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JIRCAS Newsletter for INTERNATIONAL COLLABORATION

Vegetation survey in the project site of Mongolia (Photo by K. Toriyama)

In This Issue

JIRCAS
JAPAN INTERNATIONAL RESEARCH CENTER FOR AGRICULTURAL SCIENCES

Wisdom of the Nomad and Greenhouse Gases

The face of the suntanned nomad seemed to be somewhat lonely. Normally, yogurt and cheese made from goat or sheep milk were usually served in case someone visits a ger located in the vast Mongolian grasslands in early summer. However, I was not served such dairy products when I visited the former nomad's home, and he did not even answer my question about the number of his animals. The cause is called "Zud" or "dzud", a local word that means a large number of livestock animals died due to the cold wave and the heavy snowfall of the winter season. There was a serious attack by "Zud" in the winter of this year, and more than 40% of livestock animals had been lost in Ovorhangay Province that exists 500 km southwest of Ulaanbaatar, the capital of Mongolia. Anyway, these dairy products such as yogurt and cheese are very important protein sources for nomads in these areas. It is difficult to preserve raw milk in a ger without a refrigerator, but fermented dairy products can be kept longer in room temperature. It is really amazing, this wisdom of the nomad who devised such a preservation method long time ago before the invention of the refrigerator.

The preservation property of well known foods in Japan such as miso, soy sauce or pickles is also improved using the power of microorganisms. And "silages" used as livestock feed are also one of them. Silages are anaerobically fermented forage crops or corn in a silo or wrapped with polyethylene film, in other word, these can be called "pickles" for livestock ruminants. Recently, fermented mixed ration with forages and concentrates such as brewery residues or wheat bran for livestock ruminants have been established. However, this feeding technology has not been introduced in the developing countries yet. We are considering that by feeding livestock using this technology during the winter or dry season when the depletion of feed stuffs happens, serious "Zud" can be prevented as a result. And likewise, the life of nomads or farmers will become easier because of improvement in the productivity of their livestock.

This will benefit not only the farmers in these developing countries alone through the improvement of the livestock production efficiency. Have you ever heard about the greenhouse gases? It is actually recognized that the ratio of the greenhouse gases of agricultural origin to the total greenhouse gases in the world is around 30 percent when indirect sources are included. However, it won't be as effective to just talk to the poor farmers to make the greenhouse gases decrease.

Then what should we do? I think the most effective way is to improve the efficiency of agricultural production in these developing countries. If the production efficiency can be raised to double the original level, the greenhouse gases from each product can be reduced by half.

It is impossible to improve the production efficiency in developed countries to double its level, but there is still a possibility in developing countries. For example, beef cattle is usually slaughtered at the age of two years or less in developing countries, in contrast, the beef cattle in developing countries takes three or four years, sometimes more than five years until shipping. The fattening period of beef cattle in developing countries can be shortened by improving the feeding efficiency with the use of by-products or food residues, such as brewery residues or by squeezing the dregs of juices, shortening of the fattening period will also bring improvement of the beef quality. This feeding technology is very important because it will bring, not only increase in the income of farmers, but also the mitigation of greenhouse gases from animal production. Developing this technology will be an important international contribution because Japan is exporting greenhouse gases to other countries when it imports around 60% of its food from them. JIRCAS is working on such important research while coordinating closely with many national and international collaboration researchers and institutes. In this feature article, we want you to feel the potential of the research.

Akio Takenaka
Director, Animal Production and Grassland Division, JIRCAS

Grasslands Study in Dry Areas – Present Situation and Future Perspectives

Photo. 1. Desertification (back) and restoration (front) of once grazed grassland, Inner Mongolia, China, 2006 (Photo by K.Toriyama)

Grasslands in dry areas and desertification

Drylands account for about 40% of the total land area in the world. In these areas, as the evaporation exceeds precipitation, arable lands cannot be sustained without irrigation. Thus, nomadic life has continued for centuries in these areas because herbivorous animals possess the functions to convert grasses into meat, milk, and hide, which are the sources of their livelihood. Herders have the tendency to keep as many animals as they can to make their living richer and more comfortable. However, the pastures they use have a limitation to carry and support animals. This inconsistency becomes obvious when the pastures are open-access to all the herders and leads to the famous "tragedy of the commons". Once the balance between grass and soil becomes upset, grass regeneration cannot catch up, and loss of vegetation cover accelerates the soil erosion; the functions of the soil such as the supply of nutrients and its water-holding capacity to sustain grass vegetation will be lost gradually. This phenomenon is what is called land degradation or desertification, and the restoration needs tremendous efforts and time as seen in the following photo of Inner Mongolia, China. Grazing lands occupy 4.5 billion ha of the total land area of 13 billion ha in the world. The proportion of degraded lands is estimated by UNEP as 73% (Fig.1.) and the major causes are thought to be over-grazing, over-cutting of woods and over-cultivation.

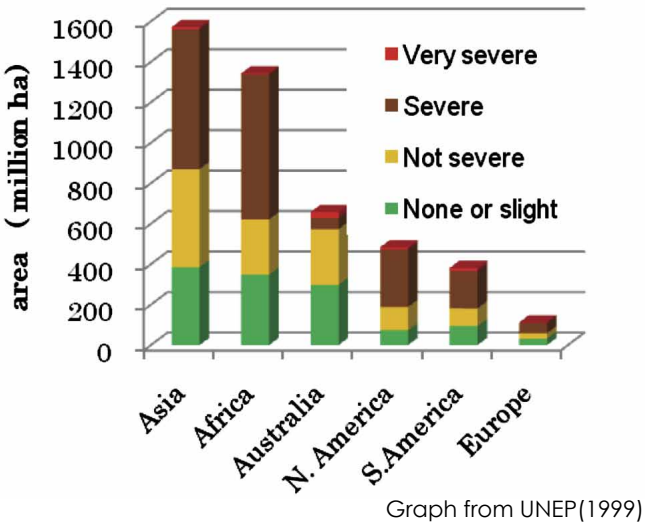


Fig. 1. Desertification or degradation area of grazing lands by continent

Vicious circle of desertification and global warming

There is a global concern about global warming and hence many countermeasures have been advanced. However, as shown in the JIRCAS International Symposium on Desert and Desertification in 2006, desertification was considered only as a regional problem and priority for its research was not considered as high as global warming itself. However, if desertification proceeds, carbon sequestration by grasses would also decrease. As the areas affected by desertification are distributed mostly in developing countries, their residents are obliged to migrate during some extreme events and will become potential causes of regional conflicts. Therefore, it is strongly required to carry out proactive actions such as surveys or researches on the mechanism of desertification and prevention and restoration methods.

Seeking harmony between grassland conservation and livestock farming

From the above mentioned, JIRCAS has been implementing surveys and researches with the aim of attaining grassland conservation in dry areas. Of course, it is not the same matter as nature conservation, because it is closely related to the herders' livelihood. Therefore,

it is required to carry out these studies while considering a good balance between environmental conservation and productivity. There are some research topics implemented by JIRCAS in Mongolia where the expansion of desertified areas by over-grazing is of a strong concern. We have been implementing research on estimating appropriate grazing pressure, as well as methods to increase the income of herders. In addition, planning and verification of improved grazing method, and a self-sustained repair system of drinking wells for animals were also carried out. However, we have a concern that these adjustments for grassland use alone would not be the adequate or appropriate solution to deal with the recent huge annual fluctuation of the weather.

Future perspectives of research on sustainable grassland use

Compared with humid areas, the technological options for agriculture are very limited in dry areas. I think research on the improvement of soil functionality should be given more priority because soil functions to hold scarce water and supply nutrients are the bases for combating degradation of land. For example, JIRCAS tackled research to raise the soil productivity in Niger, Sahel area of west Africa. It showed that setting the fallow zones beside arable land could have the potential to trap soil particles which were wind-eroded from nearby areas and the soil fertility will thus be improved to give a good yield in the next season. This is an excellent example to put a stop to land degradation or desertification.

It is not an easy task to apply technological input alternatives, such as the introduction of improved varieties, fertilization, irrigation, etc to vast grasslands, which are considered as usual practices for arable land in terms of the cost of introduction. Thus, we have to explore not only to obtain an appropriate grazing system based on carrying capacity evaluation by satellite remote sensing, but also to develop technologies that are not limited to grasslands. Therefore, it is necessary to study the possibilities of fodder production in arable land and/or silage-making from agricultural by-products to raise the animal productivity while reducing the over-grazing on natural grassland, or value addition to animal products such as milk to bring profit to herders, especially those living in remote areas. Of course, careful managerial evaluations of these technological inputs have to be done. In addition, an evaluation of herders' grazing management from the perspective of resilience will be important under such extreme climate events which happened in recent years.

Kazunobu Toriyama
Animal Production and Grassland Division, JIRCAS

Photo. 2. Grazing sheep and goats on a grassland in a dry steppe area of Mongolia
(Photo by K.Toriyama)

Development of a Sustainable Agro-pastoral System in Dry Areas of Asia

To determine the optimum conditions for sustainable livestock production in pastures of semi-arid areas, the research project, "Development of a Sustainable Agro-Pastoral System in Northeast Asia", has been carried out since 2006. Some of our activities will be shown as follows.

Photo. 1. Grazing experimental site in Mongolia (2009)
(Photo by K.Toriyama)

Grazing experiment and remote sensing

We have been conducting a grazing experiment at Bornuur Sum, about 130 km from Ulaanbaatar, Mongolia, with annual precipitation of 250 mm, where we investigated the effects of animal species (cattle, sheep and goat) and grazing pressure (sheep) on the vegetation changes. The relationship between grass production, animal intake and daily weight gain has been studied. Based on this result, a method to calculate the appropriate carrying capacity of the grassland will be developed.

Satellite remote sensing is a useful tool to provide timely information for the migration of flocks, which may lead to the appropriate use of grasslands. There was a good correlation between the grass biomass estimated by satellite remote sensing and the data measured in our grazing site. It is necessary to develop a practical information method to provide measures for herders by using frequent satellite images at low cost.

Supplemental feeding in winter time

In Mongolia, grazing is common even in severe winter time. Thus the weight loss and death of animals in some severe event (Dzud or zud) have been big problems. Therefore, grazing management during winter time was evaluated using supplemental feed such as wheat bran, etc. The results showed that the survival of the sheep was possible while the suppression of weight decline was also observed. This may be effective to lessen the burden on the grasslands in the next season as well as to increase income by quickening the fattening time of the animals.

Simulation for seeking a balance between grassland conservation and herders' income

A dynamic system model, comprising of three sub-models, i.e. vegetation, livestock growth and household income for simulating the optimum conditions for long term sustainability of livestock farming in Mongolia, was developed. Long term simulation for 30 years on the animal numbers and the herders' income status were conducted based on the information obtained from our grazing experiments, feeding experiments and economic and household surveys as well as some scenario such as changing land use rights, enhancement of slaughtering younger animals, etc. The results will help to develop appropriate conditions for sustainable livestock farming.

Nomadic life has been carried out in Mongolia for centuries; one big reason was risk aversion. However, current extreme climatic events as well as over-grazing near urban areas call for a settled livestock farming as well. We are now reviewing our research in terms of close cooperation with fodder production and value addition to the livestock products.

Kazunobu Toriyama
Animal Production and Grassland Division, JIRCAS

Establishing the Conditions for the Efficient Use of the Mongolian Pasture

We imagine Mongolia as having plenty of domestic animals such as horses and sheep grazing on the vast grasslands. But like China, this country is considered as the focus of the sources of the dust and sandstorms affecting even Japan. The main reason of the dust and sandstorms is the pastures. In other words, due to the imbalance in the ratio of pasture vegetation yield and the number of grazing animals, the pastures have deteriorated and territories affected by desertification have expanded.

In order to prevent further pasture deterioration in the plain steppe areas of Mongolia, JIRCAS has been conducting this project on the development of pasture management.

Studies on local conditions show that even in pastures that used to have balance between the plant yield and the number of animals under nomadism, in some areas, animals are crowding due to the herders coming together in the urban areas, uneven distribution of usable wells or other reasons. This caused the imbalance in the vegetation and subsequent plant deterioration. Therefore, active participation of herders in the planned pastoral use management for overcoming the above mentioned problem has become one of the urgent issues. JIRCAS has been cooperating with local herders and administrations on the development of the regional pastoral use plan.

The purpose of this plan is to prevent pasture plant deterioration and avoid animal crowding in one place by implementing planned pastoral use and rotating it according to the four seasonal conditions. This activity should be done on the basis of joint discussion with the herders.

The herders in the project area have been implementing the planned pasture use through joint efforts. They will independently continue it sustainably for the long term.

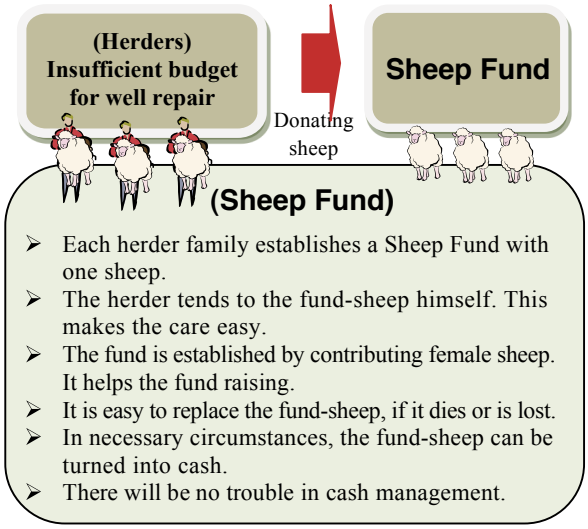
Likewise, in order to introduce a technology to support pasture capacity and sustainable livelihood of herders, studies on vegetative restoration, water resources management, renewable energy use and farming management were carried out. Specifically, supplying animals with adequate water is the most important. Because the use and repair of most of the wells in the pasture are unsatisfactory, there are many unusable or abandoned ones.

Therefore, JIRCAS practiced the repair of those wells and establised a method on how to repair them. In addition, it developed a system which enables the local herders to repair wells by themselves independently. This consists of the "Sheep Fund" to be established with sheep donated from the herders and to be used for the well repair as altemative for cash, and setting up a Well Repair Team. Herders have been actively participating in the "Sheep Fund" activity. A total of 21 of the"Sheep Fund" has already been established for wells in the pastures of the study area, and recognized by herders.

This pasture use strategy and management activities have been published in the "Guidelines for Pasture Use Planning" and "Technology Manual", and used by other provinces of Mongolia.

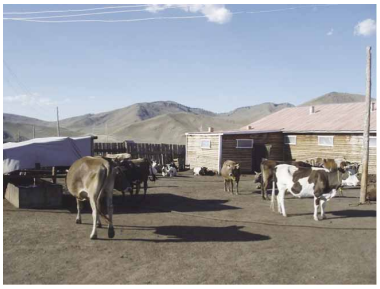
Takeshi Matsumoto
Rural Development Planning Division, JIRCAS

Herders are discussing and planning their pasture use
(Photo by: T. Matsumoto, Uvurkhangai Province)



"Sheep Fund" to solve the lack of financial resource for the improvement of well use and protection

Increasing Intensive Animal Husbandry in Mongolia



Middle scale dairy farm in the suburbs of Ulaanbaatar (Photo by: H. Komiyama)

In Mongolia, the nomadic type of animal husbandry that moves from one natural grassland to another 3-4 times a year according to the season has been implemented since faraway times as subsistence livelihood of the majority of the residents. During the planned economic age until the 1990s, nomadic livestock were collectivized in *Negdel* (agricultural cooperatives). However, the form of animal husbandry done in *Negdel* was still the nomadic style.

On the other hand, the establishment of large-scale, intensive animal husbandry farms by the government-run farming system was advanced with the cooperation of the former Soviet Union, etc. aimed at the stable supply of livestock products to the urban residents who had increased rapidly after 1960s. After the transition to a market economy in the early 1990s, these farms were gradually privatized. However, many of them became impossible to operate due to the shortage of operating funds and the distribution of domestic animals etc.

After the transition to the market economy, both the numbers of nomads and livestock increased rapidly since the people were able to practice the nomadism style freely, without any restriction on the number of domestic animals.

During the planned economy period, the total number of five animals (horses, sheep, camels, cattle and goats) fluctuated between 22 and 25 million heads. Now, it has reached even 43.6 million heads (as of the end of 2009). Specifically, the increase in the number of goats, which produce expensive cashmere, is remarkable. It is equivalent to 68.9 million heads of sheep; if this livestock number is converted into sheep unit, a total of 62-68 million sheep is assumed to be sustained by the natural grassland in Mongolia. Therefore, the present livestock numbers are exceeding the carrying capacity of the natural grasslands in Mongolia. Notably, the suburbs of big cities are facing severe overgrazing due to the concentration of livestock.

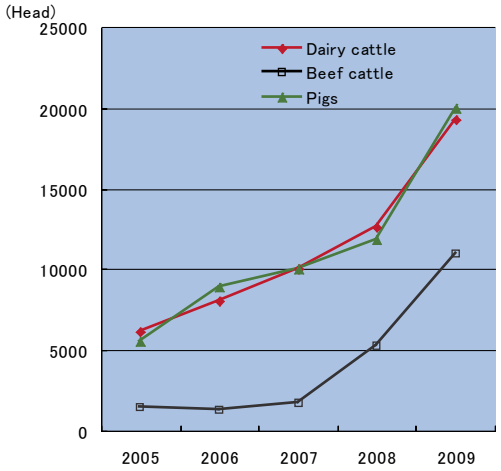
The sheep per person ratio of the population in Mongolia is 26 heads, which is the largest in the world. In terms of the number of livestock, Mongolia is the No.1 livestock country in the world. However, if it is compared with the livestock production of New Zealand, it holds the second place in the world in terms of sheep per person ratio. Mongolia's productivity is only one seventh for cow's milk, one third for cattle meat and one fourth for sheep meat. In addition to the low productivity, there exists several major animal diseases. Mongolia is only slightly exporting meat to Russia etc., while New Zealand is exporting a large amount of dairy products and meat.

Although Mongolia is a major livestock country, it is importing half of its domestic consumption of milk and dairy products which are being produced in the milk processing plants. Due to the problems of transportation, quality, etc., it is impossible to fulfill the various needs for dairy products of the city residents, who are increasing rapidly, due to the nomadic form of animal husbandry alone.

Then, intensive animal husbandry farms, such as dairy farms, beef cattle farms, pig farms and poultry (layer) farms, etc. are increasing rapidly around the city outskirts in recent years. The government is also supporting the shift to such farms in the policy.

It is thought that the future of animal husbandry in Mongolia should be a balanced development between traditional nomadic type of animal husbandry and intensive animal husbandry. Therefore, we have been implementing collaborative research with the Mongolian State University of Agricultural (MSUA) since Fiscal Year 2005 to clarify the basic conditions of sustainable management, not only for the nomadic type animal husbandry but also for intensive animal husbandry.

Hiroshi Komiyama
Development Research Division, JIRCAS



Transition of number of livestock in intensive animal husbandry farms

Introduction of an Agro-pastoral System in Brazil

The demand for cereals is growing as a result of worldwide increases in agricultural prices due to economic globalization and the pressure of overpopulation. Demand for cereals is further spurred by the growing demand for other forms of bioenergy such as bioethanol. The soybean, corn, and sugarcane farmlands of South America, as the supply centers of these agricultural products, have expanded and their production volume has increased, especially in Brazil. These farmlands have mostly been expanded by means of buying up on the stock farms stretching over the cerrado, the tropical savannah in Brazil, or leasing grasslands.

Although these grasslands were established by comprehensive development of the cerrado from the 1970s onward, most stock farmers have continued to operate unproductive businesses and have not improved their lands. Only the magnificent scale of the grasslands, which stretch over thousands of hectares, has enabled the business of grazing to continue. However, rises in cereal prices and increased labor, administrative and maintenance costs have recently obliged stock farmers to raise their productivity. An agro-pastoral system is being adopted to meet this need.

In the agro-pastoral system, soybean is cultivated on waste grasslands for approximately 4 years (Photo. 1), and then grasslands with increased productivity are renovated on the same land. A large amount of fertilizer is required to cultivate soybean; accumulated fertilizer components such as phosphates can be used to renovate the grasslands, and the cost of this pasture improvement (e.g. the cost of seeds) is covered by the income from the soybean crop.

Photo 2: High-production grassland developed after soybean cultivation
Photo by: K. Shimoda in Mato Grosso do Sul, Brazil

Photo 1: Soybean crop (foreground) developed on a waste grassland (background)
Photo by: K. Shimoda in Paraná, Brazil

Because the grasslands were too vast for stock farmers to manage economically, many of them had to give up the idea of pasture improvement. In the agro-pastoral system, the stock farmers do not necessarily cultivate the soybean by themselves but can lease the land to soybean farmers.

Since 1997, the Japan International Research Center for Agricultural Sciences (JIRCAS) has conducted selection and cultivation tests of pasture grasses that are suitable for an agro-pastoral system and have investigated the yields and persistency of these species in collaboration with the National Beef Cattle Research Center of the Brazilian Agricultural Research Corporation (EMBRAPA-CNPGC). In addition, JIRCAS has used verification testing of the agro-pastoral system to examine the productivity of soybean and millet cultivated on waste grasslands. As a result, grassland productivity has been improved and use of the agro-pastoral system has become widespread among stock farmers in Brazil through EMBRAPA-CNPGC (Photo 2).

In Brazil, some stock farmers who have been bought out by soybean and sugarcane farmers have now opened up the cheaper Amazon forest lands and have developed huge ranches, thereby destroying the natural environment. In contrast, those stock farmers who have adopted the agro-pastoral system have succeeded in improving their productivity and gaining stable incomes by mixed farming. In this manner, we hope that introduction of the agro-pastoral system will help to conserve the Amazon.

Katsuhisa Shimoda
National Institute of Livestock and Grassland Science, NARO

Brachiaria Breeding Project

Brachiaria is a pasture grass belonging to the family Poaceae. It is not well known in Japan but is widely cultivated in tropical regions, mostly in Central and South America. According to an estimate, approximately 70 million hectares of *Brachiaria* grasslands exist in Brazil alone. This land area corresponds to approximately 43 times the lowland rice acreage in Japan in Fiscal Year 2009. *Brachiaria* is also cultivated in Australia and Southeast Asia, particularly in Thailand, where approximately 0.3 million hectares are available for *Brachiaria*. Recently, *Brachiaria* was also introduced to Okinawa, Japan and a breeding program was launched.

Most *Brachiaria* species are native to Africa, and the ones that are used in agriculture are limited to several species such as *B. brizantha* (palisade grass), *B. decumbense* (signal grass), *B. humidicola* (koronivia grass) and *B. ruziziensis* (ruzi grass). Despite its African origin, for all practical purposes *Brachiaria* is not cultivated in Africa today. Collection of the grass as a genetic resource and full-scale introduction of Brachiaria to South America were initiated in the 1950s, and the importance of this genus as a pasture grass was acknowledged when *B. decumbense* 'Basilisk' was introduced to South America from Australia in the 1970s. *Brachiaria* breeding is currently conducted at the International Center for Tropical Agriculture (CIAT) and the National Beef Cattle Research Center of the Brazilian Agricultural Research Corporation, and high quality cultivars, as typified by Mulato and Mulato II, have been developed from interspecific progeny at CIAT.

Brachiaria exhibits wide adaptability to various conditions, including water logging conditions, poor soil fertility, soil acidity, and drought. However, the development of cultivars with even higher environmental tolerance and productivity is highly awaited because of changes in the global climate and the accompanying changes in cultivation conditions. In this project, we aimed to develop cultivars with charateristics such as high drought tolerance and established transgenic lines of ruzi grass. Currently, we are analyzing the line, transformed with the DREB gene, which is responsible for drought tolerance. In addition, we are developing a transformation system for palisade grass, cv 'Marandu', which is the most widely cultivated today. Moreover, we are selecting lines with superior agricultural traits in terms of higher seed and biomass productivity in the F1 population of tetraploid ruzi grass, whose chromosomes were artificially doubled. We are targeting countries such as Thailand, where the diploid ruzi grass is widely cultivated. This project is conducted as a collaboration with the University of Miyazaki, Okinawa Prefectural Livestock and Grassland Research Center, and the National Institute of Livestock and Grassland Science, in Japan.

Kazuhiro Suenaga
Director, Biological Resources Division, JIRCAS

Population of tetraploid ruzi grass (Okinawa Prefectural Livestock and Grassland Research Center)

Cultivation of Mulato developed at CIAT
(Faculty of Agriculture, Ubon Rajathanee University, Thailand)

Eye in the Sky: Monitoring Mongolia's Grasslands from Space

In the light of global climate changes and the ever increasing number of grazing livestock, the sustainability of Mongolia's grasslands is continuously being challenged. Grassland resources monitoring in a timely manner is crucially important. The most commonly used and reliable method to do so is to collect a network of detailed ground samples at many locations by cutting pasture grass and gathering data to obtain the big picture. Although not to be a complete alternative to this laborious ground work, a great way to supplement this conventional method is to use the information collected by the Earth-observing satellites—space remote sensing technology.

The advantage of using satellite remote sensing can be summarized as follows:

- Data can be obtained systematically over very large geographic areas.
- Up-to-date data can be obtained with relative ease.
- Repeated observations allow time series analysis to extract changes and trends.

The machine eyes — sensors on board satellites captured declining vegetation trends around major cities and formerly cultivated croplands in a decade following the 1990 transition from then Soviet-led planned economy to market economy (Fig. 1). Remotely sensed spectral data were processed and coupled with ground samples to depict highly variable pasture resources distribution in seemingly homogenous Mongolian grasslands (Fig. 2).

Findings from these monitoring efforts are expected to form the basis for predictive simulation and assessing dynamic carrying capacity of pastures. More work is on the way to secure better biophysical information retrieval using Eye in the Sky.

Akira Hirano
Development Research Division, JIRCAS

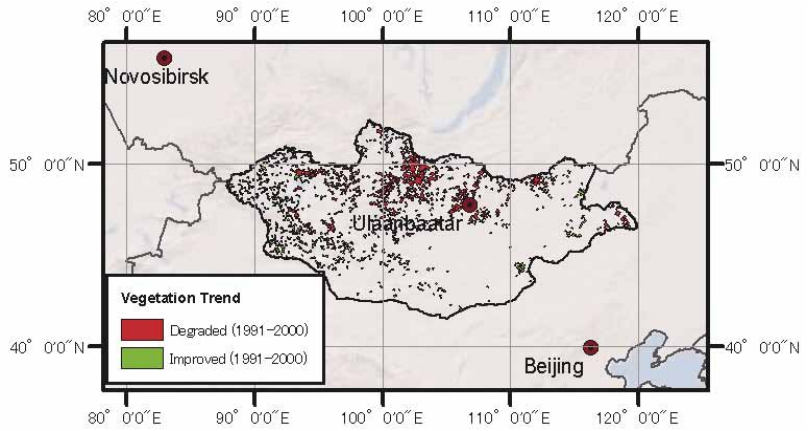


Fig. 1. Vegetation trend in Mongolia (1991-2000). (NOAA/AVHRR data)

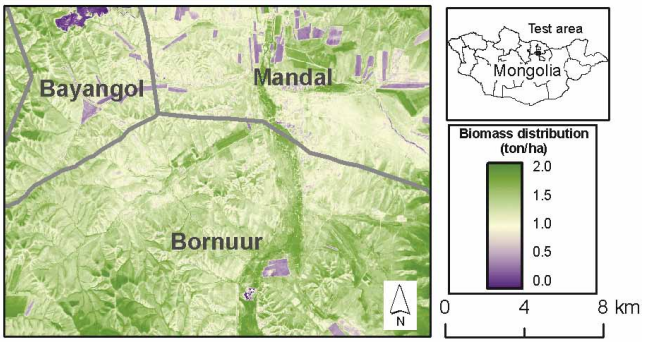


Fig. 2. Pasture biomass estimation using FORMOSAT-2 high resolution satellite data.

Forest Conservation by Harnessing Unused Resources

Mongolia is often associated with grasslands and deserts; however, central to northern Mongolia is covered mostly with trees of the larch family. Annual precipitation is extremely low in Mongolia, and thus the conservation of forests is difficult in most areas. Once cut down, the forests lose their recuperative strength and eventually transform into grasslands. Presumably, the grasslands then turn into deserts as a result of livestock grazing. For this reason, various organizations, including NGOs, are planting trees in an effort to prevent the desertification of Mongolia.

Nomadic families in Mongolia once predominantly used cattle dung as fuel. However, the massive cold wave that hit Mongolia 10 years ago significantly decreased the numbers of cows and horses, and trees and shrubs on the grasslands are now being used as firewood. Therefore, not only afforestation, but also the maintenance of existing forests, is of foremost importance to prevent desertification. For this purpose, we need to reduce the rate of deforestation. We therefore aim to reduce the number of trees used as fuel by harnessing unused resources and producing and disseminating fuels that can be used as substitutes for cattle dung.

Because it is extremely cold for most of the year in Mongolia, heaters are used from October to June in government offices and schools. Coal is consumed in boilers as fuel, and the coal powder released due to the abrasion of coal pieces as they are being shoveled into the boilers is disposed of as industrial waste. In addition, the nomads use very little dung of goats and sheep as fuel. We therefore developed fuel blocks by mixing these previously unused resources and solidifying them in metal molds. One or two blocks of this fuel supply enough energy to cook a meal for a family of four.

Promotion of the use of this fuel block in Mongolia will lead to forest conservation. We therefore collaborated with city governments and established a system of buying up the fuel blocks produced by the nomads.

From the month of June in 2008 until the following June, replacement of the coal used in a village kindergarten (educating 50 children) with the fuel blocks conserved approximately 16 cubic meters of trees and 2.7 tons of coal; this corresponded to approximately 500 square meters of Mongolian forest.

Because this fuel block system leads to environmental conservation and increases income, it is being used in 12 out of 18 counties in Uvurkhangai Province, in collaboration with the provincial government this year.

Kenichiro Kimura
Public Relations Office, JIRCAS

Cutting logs to be used as fuel
(Photo by: K. Kimura)

Manufacturing fuel blocks (Bottom left picture: a fuel block)
(Photo by: K. Kimura)

TARC-JIRCAS 40th Anniversary International Symposium: A New Decade for International Agricultural Research for Sustainable Development

JIRCAS, which has its beginning as Tropical Agriculture Research Center (TARC) is celebrating its 40th anniversary this year. To commemorate this occasion, JIRCAS has organized this international symposium with the support from related organizations (This symposium is partly organized as a project commissioned by the Ministry of Agriculture, Forestry and Fisheries (MAFF).

◆ **Date: November 8, 2010 Afternoon and November 9, 2010**

In the morning of November 8, the Ceremony of Japan International Award for Young Agricultural Researchers will be held.

◆ **Venue: Tsukuba International Congress Center, Epochal, Convention Hall 200**

◆ **Objectives:**

World agriculture (incl. forestry and fisheries) rapidly changes in response to global movements such as recent events of economic and food crises, strengthened measures for global warming, rapid growth of the emerging economies and so on. Regarding development strategies, the global development goals are doubtful to be achieved and are supposed to be amended. The roles of agriculture for development, in contrast, have been re-evaluated.

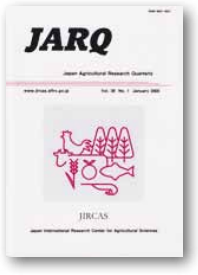
Agricultural research is also facing a new era owing to the globalized society as well as the advancement in information technology, biological and environmental sciences. New research networks have emerged beyond the conventional research systems and existing institutions are struggling to find out new research frameworks and targets.

This symposium aims to grasp these new trends surrounding international agricultural research though the exchange of opinions among experts from various organizations, and to obtain useful suggestions for future activities of related research institutes as well as individual researchers.

◆ **Program:**

- **Keynote Speech:**
  'Enhancement of Japanese R&D and International Cooperation in Science and Technology'
  Prof. T. Shiraishi, Executive Member of the Council for Science and Technology Policy, Cabinet Office
- **Session 1: Trends in International Agricultural Research Networks**
  International forums such as CGIAR will present the most up-to-date situations.
- **Session 2: Challenges of Development-oriented Agricultural Research Institutes**
  Institutes with similar functions to JIRCAS will report their challenges.
- **Session 3: Network Formulation by Japanese Agricultural Research Bodies**
  Discussions on the formulation of domestic research networks will be made.
- **Panel Discussion: Agricultural Research for Sustainable Development - Towards a New Decade**
  Domestic and Overseas Experts will map out the direction of Future Activities.

(Session 3 will be organized as part of the "Global Scale Issue-oriented International Research Network Project" commissioned by MAFF, and Panel Discussion will be co-organized with the project.)



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