Chapter 11
Mongolia: Country Features, the Main Causes of Desertification and Remediation Efforts

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Synopsis Mongolia's efforts to combat desertification are outlined. There is a new action plan and a strategy is in place. Legislative reform has sought to make new provisions for securing land users rights and securing tenure over grazing lands. Community-based Grasslands Management in Mongolia's Gobi has proven successful in raising household incomes. Examples are given of successful projects.

Key Points

- Agriculture is one of the key sectors of Mongolian economy. Nearly 80 % of Mongolia's territory is used for agriculture. Nearly half of the working population is engaged in agriculture, and many changes in agriculture sector have been taking place recently. The agricultural sector consists of two main subsector, these are crop production and livestock production.
- Vast pasture resources, the harsh climate and low population densities have favored the evolution of extensive livestock/pastoral livestock production in Mongolia. New livestock breeds of cattle, sheep and goats were developed for the extensive livestock production system. The newly-emerged intensive livestock subsector is characterized by using foreign breeds which have a higher productivity.
- Main causes of desertification are anthropogenic impacts, which accelerate the process of land degradation created by natural impacts such as global warming, drought and climate change. These factors are interrelated; sometimes they are affecting each other positively, and other times negatively. Human activities as a

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factor of desertification occur in the frame of natural dryness, causing negative impacts. Within these anthropogenic factors, animal husbandry has the strongest influence throughout the years by its exploitation of pasturelands that covers 80 % of the total territory.

- There has been a shift from sheep keeping to goat keeping among herders who are trying to respond to the growing international demand for cashmere wool. Goats, however, are much more harmful to the environment than sheep because they disturb the pasture's regenerative capacities by feeding on roots and flowers. Consequently, the shift to goat keeping is putting increasing pressure on the pasturelands in Mongolia, threatening to accelerate pasture degradation and processes of desertification. Over the past few years, the number of goats has increased significantly by ten million. Currently, goats make up 47 % of the total number of livestock in Mongolia.

Keywords Gobi • Cashmere • Land use rights • Dust storms • Infrastructure protection • Forests • Water supply • Biodiversity • Climate change • Population growth • Market economy • China • Republic of Korea • Russia • Legislation • Strategic plan • Dzud • Constraints • Dinosaurs

1 Country Background

1.1 Geographic Location

Mongolia is located in Central Asia bordered by Russia to the north and China to the east, west and south (Fig. 11.1). It has 1,566 million square kilometer (km^2) in area with maximum extent west–east of approximately 2,200 km and north–south 1,250 km, but sparsely populated with an average density of 1.5 persons/km^2. The 18th largest country in the world, 5th in Asia.

Elevation in Mongolia ranges between 560 meters above sea level (m asl) and 4,374 m asl, with an average altitude of 1,580 m asl.

1.2 Landscape

There are mountains in the north and west. Nearly 10 % of the land is forested, mostly in the north. The Central Region is steppe or grassland. The southern part of Mongolia is Gobi or semi-desert. Most of rivers and lakes are located in the northern part of the country (Fig. 11.2). Nearly 90 % can be used for agricultural or pastoral pursuits, 9.6 % is forest and 0.9 % is covered by water. Less than 1 % has no effective use.

Fig. 11.1 Geographic location of Mongolia and the location of population centers, It is the 18th largest country in the world, 5th largest in Asia

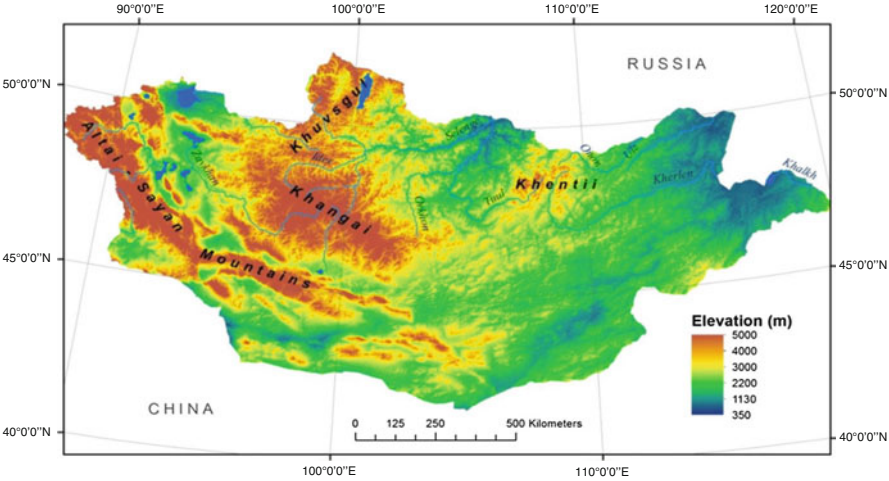

Fig. 11.2 The southern regions of Mongolia are desert whilst in the north and north-west there are uplands with forest cover

1.3 Climate

Mongolia has an extreme continental climate, very cold in winter and warm in summer. The average temperature ranges from +35 °C in summer to −40 °C in winter. There are over 250 sunny days a year. Some western and northern mountains areas in the country receive 450–1,000 mm precipitation. Precipitation in the northern and central areas is approximately 300 mm and the eastern southern areas receive less than 200 mm precipitation. The short growing seasons, low precipitation and high evapo-transpiration are the overriding constraints of Mongolian agriculture.

1.4 Population

The population of Mongolia is just over 2.7 million. Mongolia is one of the least densely populated countries of the world. The capital and largest city is Ulaanbaatar, has a population of 700,000. The annual population growth is about 2 %. Nearly 95 % of the population are Mongolians and 5 % of the population are Kazakhs and others. The main religion is Buddhism. Since the democratic changes of 1990 in Mongolia, religion has been practiced widely. Now people have freedom of belief and many monasteries have been reopened. The official national language is Mongolian.

2 Agriculture in Mongolia

Agriculture is one of the key sectors of Mongolian economy. Nearly 80 % of Mongolia's territory is used for agriculture. Nearly half of the working population is engaged in agriculture, and many changes in agriculture sector have been taking place recently. The agricultural sector consists of two main subsector, these are crop production and livestock production.

2.1 Crop Production

The total arable land is 1.3 million hectares (Mha), half of them was sown to crops and bare fallow. Crops are mainly wheat, barley, oats, potatoes, and vegetables. The main types of vegetables grown are cabbage, carrots, onions, and turnips. Mongolia is still importing flour, sugar, fruits, some vegetables, and sunflower and soybean oil from abroad.

2.2 Livestock Production

Livestock breeding is very important and contributes about 70 % of the gross agricultural output. The livestock sector accounts for 20 % of economic output in the Mongolian economy and translates directly into a source of employment and livelihood for at least 40 % of the population. The national livestock herd was estimated at almost 32 million heads at the end of 2000. But dropped dramatically as a result of the severe dzuds. However by 2007 the livestock inventory had risen sharply. The 2007 annual livestock census reported an increase of 15 % of livestock from 34.8 to 40.3 million livestock, with the number of goats, sheep and cattle increasing by 18, 15 and 14 % respectively Livestock farmers and

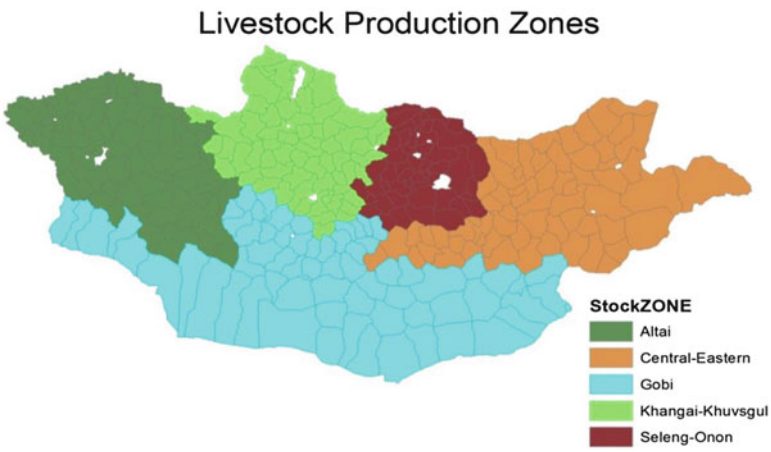

Fig. 11.3 Livestock production zones based on description by Suttie (2005)

herders produce meat, milk, dairy products, wool, cashmere and leather. Vast pasture resources, the harsh climate and low population densities have favored the evolution of extensive livestock/pastoral livestock production in Mongolia (Fig. 11.3). New livestock breeds of cattle, sheep and goats were developed for the extensive livestock production system. The intensive livestock subsector is characterized by using foreign breeds which have a higher productivity. The subsectors raise or produce mainly dairy cattle, sheep, pig and poultry.

3 Mongolian Gobi

The Mongolian Gobi is a vast zone of deserts and desert steppe covering almost 30 % of the Mongolian territory and also of the Northeastern China. The gobi is often imagined as a lifeless desert, but in reality it is a land of steppes that serve as a viable habitat to humans and wildlife alike. Many camel breeders inhabit this zone, which is also rich in wildlife and vegetation.

The Mongolians say that there are 33 different Gobi, from which sandy deserts occupies a mere 3 % of the total area. The gobi's climate is extreme, with +40 °C in summer to −40 °C in winter. It has very little precipitation. The Mongolian Government established the Great Gobi Strictly Protected Area in 1975. In 1991 the United Nations designated the Great Gobi as the fourth largest biosphere reserve in the world. The protected area is divided into two ecologically distinct parts, the southern Altai Gobi and the Dzungarian Gobi. The Gobi was originally an ancient island sea basin. Later it became home to many species of dinosaurs, and today has reservoirs of fossilized dinosaur bones and eggs. A complete dinosaur skeleton and eggs are exhibited at the Museum of Natural History.

4 Desertification in Mongolia

Mongolia's land area is 1,564,416 ha, with 8.3 % covered by forest, 80 % pastureland, and 1 % for cultivated farmland. About 90 % of the total area of the country has the potential for desertification and 41.3 % is considered as desert and desert steppe zone. Main causes of desertification are anthropogenic impacts, which accelerate the process of land degradation created by natural impacts such as global warming, drought and climate change. These factors are interrelated; sometimes they are affecting each other positively, and other times negatively. Human activities as a factor of desertification occur in the frame of natural dryness, causing negative impacts. Within these anthropogenic factors, animal husbandry has the strongest influence throughout the years by its exploitation of pasturelands that covers 80 % of the total territory. There has been a shift from sheep keeping to goat keeping among herders who are trying to respond to the growing international demand for cashmere fiber. Goats, however, are much more harmful to the environment than sheep because they disturb the pasture's regenerative capacities by feeding on roots and flowers. Consequently, the shift to goat keeping is putting increasing pressure on the pasturelands in Mongolia, threatening to accelerate pasture degradation and processes of desertification. Over the decade ending 2010, the number of goats has increased significantly by ten million. In 2010 goats made up 47 % of the total number of livestock in Mongolia.

Therefore, effective pastureland management is the best solution in combating desertification. Pasturelands constitute one of the key resources for the livestock based economy in Mongolia. According to the 2005 Land Inventory Report, 116 million ha or 73.9 % of the total land surface of Mongolia can be considered as pastureland. Being one of the key resources in the Mongolian economy, therefore, effective pastureland management is the best solution in combating desertification. Improved pastureland management has the potential to improve both rangeland health and rural livelihoods (Bedunah and Schmidt 2004; Nixson and Walters 2006)

Mongolia is divided into six natural zones: tundra; high mountain; forest steppe; typical steppe; desert steppe; and desert (see Fig. 11.4). The pasture productivity, dominant species and type, length of growing season and phenology are different for each of these natural zones. The pasture productivity, for instance, ranges between 150 and 1,500 kg/ha increasing from the deserts in the south to the forests and forest steppes in the north.

4.1 Factors Influencing Pasture Resources

Historic changes in pasture resources have been examined (Saizen et al. 2010; Shestakovich 2010) with a view to understanding how these changes can be related to shifts in climate and to socio-economic developments.

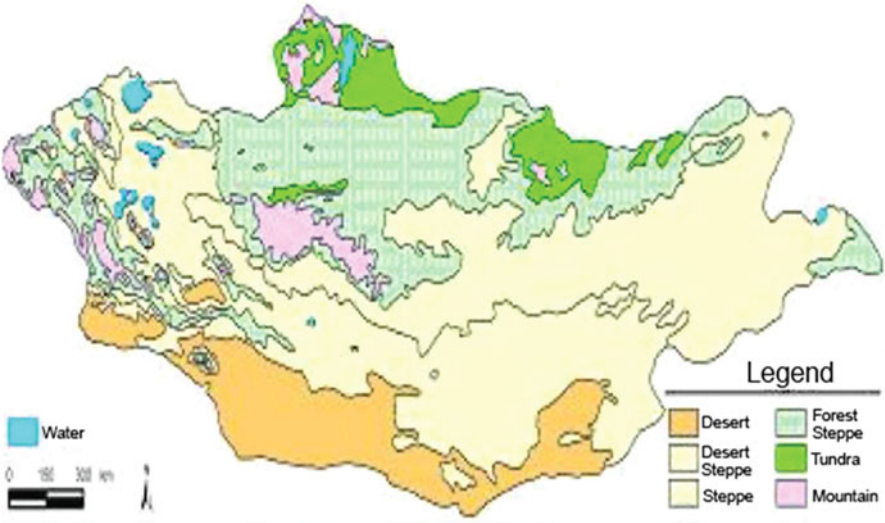

Fig. 11.4 Natural zones of Mongolia showing principal vegetation types

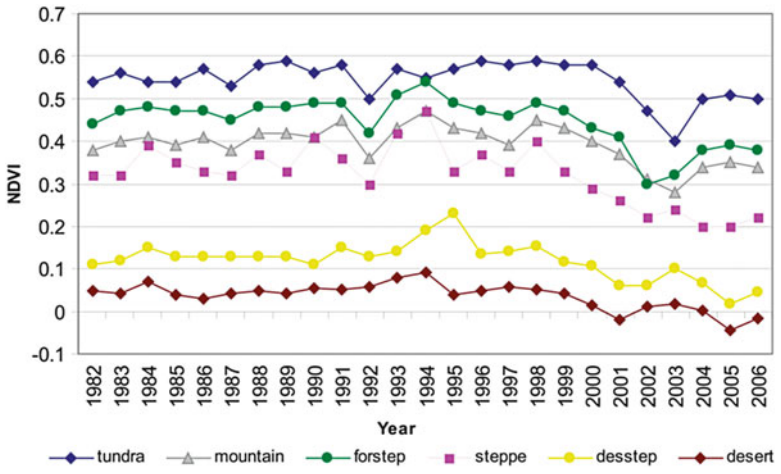

Fig. 11.5 Trends in NDVI in five different zones of Mongolia from 1982 to 2006

The NDVI changes over the last 24 years for July and August are depicted in Fig. 11.5. The NDVI values don't show a significant trend before 1994. However, from 1994 onwards, a decreasing trend can be observed. This trend can be observed in all natural zones and, in desert steppe and desert zones, the NDVI values are even dropping below the 0.06 threshold of no vegetation (i.e. bare soil).

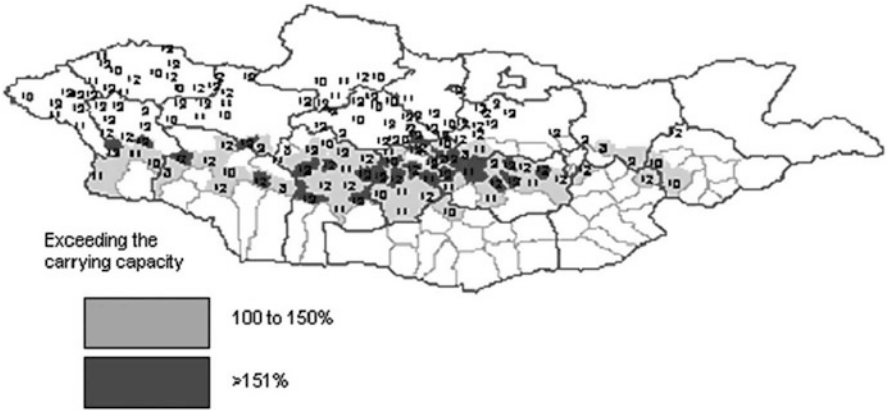

Fig. 11.6 Over grazing is serious and often exceeds 150 % of the assessed carrying capacity

Typically, the causes of land and pasture degradation are various. The Agency of Land Affairs, Geodesy and Cartography carried out a study on the state and quality of pasturelands in Mongolia and found that more than half of the pasture area was degraded to some extent. There are different reasons for the degradation but the main factor causing pasture degradation is overgrazing (Fig. 11.6).

Disturbance from mining, uncontrolled vehicular access to the rangelands, damage from rodents, sand movement, and water erosion are also significant contributors to land degradation. In the next 40–50 years, many *soums* (sub-provinces) in the territory of the Bayan-Ulgii and Khovd provinces (in the western region of Mongolia) will increasingly be affected by desertification, because the amount of precipitation will decrease and average temperature will increase.

Herders are living under direct risk of weather and climate. Local officials and 97.6 % of the herders consider climate change and environmental change a reality in their area. When asked which aspects of their environment and climate had changed most significantly they named various elements including heavy snowfall, reduction of drinking water, frequent drought and *dzud* events, drying up of rivers and springs, reduction in hay making yield, reduction of feeding value of pasture land, sand movement and intensification of desertification. The herders also noted a decrease in the number of forage plant species, animal fatness and bodyweight, and consequently a reduction in the production of meat and milk as well as wool, cashmere and molt hair.

Also, because of decreased permafrost, perpetual snows, glaciers, lakes, streams and rivers that have their origin in the Khangai Mountain range, will lose their headwater and will eventually dry up completely. They will only have seasonal and temporary flow dependent on precipitation levels. Furthermore, the decrease in permafrost in combination with changing rainfall patterns, will very likely result in an increase in the number of forest fires. Taken together, most of the studies

conclude that climate change will negatively impact the natural resource base in Mongolia and will consequently further aggravate the precarious conditions in which rural communities are living (Mearns 2004).

5 Government Response to Perceived Threats

5.1 Legislative and Regulatory Response

In response to these and other observations, the government of Mongolia has started to formulate legislation and policy measures to prepare itself for the possible consequences of climate change. In 1993, the government ratified the United Nations Framework Convention on Climate Change (UNFCC) and in 2001 it approved a National Action Program on Climate Change. In addition, several policy documents have been put in place that are directly or indirectly related to climate change. These include:

- Laws on Nature and Environment; Laws on Meteorology, Hydrology and Environmental Monitoring; Laws on Land; Laws on Arable Farming; Laws on Disaster Prevention; Laws on Pasture;
- A program on sustainable development of Mongolia, 1999;
- A national program on preventing livestock from drought and *dzud* disasters, 2001;
- A food program on food supply, security and nutrition, 2001;
- A program on supporting development of intensive livestock-farming, 2003;
- A state policy on the development of food and agriculture; and
- Relevant annual reports on the natural and environmental review in Mongolia.

The government has also established an inter-disciplinary and inter-sectoral National Climate Committee (NCC), led by the Minister for Nature and the Environment, to coordinate and guide national activities and measures aimed at adapting to climate change. High-level officials such as Deputy Ministers, State Secretaries and Directors of the main departments of all related ministries and agencies are members of the NCC.

Mongolia is a party to the UN Convention on Combating Desertification (UNCCD) since 1996. As part of UNCCD, Mongolia developed National Action Plans (NAP) 1996 and 2003. The new government developed the national action plan (2010–2020) for combating desertification that was approved parliament in 2011. Also, development of a new Pasture Law is in progress. In the implementation framework of these two NAPs, the Government of Mongolia focused on national capacity building for combating desertification and the creation of a more viable policy and legal environment to take real action. The national legal framework has been strengthened by a number of new or modified laws regarding ecosystem management.

5.2 Legal and Regulatory Environment to Combat Desertification

The main legal documents related to combat desertification are the National Action Plan to combat desertification (NAP CD2) and the Pasture Law. NAP CD 2 was approved by the Government of Mongolia in 2011. Different regulations regarding pastureland management exist in the "Land Law", "Nature Conservation Law" and "Law on Natural Plant". A new "Pasture Law" was developed by Ministry of Agriculture and Light industry, but in 2011 it is was not yet approved.

5.2.1 National Action Plan to Combat Desertification (NAP CD2)

The reason for formulating a new National Action Plan to Combat Desertification (NAP CD 2010–2020) is the limited impact of the two former NAPs. Considering the gravity of the problem, there is a need to address desertification in a different and much more resolute way.

The new National Action Plan has the following five components:

- Institutional strengthening;
- Policy and legal framework reform;
- Science, technology and knowledge integration;
- Advocacy, awareness raising and education promotion;
- Implementation of concrete actions at the grassroots level;

Every component has an operational objective and actions in order to reach objectives of each component.

6 Formulating Adaptation Measures

Many of the adaptation measures that have been formulated in the past, were often characterized by their generic approach and in many cases little thought went into how they can be financed and implemented. Furthermore, adaptation measures are often formulated without taking into consideration other drivers of change. The debate about climate change vulnerability, for instance, has caused a lot of discussions in Mongolia about whether or not the government should stimulate a shift from traditional livestock activities towards an economy based on farming. However, traditional livestock activities are not only under pressure from climate change but are also influenced by other socio-economic developments, such as the increased demand for cashmere. Without understanding these broader developments, it is hard to develop appropriate policies for dealing with the problems that people are facing (Bedunah and Schmidt 2004).

A donor-funded land management project in the rangelands of Mongolia's Gobi desert was designed to create both conservation and livelihood benefits. This GTZ project ran from 1995 to 2006, Leisher et al. (2012) report increased household income and increased rangeland productivity and attribute the success of the project to the incorporation of community-based management into the design. The project created community organizations (CBO) to improve pasture management, develop alternative livelihoods, and strengthen cooperation among local communities, and district governments. Improved pasture management included coordinating the moves on and off pastures for all participating herders, improving water sources for livestock, and developing specific winter grazing areas for CBO members. The development of CBO was supported by locally hired community organizers who were part of the project staff. There was one community organizer in each district, and their role was to organize and encourage the communities and act as a liaison with local government, resource agencies, and the rest of the project team. The project ran for more than 8 years, comprised 12 districts across 3 provinces, and covered 13.5 Mha. When funding support to the project ended in 2006, 83 CBOs had emerged, involving 1,175 households, or about 14 % of the households in the project area.

Other success stories have been reported. Mostly from bi-lateral co-operation (principally with the Republic of Korea and with China). Both of these donor countries are concerned about the dust problem which plagues the eastern seaboard of China and the Korean peninsular and Japan (Squires 2007) but protection of infrastructure such as the railway line from Ulaanbaatar to Zamyt-Ud on the border with China is another priority and desertification control measures have been applied to stabilize dunes and prevent entrainment of sand and dust using methods outlined in Chaps. 2 and 3 (this volume).

Apart from measures designed to prevent land degradation there is also effort directed at reducing the grazing pressure by improving the supply of forage. An example of a successful approach is outlined in Box 11.1.

Box 11.1: GL-CRSP GOBI Forage Project: A Success Story

GOBI Forage Project* has been operating from 2004 to 2008. The ability of the project... to produce current and accurate maps showing forage conditions 30 and 60 days into the future has proven exceptionally valuable to herders and those with a stake in rangeland management. It has also had a transformational impact on the thinking of Mongolian Government Ministries and donors working in rural development sector It has been described, as a cutting-edge project that has established a forage monitoring and forecasting service that regularly delivers map information to pastoral communities, policy makers and administrators responsible for agriculture and rural development. Successes in the project were derived in part from the Project's ability to successfully carry out four complementary activities: (i) adapting the

(continued)

Box 11.1 (continued)
technology for measuring forage quantity to local conditions; (ii) conducting detailed field measurements of forage quality; (iii) information outreach (extension); and (iv) linking information with herder alliances. The way [the technology] was applied in Mongolia was truly seminal, and the impact on the ground was dramatic. Many of the herders, provincial administrators, and technical specialists that were originally sceptical about the feasibility of obtaining accurate forage prediction maps are now impressed by the high quality predictive capacity of project technology and efficient information dissemination protocols. An increasing number of government officials are using Gobi Forage radio broadcasts (part of the outreach effort) to obtain information about pasture conditions and to guide their recommendations on livestock movements. Some 93 % of government officials who use Gobi Forage products now indicate that those products are "very useful" for their work. One provincial governor described how the system helped him manage the influx of some 50,000 herders and their families from a neighboring drought-stricken province and prevent conflict with local herders. While perceptions of the accuracy of the forage information vary widely among herders themselves, use of the technology is increasing, with almost 50 % of herders claiming that the data had informed their decision-making. It isn't only the livestock raisers who benefited here. Use of GOBI Forage technologies by soum (county) and aimag (province) officials has proved fundamental in the management of human populations and livestock across political boundaries during times of drought and harsh winter conditions. As virtually all significant short term movements of human populations are related to forage conditions, the map resources generated by the GOBI technology suite assist in pastoral migration management, greatly enhancing the capacity for improved natural resource management and institutional operation. The technology and its application has also transformed how some of the main government institutions responsible for agriculture – including, but not restricted to forage monitoring – operate and, more importantly, how well they operate.

*http://glcrsp.ucdavis.edu

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