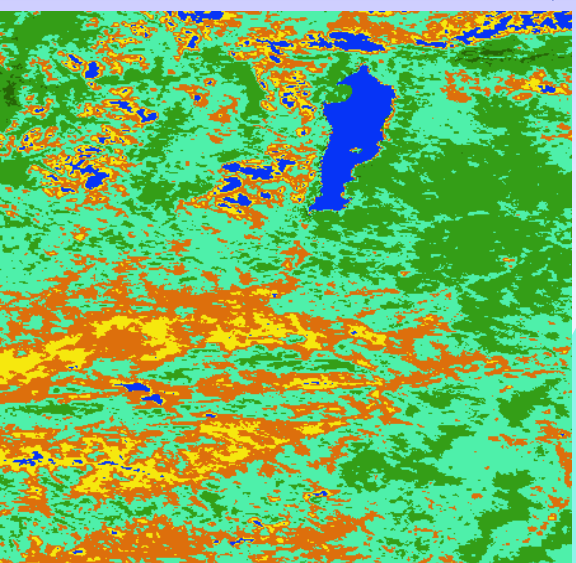
2005

2006
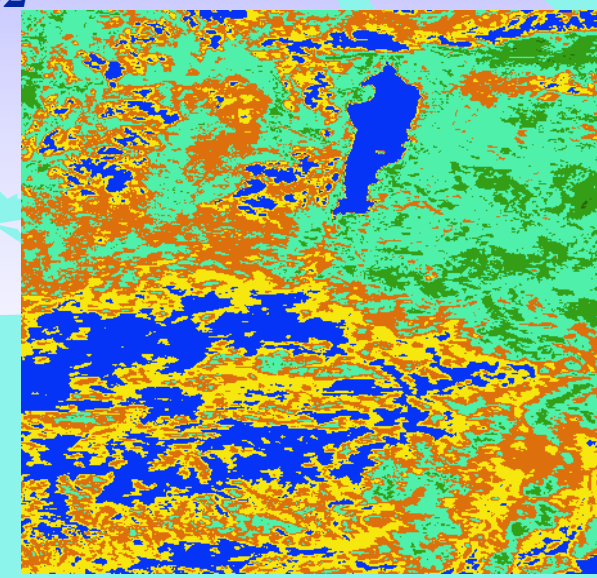
2007

0 tonnes/ha

70 tonnes/ha

140 tonnes/ha

210 tonnes/ha

280 tonnes/ha

350tonnes/ha
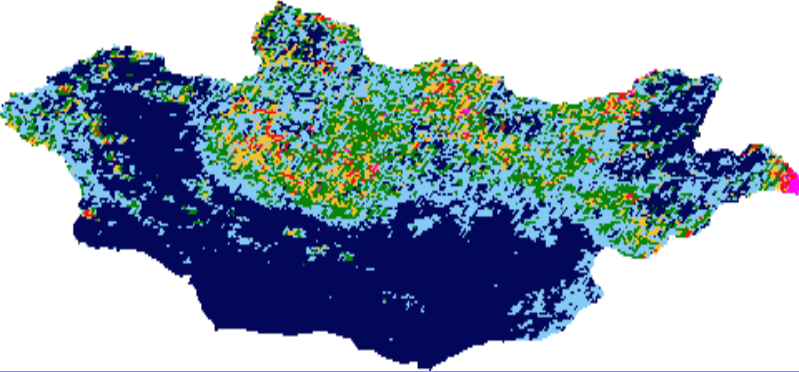
1985
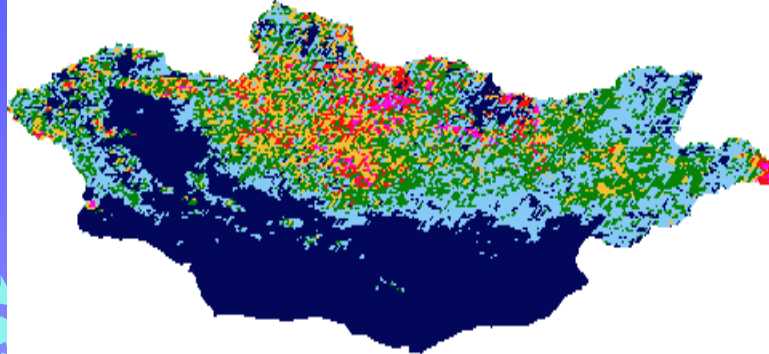
1990
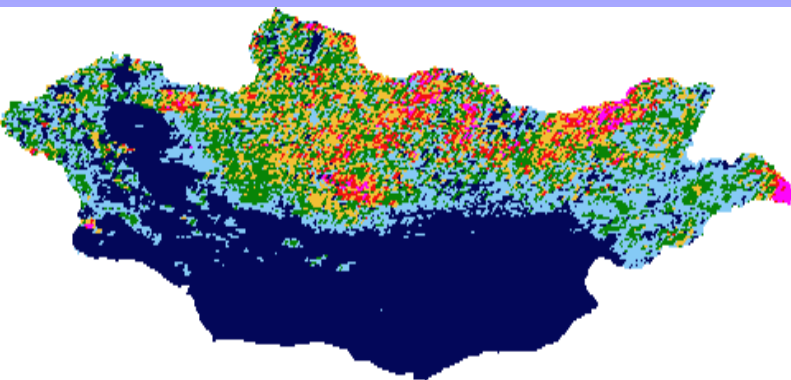
1995
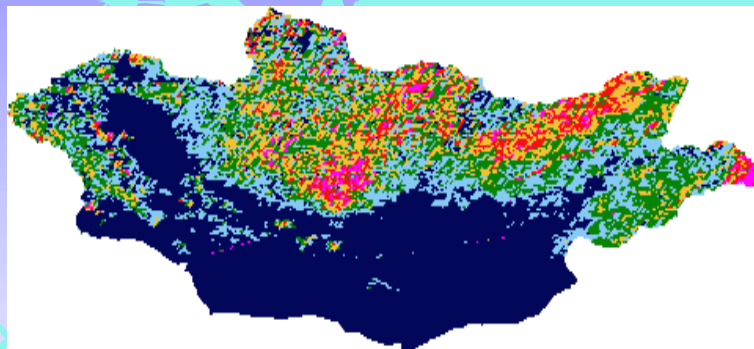
2005
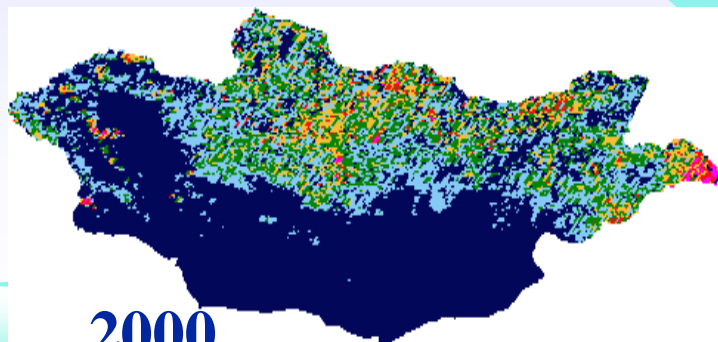
2000

0%

20%

40%

60%

80%

100%

Model of the Forest fire in Batsumber subprovince
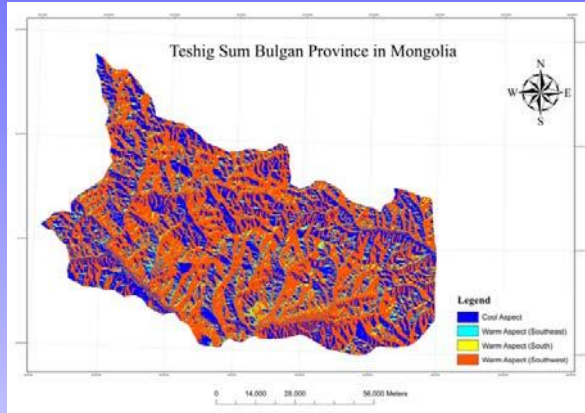
Aspect Map
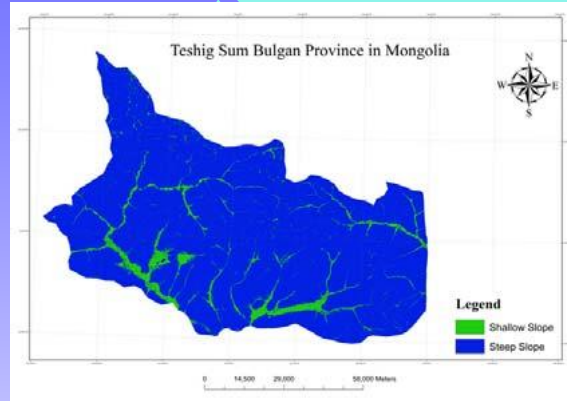
Slope Map
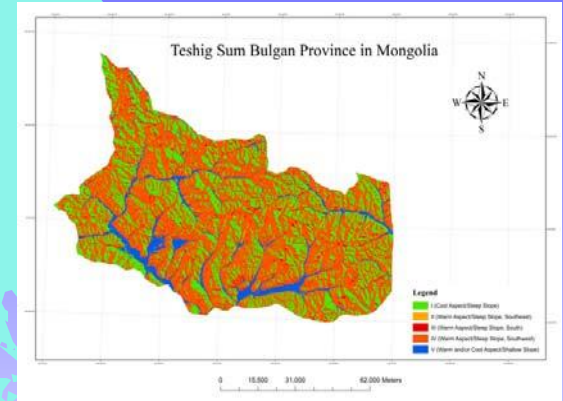
Aspect, Slope Combination Map
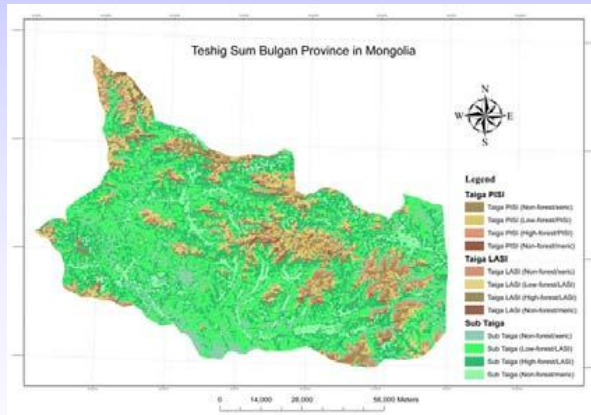
Vegetation Type Map
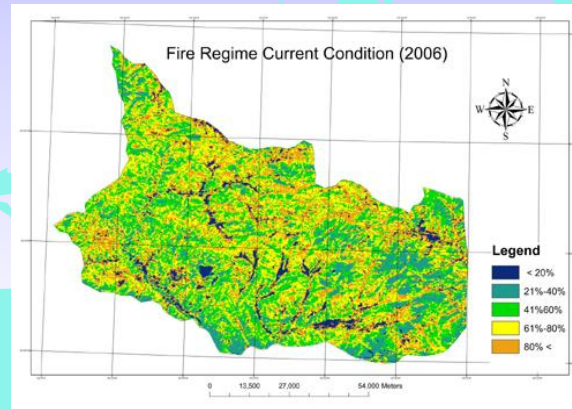
Forest Cover Map
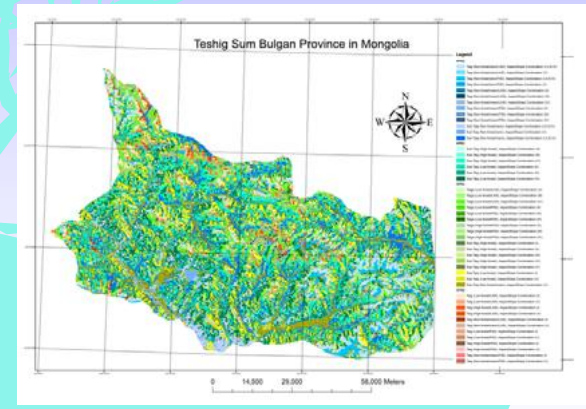
Historic Fire Regime map

Ground truth data collection
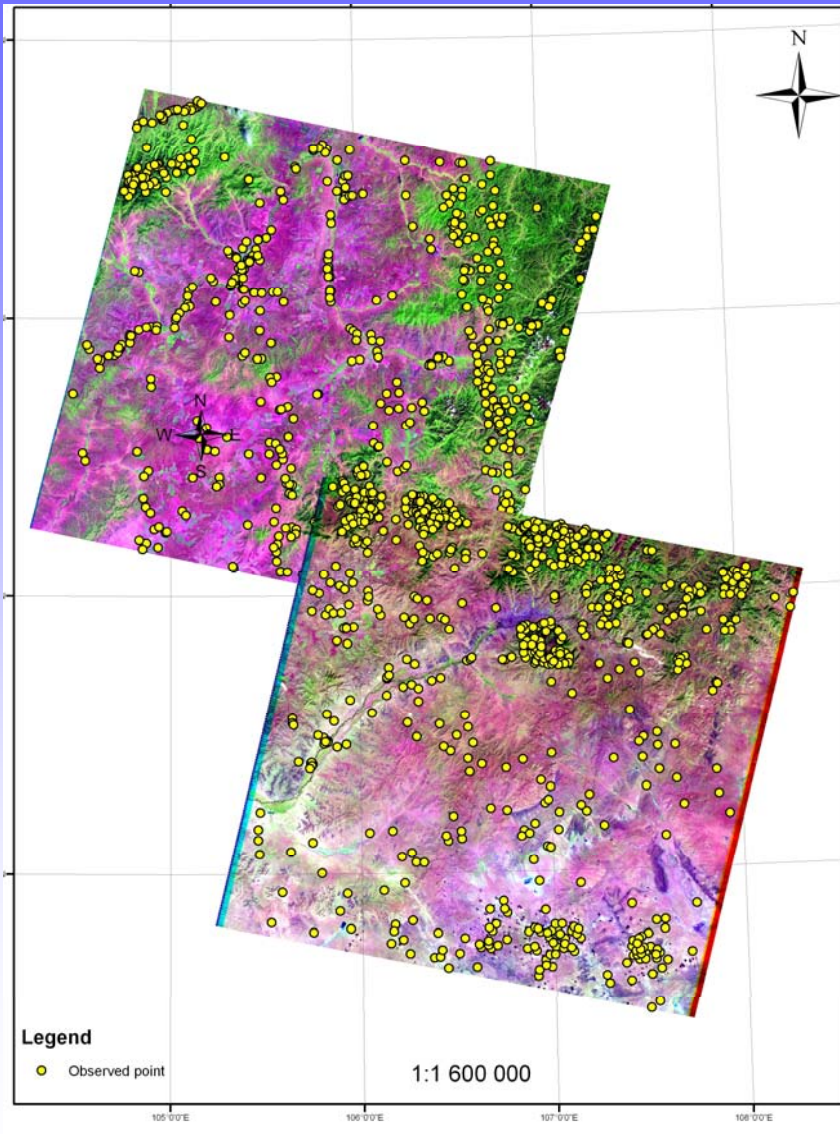
Location of ground truth collection

Land cover classification – field trip

Legend
- Observed point

Path 131 Row 27
RGB
- Red: Band_1
- Green: Band_2
- Blue: Band_3

1:1 200 000
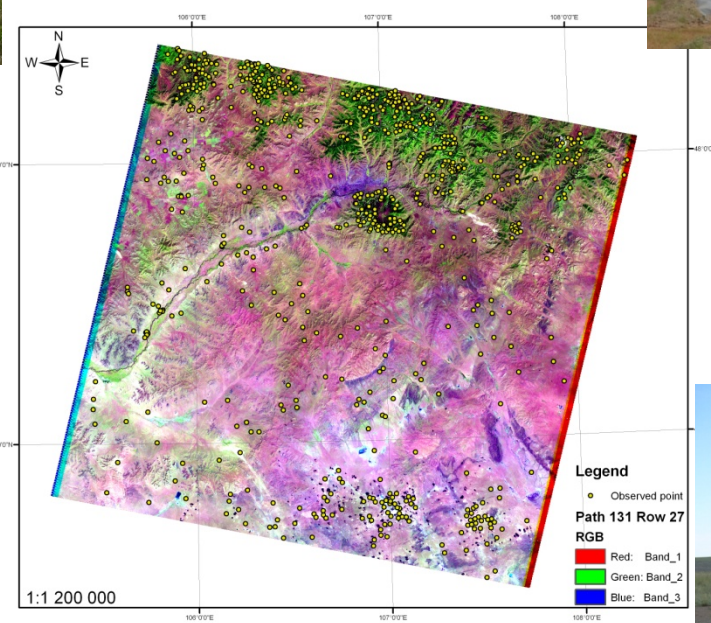
Vegetation classification of the High mountain
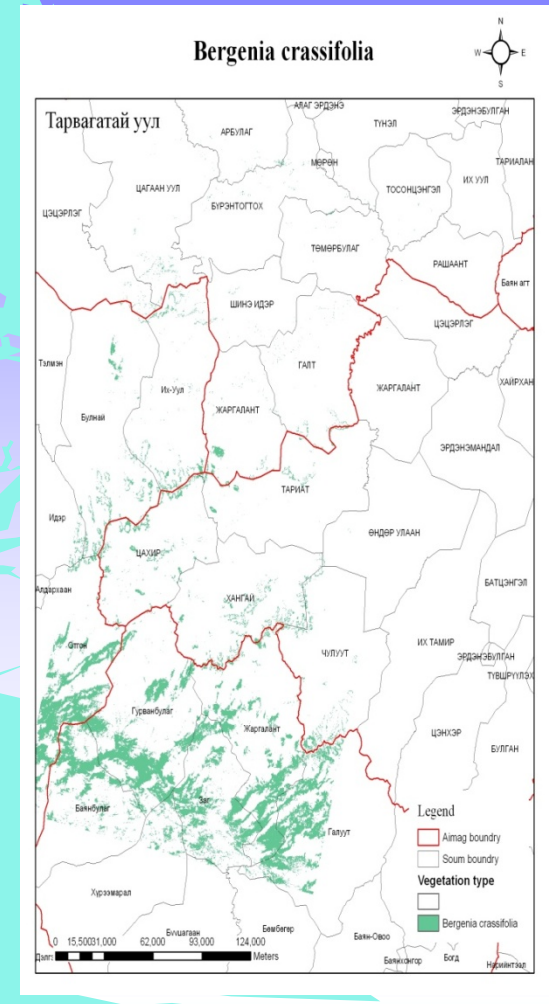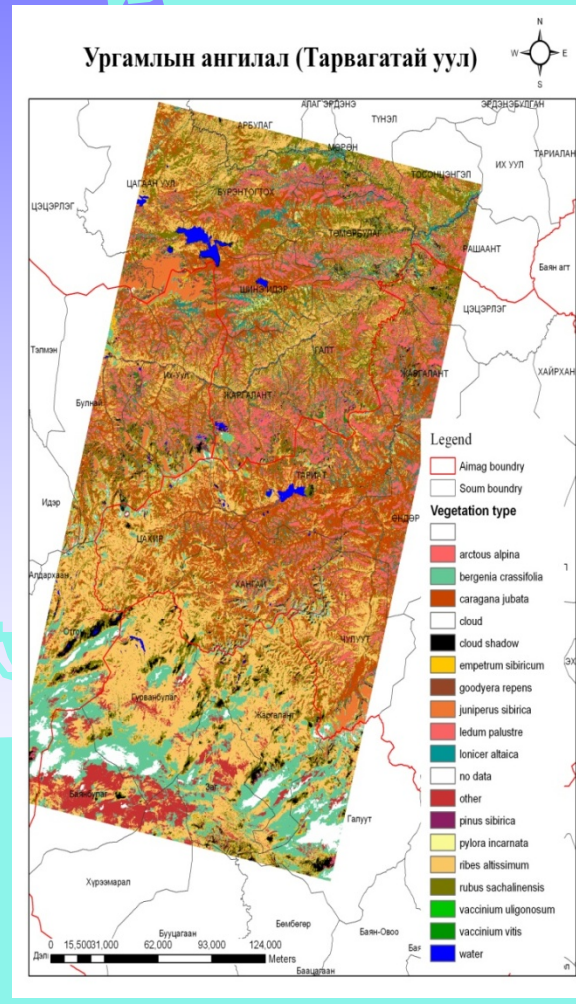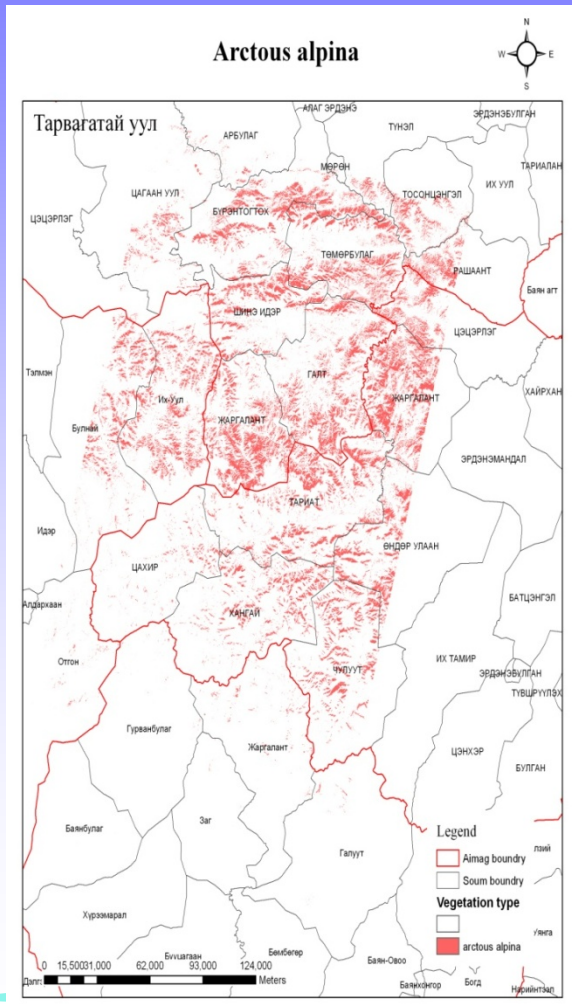
Results and discussion

- Desertification = land degradation
- Causes:
  - Climate change → drought
  - Inappropriate natural resource use → diminishing of natural resources

- Consequences:
  - Increased area of drylands
  - Weak economy
  - Increased poverty
  - Under development of rural areas → migration

Human impacts contributing to change climate and environment

Deforest Pasture , Overgrazing,Mining, Air pollution

Already several species are endangered or experiencing
marked declines and several natural systems are being subjected
to growing external stresses, especially from expanding livestock he
and mining activity.

There is a need to undertake analyses of biodiversity, land

degradation, land use and vulnerability in Mongolia as an important

factor of sustainable development.

**Necessary of cooperation with international network for region
and GEOSS.** To promote GEOSS activities in Mongolia

The Green Wall national programme will be implemented in three phases as follows:
• First Phase (2005-2015):
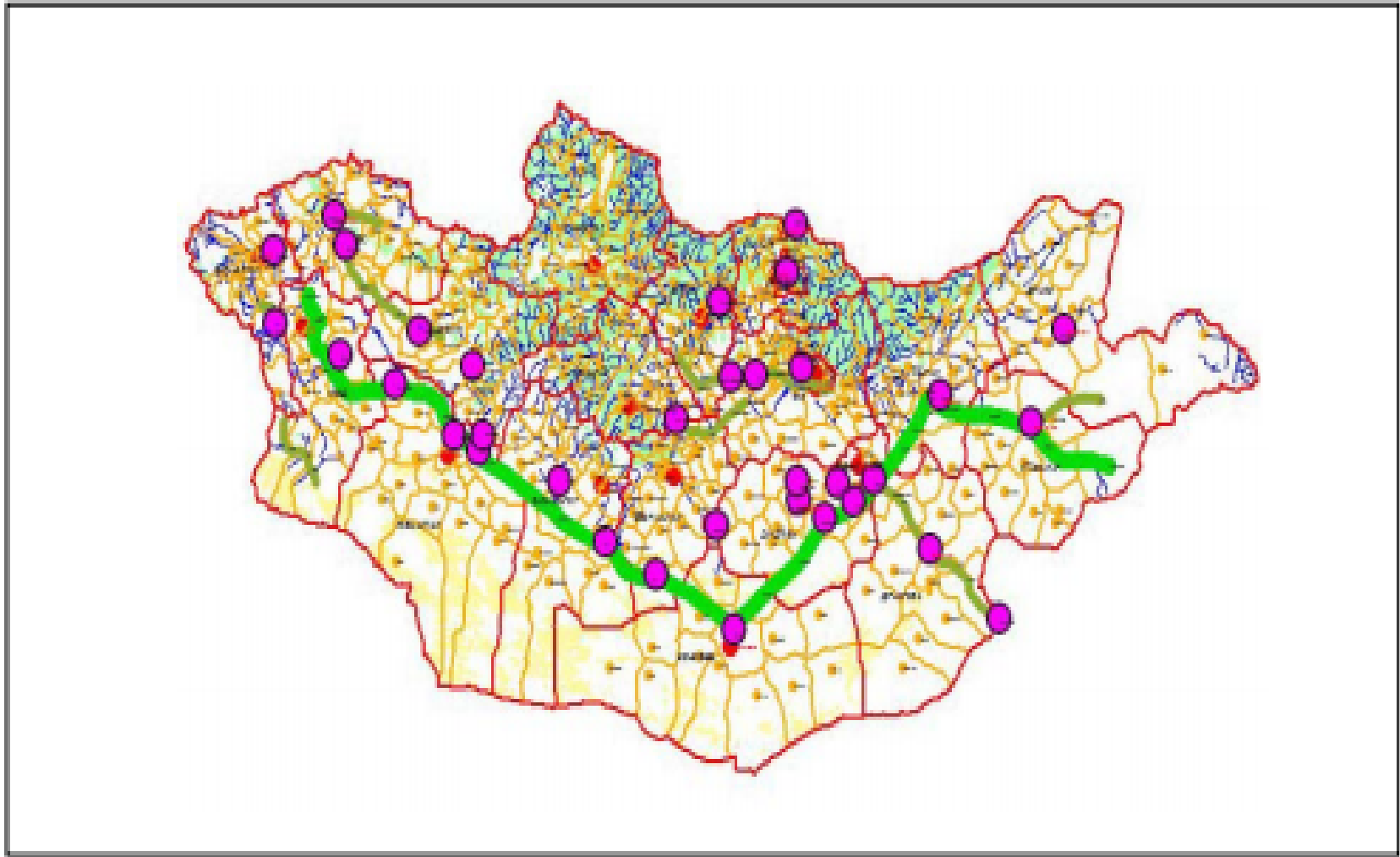
Location of Green Wall sites constructed and planted in 2005-2006

This website aims to widely present GIS based information on biological diversity in different eco-regions of Mongolia. (http://gis.wwf.mn/En/)
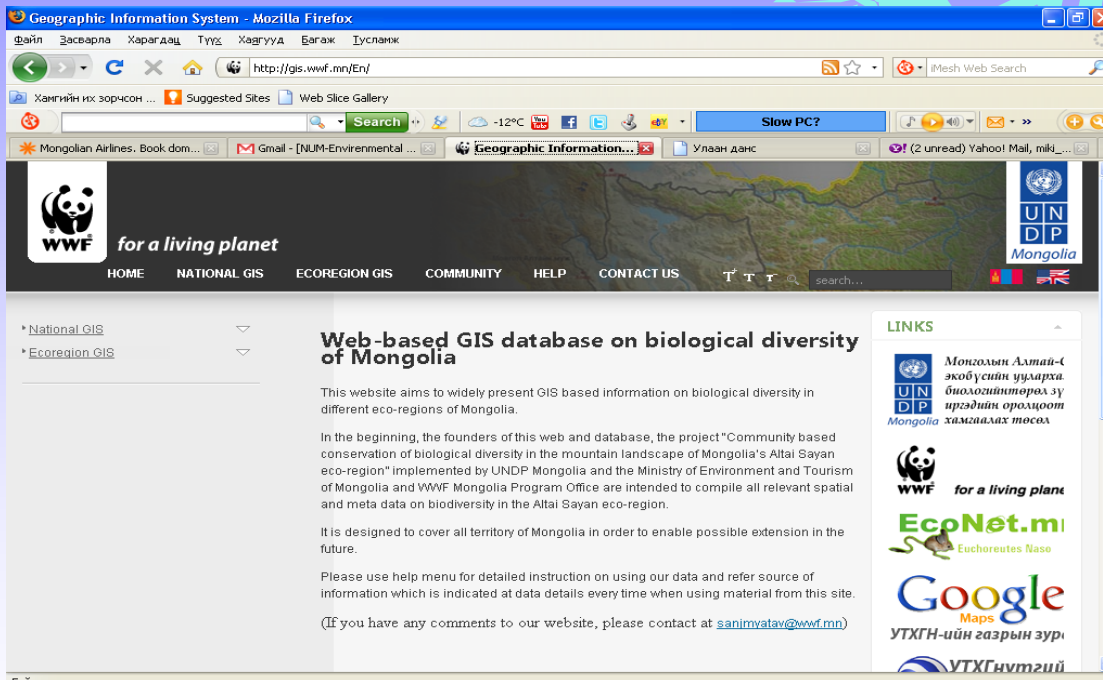
The database of Mongolian WWF
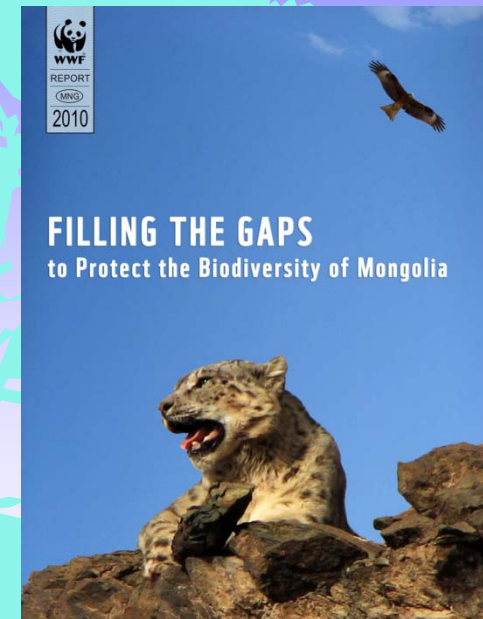
The report of Mongolian WWF

Mongolian forestry information and training program websites:

Website:
www.forestry.gov
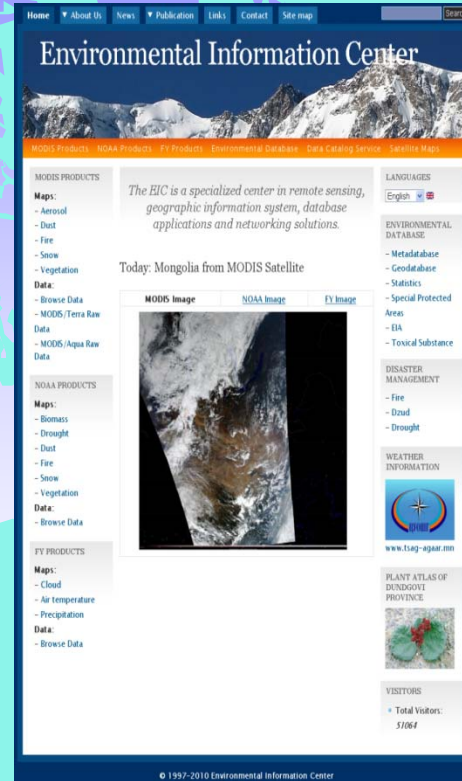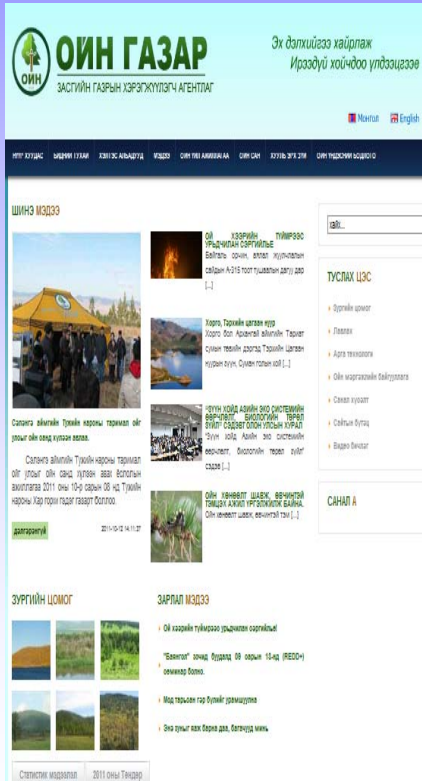
Website:
www.biology.num.edu.mn

Website:
www.icc.mn

Website:
geodata.mne-ngic.mn

National Agency
of Forestry

School of Biology
and Biotechnology, NUM

Environmental Information Center

The database is available at www.geodata.mne-ngic.mn

The database is available at www.zuil.mn

Thank you for your attention