

Living with Desertification and Climate Change:

An Approach to Upgrading Adaptive Capacity in the Gobi Region, Mongolia



Background

Desertification is triggered by both, human activities (deforestation, over-grazing, over-farming, etc.) and climate change (drought, etc.). It has become a grave threat leading to food and water shortages and poverty for people living in the arid regions that are vulnerable to its effects.

In order to address desertification, the United Nations Convention to Combat Desertification that came in effect in 1996 requires developed country Parties to support developing country Parties, those which are suffering the effects of desertification.

Our research project has been conducted to support Mongolia, one of the affected countries, and to contribute to the implementation of the Convention by sharing the scientific and technological knowledge obtained.

Outline of the Project

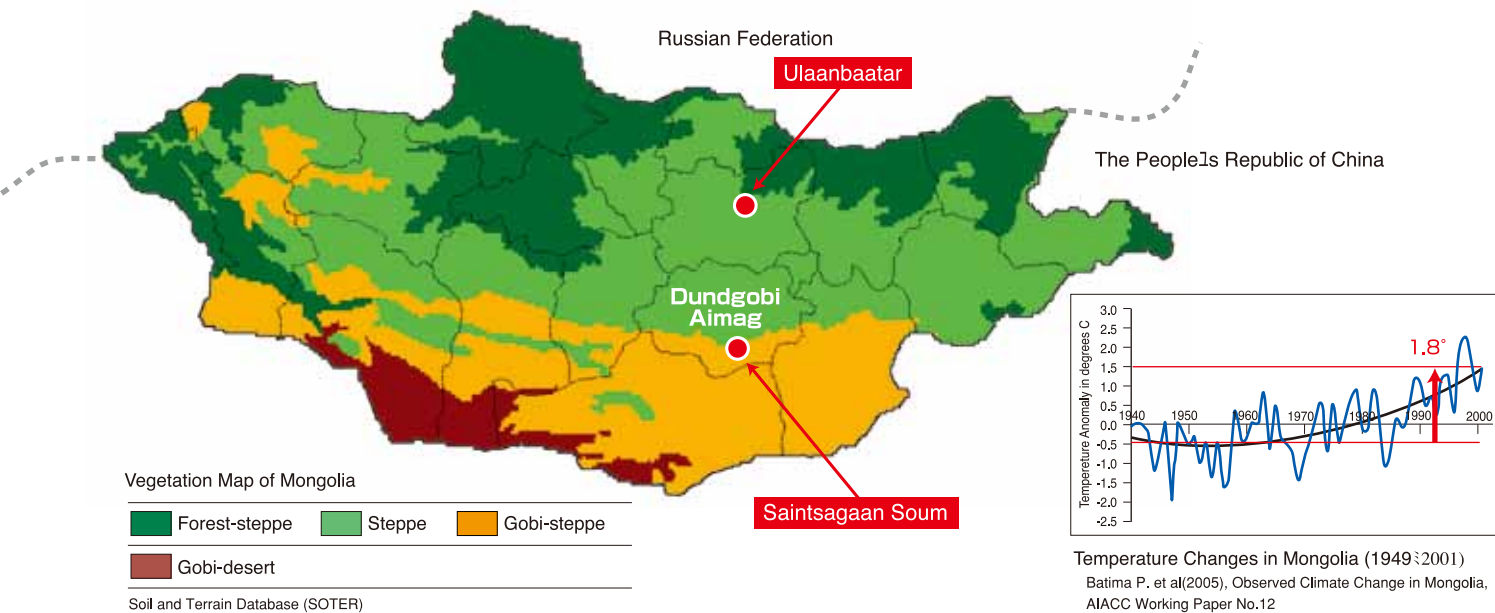
It is estimated that due to climate change, dry areas vulnerable to desertification will experience an intensification of extreme conditions such as drought, and that areas affected by these conditions will expand. This project has been conducted in Dundgobi, Mongolia, and achieved the following: (1) identification by Japanese specialists of suitable measures to improve capacity among herders to adapt to regional climate changes; (2) implementation of pilot projects while applying the measures identified more widely and involving the local officials and residents; and (3) formulation of possible options for adaptive measures based on the experience and knowledge gained, and suggestions for policy-making.

Project period: August 2007- March 2011

Project area: Saintsagaan soum, Dundgobi aimag, Mongolia

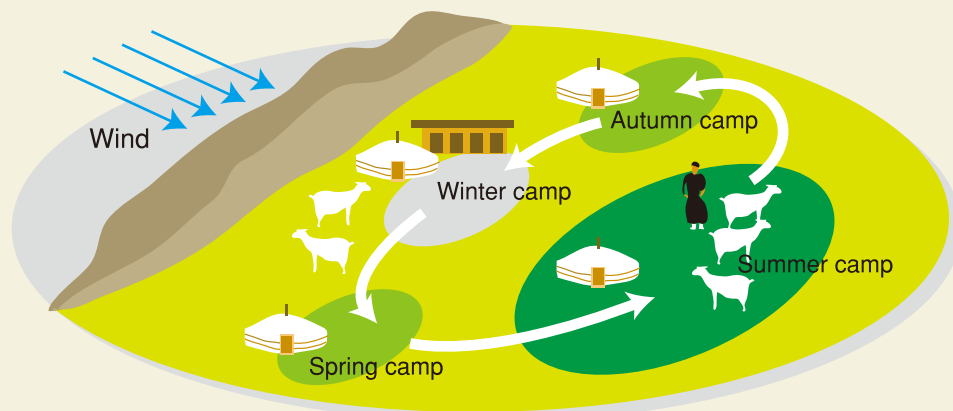
Collaborators: (Japan) The University of Tokyo, Waseda University, etc.

(Mongolia) Cabinet Secretariat of Mongolia, Dundgobi aimag, Institute of Geoecology, Mongolian Academy of Sciences



Nomadic Grazing in Mongolia:

Herders in the Gobi region move to rotate their grazing lands seasonally so that they can feed their livestock sufficiently. When grass is in short supply because of drought, they even make long-distance journeys (Otor) of hundreds of kilometers in search of grass. They have a recognized claim to ownership of the land they have customarily used for winter, which is located on the leeward side of mountain for protection from the winds. Shelters are built there to protect animals from the cold and fuel for daily use is stored.



Findings from Background Study

Dundgobi is increasingly vulnerable to natural disasters in winter (Dzud*). This has been triggered by natural environmental changes such as drought, and by socio-economic changes such as the transition to a market economy, which led to over-grazing. Climate change is also most likely to increase future incidences of drought. This area, therefore, needs adaptive measures urgently.

[Social/Economic Changes] (from statistical and documentary data)

[After Transition to Market Economy (1990)]

- Increase of livestock
- Increase of Cashmere goats to respond to demand for Cashmere wool
- Increase of nomad households due to urban unemployment after the market economy transition
- Concentration in specific areas based on infrastructure availability (wells, transportation, market access, etc.)
- Dissolution of farmers' and herders' co-operative unions

[Changes in herders' mobility after 2000]

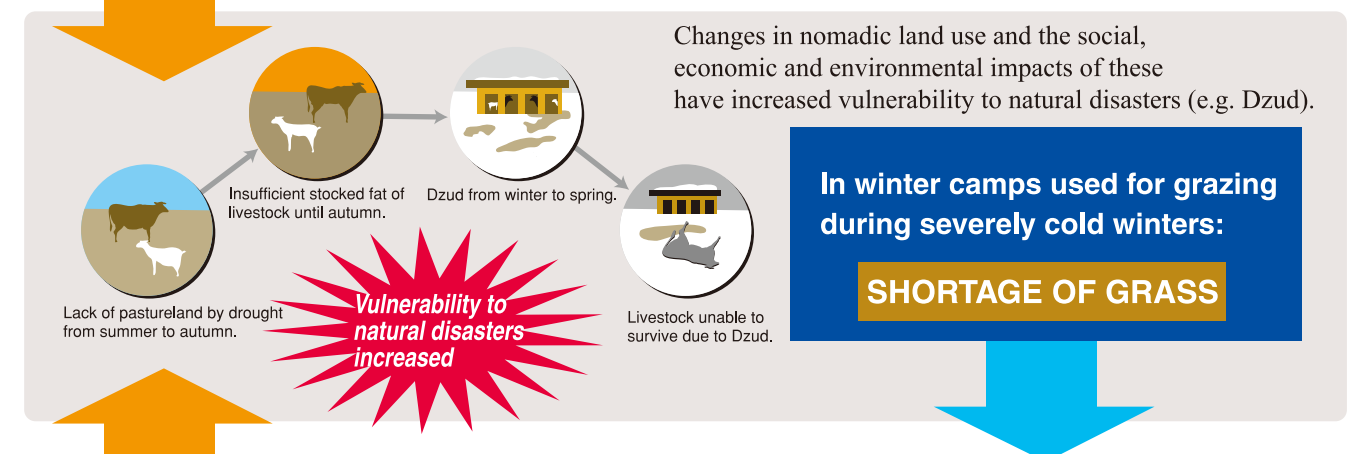
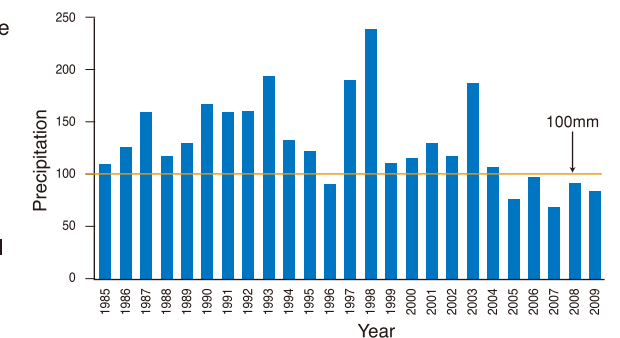
- Because of lack of pasturelands in the region and absorption of herders from other regions, restrictions under the system of regional divisions and opposition by local herders to accept outsiders have made Otor difficult.
- Increasing number of herders have been using up all grasslands grown by precipitation, so grassland rotation is difficult.

[Natural Environmental Changes] (from meteorological data and records)

Increasing drought in 2000s

Increasing strong winds in 2000s

Increasing frequency of drought predicted in the future



[Herders' land use]



Interviewing herders

Current problems:

Rain shortages have decreased the availability of plants and the amount of grassland useable for grazing. This results in the concentration of herders in limited areas where rain has recently fallen. Principles of reciprocity mean that nomads are reluctant to drive the outsiders out of their own customary seasonal pastures, even those precious areas reserved for winter. As a result, animals consume grass, and not enough good grassland is left to endure through the severe cold of winter.

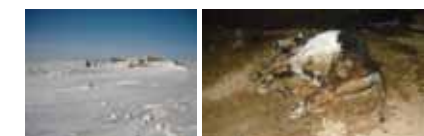
Principle of Model Projects

Pastures and fodder reserved for emergencies at winter camps

Past



Present



Dzud Damage in 2009 -10 (March 2010, Saintsagaan sum, Dundgobi aimag)

(*) Dzud is a natural disaster involving harsh weather conditions from winter to spring (low temperatures, snowfall, strong winds). Animals' body temperatures drop and grass becomes scarce, which lead to a loss of livestock. When it is preceded by drought, the damage is intensified.

Pilot Projects

Three pilot projects, each for a different level of sedenterization, have been conducted, using survey data and issues related to Dundgobi herders, in collaboration with herders and local authorities.

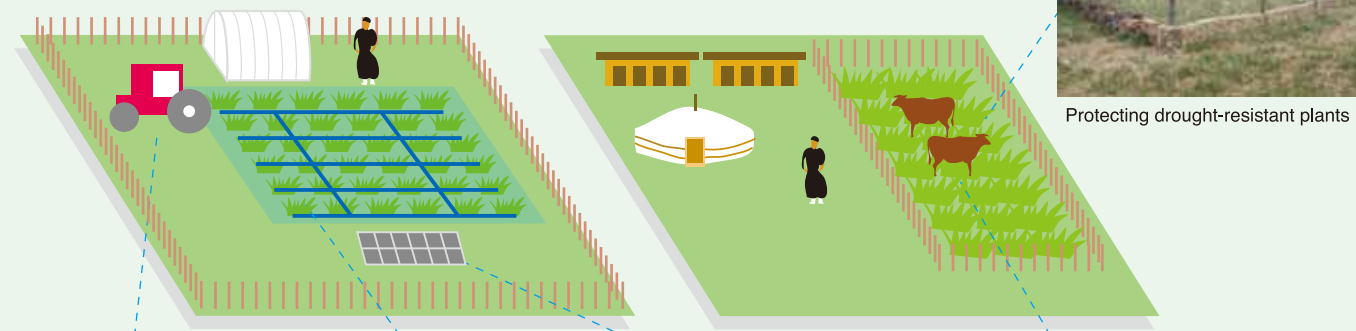
These projects enclose pastures to protect them in winter camps for the cold season and we study changes in adaptive capacity to climate change based on results.

Settlement Type

This model aims to promote intensive land use by herders where they have a recognized right to do this, in their winter camp. They will grow plants for animal feed by use of groundwater that is less likely to be affected by drought. The feed produced will be used to breed productive livestock (dairy cattle), and the milk will be sold commercially. Although this requires considerable initial investment, it enables herders to increase their incomes greatly through production of dairy products as well as by growing and selling vegetables. Because the feed can be used in winter, the damage caused by Dzud can be avoided. In order to prepare for drought and Dzud, plants resistant to drought are protected from animals. Settlement is compulsory in this model because animal feed and vegetables are produced in summer/autumn, and cows must be tended to in purpose-built sheds during winter/spring.

What We Did:

- ① Introduced dairy cows with high milk productivity (Simmental species).
- ② Introduced solar panel use for powering irrigation pumps
- ③ Grew vegetables/feed by using drip irrigation system and farming machinery (tractors)
- ④ Protected drought resistant plants from animals, e.g. *Achnatherum splendens*



Tractor



Drip irrigation



Solar-powered irrigation pump



Cow of Simmental species



Protecting drought-resistant plants

Semi-settlement Type

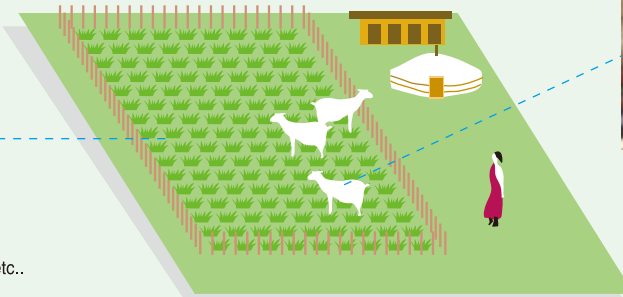
While herders continue to make seasonal moves, in order to secure good grass for emergencies like Dzud, pastures in their winter camps where they have rights to stay are enclosed with fences. (In cases of serious drought and grass shortage, they conduct Otor before winter comes.) For covering the cost of building fences and managing with less feed at the time of drought, more highly-productive livestock are introduced (native Mongolian goats with enhanced milk production). Unlike in the Settlement model, feed production is not included here, and because the goats are of the same species as previously, Otor is possible if necessary.

What We Did:

- ① Protect pasture, e.g. *Salsola sp*, *Stipa gobica* etc.
- ② Introduce native Mongolian goats of high milk-productivity, Goat of Tulmun Khukht species, rather than cashmere goats



Protected pasture, e.g. *Salsola sp*, *Stipa gobica* etc..



Udder of an ordinary goat



Udder of a Goat of Tulmun Khukht species

Nomadic Grazing Type

Herders migrate seasonally as always. The costs necessary for this are financed by increasing the value created of their livestock products (wool). In this model, a group is formed, and within the group, one sub-group carries out seasonal moves and Otor, and another, operating in an urban environment, is responsible for felt manufacture.

In the winter camps, herders enclose pastures to protect drought-resilient plants in order to secure enough grass for winter during drought years. But unlike in the 'semi-settlement' model where they rely on milk production to increase income, in the 'nomadic grazing' model, they collect wool. Therefore, close access to markets is not necessary and the traditional Otor is possible.

What We Did:

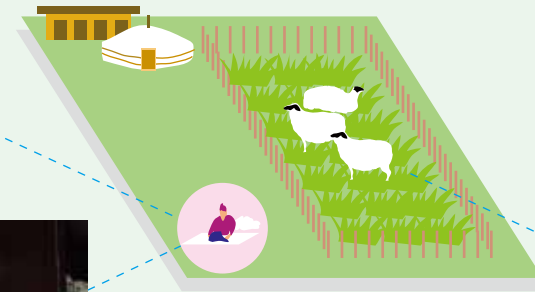
- ① Protected drought resistant plants, e.g. *Achnatherum splendens*
- ② Established and managed a small-scale factory to manufacture felt



Felt manufacturing



Selling felt products



Protecting drought-resistant plants

The pilot projects began with initial trials conducted in close partnership with the herders at the actual locations, followed by repeated discussions with central and local government authorities on the results. An international conference was held to exchange up-to-date information and scientific knowledge among scientists, government administrators and NGOs.



Our survey team in dialogue with the herders



We meet local government officials and herders to discuss the pilot projects and necessary policies (2-3 times per year)



International conference with scientists, government officials and NGOs (October 2009, Ulaanbaatar)



Conference with central government ministries to discuss prospective project development (2-3 times per year)

Conducted trial of the model for developing adaptive capacity of herders to climate change.

Prepared education material for herders and manual for local governments.

Recommended policies to be implemented to the Mongolian government as a result of model project.

Results of the Project:

① All three models are applicable in the Gobi region. Despite the effects of Dzud, the health of livestock could be maintained and herders' incomes could be increased.

② Identified necessary policies and conditions for using the models in the Gobi region, in collaboration with Mongolian herders, local governments, central government offices and research institutions, while understanding problems, finding solutions and conducting model projects using a bottom-up approach.

③ Identified counter-measures to climate changes in pastureland of arid regions by experimental application of scientifically proven models; it was possible to incorporate ideas from experts from the international community, including Japan and Mongolia.

What We Achieved in the Pilot Projects:

Settlement Type of Pilot Project

① Introduction of cows with high milk productivity (Simmental species)

- Cows of Simmental species have been healthy and have adapted to the Gobi region.
- Even a small number of cattle can improve income. Milk from two Cows of Simmental species that had been purchased for 3 million Tug yielded a net profit of 2 million Tug in 6 months, excluding buying expenses.

*Tug means local currency of Mongolia

② Introduction of a solar-powered irrigation pump

- Solar-powered irrigation pumps are expensive to buy, but the cost can be recovered if it is used for a long time. In this model, one well was equipped with a solar power system (durability, 25-30 years; cost, 9 million Tug), and compared to a petrol-powered equipment, it saved 2 million Tug annually.
- Wind-control is necessary. (Fig.28: Before, Fig.29: After)

③ Production of animal feed/vegetables by using drip irrigation and farming machinery (tractors)

- Vegetable cultivation and feed production are feasible in the Gobi region, if recommended technology is employed.
- Drip irrigation is highly effective in the Gobi region for vegetable cultivation and feed production.
- Cultivated feed is more nutritious than grass.

④ Protection of drought-resistant plants to secure grass in case of drought

- The possibility that fence construction around the pasture will cause tensions with neighbours is minimized.
- Enclosed pastures can sustain about 40 cattle/day/ha, judging from the amount of grass and nutrition necessary for dairy cattle.
- Enclosed pastures can be used for winter grazing grounds after a drought is over, and also for weak cattle, or females that have recently calved, which are not suitable to range.



Rotating solar panels as initially installed



Improved installation with wind-control

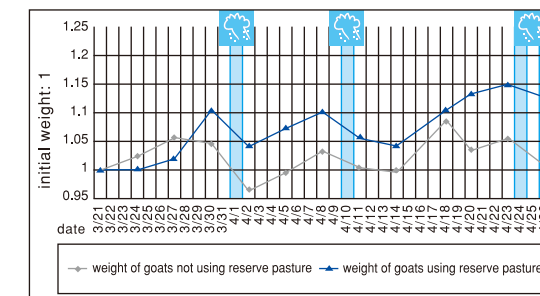
Semi-settlement Type of Pilot Project

① Protection of pastures

- Enclosed pastures can sustain about 150 goats/day/ha, judging from the amount of grass and nutrition necessary for goats.
- The weight of livestock was increased by using enclosed pastures during Dzud.
- The use of enclosed pastures reduced the labor needed to look after the weak animals.

② Introduction of high milk productivity native Mongolian goats (Tulmun Khukht species) rather than Cashmere goats

- Because the Tulmun Khukht species of goats are native to Mongolia, introduction of new breeding technique is not needed, and they can adapt to the Gobi region environment.
- These goats can create new income, as they produce twice as much milk as cashmere goats. In the pilot project, milk produced by a herd of 50 goats, purchased for 4 million Tug, was sold for a net profit of 2 million Tug within 6 months, excluding buying expenses.
- Supplementary feed such as concentrated feed is effective to increase the amount of milk, if given at the time of milking.



Relative weight of goats using/not using reserve pasture (initial weight: 1)

dNomadic Grazing Type of Pilot Project

① Protection of drought-resistant plants to secure grass in case of drought

- Vegetable cultivation and feed production are feasible in the Gobi region, if
- The possibility of fence construction around pastures causing tensions with neighbors is minimal.
- Enclosed pastures can be used for winter grazing grounds after a drought, and also for weak cattle, or females that have recently calved, which are not suitable to range.

② Establishment and management of a small-scale felt manufacture plant

- Manufacturing wool products is more profitable than selling raw wool, and helps increase income.

Preparation and distribution of manual and educational material

We created a technical manual for the local government and educational materials for herders after collating techniques that we used for training in the pilot project. The manual and materials were distributed to municipal and prefectural governments and herders in the Gobi area.



Training on felt manufacturing



Educational material for herders

Suggestions for further development, based on what the pilot projects have achieved

- A transparent policy/institution framework should be established in Mongolia, in order to address climate change effects such as drought, as well as to conduct international co-operation effectively.
- To enable the central government ministries/agencies to support local governments' activities, concrete policies should be formulated to promote agrograzing in the Gobi region, and to implement measures against desertification and natural disasters like drought and Dzud.
- To further develop the achievements of this project, Mongolian initiatives should be promoted.
- Prefectural, county and village authorities should have the capacity to support herders by providing technical information, necessary equipment and funding.
- A support system should be developed in order to improve herders' skills and capabilities through provision of information and training.

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