

**MANAGING PASTORAL RISK IN MONGOLIA -
A PLAN OF ACTION**



**PROJECT
TCP/FAO/MON 0066**

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**Project: Pastoral Risk Management
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Glossary of Mongolian terms

aimag - 'province', primary administrative unit

bag - lowest level of the administrative hierarchy

ger - mobile pastoral hut

kheseq - work team within former livestock collectives

khural - representative assembly

negdel - former livestock collectives, abolished in 1990

nutag - land and other natural resources in a specific area used habitually by particular group of herders

otor - rapid movement with livestock to make use of distant pasture, to escape drought or *zud*, or to prepare animals for winter

sum - 'district', administrative unit below province

zud - winter disaster, often caused by frozen snow cover

STUDY BACKGROUND

Mongolian herding is a highly successful livelihood system, but has always involved weather-related risks. The most obvious risks come from periodic snow disasters (*zud*), which cause heavy animal and human mortality, although drought, fire and other risks have a similar impact. In recent years, Mongolia's pastoral system has been subject to significantly increased levels of variability and risk from environmental, economic and social causes. This is due to the combination of a severe, continental climate, extremely large distances, a nomadic system which has expanded dramatically since the break-up of the state farms and livestock collectives, and deteriorating services to the livestock sector, including winter support and social security safety nets. Risk management strategies, which were operational in Mongolia before its transition to market economy, have completely collapsed under the changed conditions of a free market economy beginning in 1990. Market, social and some environmental risks to herders have substantially increased due to reduced support from central government to the countryside, and an explicit shifting of many risks from the public sector to herders. The frequency of major snow disasters is estimated nationally at around once every ten years, although for some provinces the risk is more frequent, perhaps once every five to seven years. However major snow disaster with catastrophic impacts occurred more frequently during the last 10 years. Snow storms killed an estimated 100,000 animals in May 1993, and in June 1995 heavy rain killed 60,000 recently-shorn sheep in a single night, impoverishing large numbers of herding households. The winter of 1999/2000 was the worst in thirty years and has reportedly killed two million livestock and many more have been killed in two subsequent bad winters. The livelihood and food security of up to one-quarter of Mongolia's population who depend entirely on animal rearing are seriously threatened

However, there was no pastoral risk management policy and strategy enacted by the government since its transition to market economy. Herders' risks were only addressed incidentally and partially. The Ministry of Agriculture¹ recognised that dealing with risk is the main problem for Mongolian herders under the changed market conditions, and that failure to deal with risk could jeopardise all progress in rural development and poverty alleviation. As a result, the Ministry gave the highest priority to the development of a co-ordinated national pastoral risk management strategy, linked to national poverty alleviation efforts. As a pre-requisite for a new national strategy, consolidated risk management plans at lower institutional levels were urgently needed, building on tested new strategies for improved risk preparedness, mitigation and recovery after calamities. Strategies should be adapted to and operational under the changed conditions in Mongolia. The GOM therefore requested FAO assistance through the TCP programme in preparing risk management plans for selected pilot provinces, and pilot testing key components of the plans at field level, as a model of what can be done in the country as a whole.

In that context the Rural Institutions and Participation Service (SDAR) of FAO, funded by a FAO - TCP project, with support from other technical divisions of FAO and from the Institute of Development Studies at the University of Sussex (IDS), supported from 1999-2003 the design and promotion of a pastoral risk management strategy for rural Mongolia.² The overall project goal was to contribute to improve and sustain the livelihood and food security of pastoral herders in two provinces of Mongolia (chosen to reflect different levels of risk, different ecological conditions and different experience of restocking schemes) and increase

¹ At the time the project started, the relevant Ministry was Agriculture and Industry. After a change of government in mid 2001, this became the Ministry of Food and Agriculture.

² The project was: FAO/TCP/0066, *Pastoral Risk Management Strategy*.

national, provincial and local institutional capacities and planning procedures for co-ordinated risk and disaster management in pastoral areas through:

- development of co-ordinated and integrated pastoral risk management plans, with a focus on improving the preparedness of all stakeholders to counteract and mitigate the detriment of environmental risks in the selected provinces; plans will be developed with appropriate links to central government activities, taking account of and linked to all relevant ongoing initiatives at central and local level, and herders' own perceptions and capabilities;
- pilot testing of selected key strategies for risk management in the three pilot provinces which show a high potential to secure herders' livelihoods and increase resilience against risk and disaster, and propose a process for expanding such strategies into provincial and national plans, including possibilities for donor support

The TCP produced a series of technical reports on various topics related to Pastoral Risk management, each of which contained a set of conclusions and recommendations for follow-up activities in their specific technical domain. The project also prepared and applied a large amount of training material. A final consolidating project output was the formulation of a Comprehensive Action Plan for Pastoral Risk Management which is presented in this report.

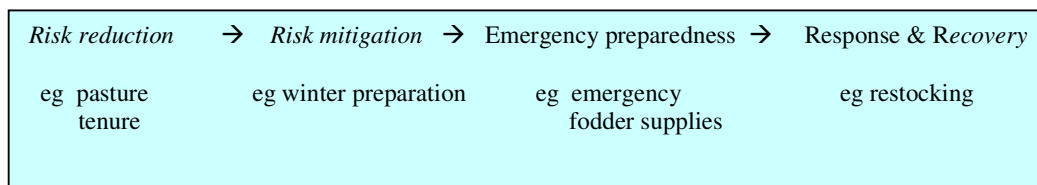
The recommendations were formulated based on an intensive research and dialogue with various key stakeholders in the project target areas and at national policy level. The TCP also contributed, through the direct collaboration with the MoFA and other national institutions such as the Mongolian State University of Agricultural, the Research Institute of Animal Husbandry, the High Mountain Research Station, and the Centre for Policy Research and their active participation in the field investigation to staff capacity building regarding pastoral risk management concepts, planning and implementation.

I. INTRODUCTION

Recent natural disasters in Mongolia, most notably a three year series of summer droughts and winter *zuds* (frozen snow disasters), have drawn attention to the devastating role played by risk in the pastoral economy. This report explores risk management by herders, and how government at different levels can best help reduce and better manage such disasters in future. It proposes enhanced winter preparation, monitoring and forecasting activities by herders and government. The proposals are based on fieldwork by the FAO/TCP pastoral risk management project (TCP 0066) during 2001 and 2002 in Turgen and Tarialen *sums*, Uvs *aimag*, and Lun and Erdene *sums*, Tuv *aimag*.

1.1 Pastoral risk management

Pastoral risk management can be conceptualized into four closely interconnected but sequential phases:



- *Risk reduction* is the long term set of activities designed to reduce vulnerability, undertaken by herders within an enabling environment created by government at different levels. Risk reduction activities include the development of herder groups for better collective action on natural resource or risk management, an improved land tenure framework that encourages conservative pasture use, or a livestock insurance scheme.
- *Risk mitigation* is the medium term set of activities designed to prepare the herding economy for stress periods such as summer drought and winter *zud*, and for sudden shocks. Risk planning includes winter preparation and better risk forecasting.
- *Preparing for emergency* is the set of activities triggered by warning of an impending disaster, or by the disaster itself. Although preparedness activities are themselves short term, the process of developing an agenda of responses, or shelf projects as they are sometimes called (reactions prepared in advance, but kept on the shelf until they are needed), is a medium term activity, a part of risk preparation.
- *Response and recovery* is the medium term set of activities designed to help households recover their livelihood strategies, sometimes also called rehabilitation. Risk recovery is key: until households have recovered, they remain especially vulnerable to new shocks.

This report focuses on *risk reduction* and *risk mitigation* – what herders and government should do in the longer and medium term to reduce vulnerability and also do every year to prepare for the inevitable hardships of winter. Such activities include monitoring the state of winter preparation, identifying acute threats (normally drought and *zud*) in advance, and planning for and managing such threats.

Because its resources were limited, the FAO/TCP risk management project has focused especially on risk reduction and risk planning. This is not because the other two sets of activities are unimportant. On the contrary, they are essential. If the risk management strategy proposed here is to be effective, further thinking needs to take place around risk response and risk rehabilitation to develop similar detailed proposals.

Consideration of all four sets of activities will enable a comprehensive pastoral risk management system to be created for Mongolia.

1.2 Government objectives related to pastoral for risk management

Zud management in Mongolia is directed by government decree no. 48 of 13 March 2001. The objectives of that decree are:

- to specify the roles of different government agencies, economic entities and livestock owners in coping with potential risks from drought and *zud*, in minimising losses, and in maximising preparedness and operational readiness;
- to elaborate rules of assessment of emergency situations, identify forms of action and organisations able to minimise negative consequences, and set up efficient and operational natural risk management networking.

Government decree no. 48 assigns key risk management activities to different levels. A national system should also specify the relationships between them. It should conform to the principle of subsidiarity: activities should primarily be undertaken at as low a level in the administrative hierarchy, and as close to those most concerned, as possible. A pastoral risk management strategy, however, cannot be carried out by local actors alone. Pastoral risk has to be managed at several institutional levels, in a co-ordinated and integrated manner. Support from government at higher institutional levels is important.

II. RISK REDUCTION

The key to risk reduction is better natural resource management, and more appropriate community organisation by herders, enabling them jointly to undertake necessary measures. Micro-finance may also have an important role to play in reducing and spreading risk.

2.1 Natural resource management

2.1.1 Recent evolution of pasture management

Current insecure and weak tenure means that herders are not adequately encouraged to use pasture in sustainable ways. This leads to increasing anarchy of use, to overstocking, overgrazing and degradation, and to greater herder vulnerability to natural risks.

During the socialist period, grassland use at brigade and *sum* levels was regulated by *negdel* and state farm managers. Quite detailed grazing land use plans were developed. These plans established boundaries for seasonal pastures to be used by different animal species, and

reserved areas and wells. Although not every detail of the plans was implemented, they provided a regulatory framework for grassland use.

Management of pastoral resources, including land use planning, was completely halted at the start of the economic transition in 1991-1992. This was partly due to the dominant idea at the start of the transition that a market economy does not need any central planning, as well as to the inability of Soviet-trained land managers to address the challenge of an emerging market economy based on small households scattered over a huge territory.

The lack of adequate policies and regulation, combined with increased violation of best-practice grazing technologies, led to degradation of natural resources. In particular, the absence of any accountability for overstocking and pasture damage, and of any land use planning, exacerbated overstocking and grazing land degradation. Out-of-season grazing and trespass have become commonplace. To prevent encroachment by others, herders cannot move far from their winter shelters, and this causes overgrazing of winter pastures and undergrazing of more remote areas. Increased livestock numbers, and the consequent breakdown of traditional grazing regulation rules, have led to increasingly severe conflicts over land and water.

2.1.2 Water management

Pasture management is not separable from water and well management. The term 'pasture' includes not only surface vegetation, but also water, topography, soil and climate, all of which play a key role in the selection of seasonal pastures and in organising seasonal and *otor* migrations by herders. In this sense the term 'pasture' is identical to the Mongolian term *nutag*, used traditionally by herders to refer to land resources collectively, including all these key components of the natural environment used by a particular herder group.

During the economic transition, the ability of herders to access quality water for livestock declined drastically, and many wells are now broken-down or not maintained. This exposes herders to increased risks. Many broken-down water points are located in areas without sufficient surface water. Rural families and their livestock are equally affected by the closure of the wells. Due to the unequal spatial distribution of water, herders now locate their camps and graze their livestock within reach of the few remaining wells and natural water sources. This causes local overgrazing around water sources, which reduces livestock productivity.

Proper well management is crucial for achieving sustainable water supplies to herders. Thousands of wells built during the socialist period were destroyed during 1991-1993 with the privatisation of *negdels* because of the absence of proper institutional arrangements to ensure their sustainable use. Despite efforts by the government, especially the Ministry of Food and Agriculture, the institutional issues surrounding the building and rehabilitation of deep wells, which require considerable investment, have not yet been resolved. The responsibilities and rights of investors such as the government and donors, and users like herder groups and individual herders, with regard to ownership, possession and user rights in relation to newly-built or rehabilitated wells are not yet specified, and are understood differently even among the government agencies involved. Divided government responsibilities for the utilisation of natural resources further complicates the situation. The 1993 Law on the Government of Mongolia specifies the responsibilities of the Ministry of Nature and Environment and the Ministry of Food and Agriculture in relation to land and water. It gives the Minister of Nature

and Environment responsibility for the protection, sustainable use and rehabilitation of natural resources, for formulating ecological policies, for prevention of natural disasters, and for the management of land use planning. The Minister of Food and Agriculture has responsibility for livestock and crop sector policies, food security, policies to protect livestock from natural disaster, veterinary and breeding services, use of agricultural land and pastures and the supply of water to pastures, agricultural extension, rodent control and state reserves. There is ample scope for overlapping responsibilities and confusion.

2.1.3 Pasture and water mapping

Pasture mapping is the foundation of better pasture management. Pasture mapping is an essential tool for designing, implementing and monitoring land use contracts, by explicitly showing boundaries of land subject to lease certificates, land uses, land resources, and migration options in case of emergency. It thus has an important role in risk management.

Land management at *bag* and herder group level requires large scale mapping, at a minimum of 1:100,000. In Mongolia there exist several sources of mapped information relevant to land use management and planning. The most comprehensive and practical are 1:100,000 land use and geo-botanic maps prepared for all *sums* in Mongolia in the 1980s by the former Land Use Planning Institute under the Ministry of Food and Agriculture, currently the Land Authority. The land use maps show seasonal pastures and wells for brigades and *kheseqs*, which were the production units under the *negdels*. The geo-botanic maps show vegetation types, with data on grass yield, protein content and feed unit value for each vegetation type. Samples were taken for each 1,000 ha or around 250-300 samples per *sum*.

During the economic transition, recording, updating and mapping of land more or less ceased. The land use planning maps have not been updated since 1990. Updating of the vegetation maps by the Land Authority started in 1996. Because of a lack of resources, updated vegetation map data is based only on 20-30 samples per *sum*. According to experts from the Land Authority responsible for the work, the grass yield data do not meet the requirement for more or less objective estimation of carrying capacity.

Another country-wide exercise to map wells and water points was carried out by the former Water Institute, currently a branch of the Geo-ecology Institute, in the 1980s. This includes 1:200,000 maps showing all wells. Again the maps have not been updated since the start of the transition, although information for four Gobi *aimags* was reviewed with Japanese assistance in 1997-1999. Another potential source of information is work by research institutions like the Botany Institute, the Institute of Geography, and the former Institute of Pastures and Feed. They reflect findings of pilot activities in one or other *sum*, implemented with different methodologies, by different scientists, at different periods.

The Institute of Hydrology and Meteorology has also been assessing pasture yields since 1960. The institute estimates grass yield, using data from *sum* meteorological stations and posts. According to guidelines updated in 2002, yield is assessed by cutting one square meter plots in spring and winter *bag* camping areas. Four to six samples are taken for each *bag* territory, which by comparison with the Land Authority sample size is very small. The *sum* data are sent to the institute for further processing, monitoring and reporting. Although *sum* meteorological staff are trained to estimate grass yield, because of the lack of good equipment and small budgets the quality of grass yield estimates is low.

Satellite data are another potential source of information. However, according to specialists at the Institute of Hydrology and Meteorology, the use of satellite data is still only at a research level and no data are produced for mass consumption. Currently the institute uses NOAA data at scale of 1:1,000,000, which is very general. Moreover, the NOAA images are very expensive, and heavy cloud cover, especially in August, significantly reduces their quality. Even if they were available, satellite images do not directly provide grass yields. Expensive ground-truthing with good land data on actual grass yields is needed to calibrate the satellite images and to enable pasture yields to be estimated for large areas.

This situation may change in the near future. Calculation of normalised differentiated vegetation index (NDVI) from NOAA imagery can show an index of current year vegetation at any particular date compared to an average of several (currently six) previous years, disaggregated at least to *sum* level. This would provide a comparison of the potential carrying capacity for the forthcoming winter, compared to previous years. This work is currently undertaken as research, but could rapidly become available to decision-makers and local officials. However, until detailed ground-truthing is carried out, it will not be possible to convert this into a numerical estimate of actual standing vegetation reserves in any one year, and thus allow an estimate of the number of livestock that could be carried through the winter-spring period.

Apart from this future possibility, the general conclusion is that there is so far little updated information suitable for managing resources at *sum* and lower levels. Information gathered during the socialist period has been outdated by the great changes in the organisation of production, including changes in use-patterns of wells and seasonal pastures. Many new hand wells have been dug, and older mechanical wells have broken down. The pattern of use of pastures by individual families with small, multi-species herds is very different from that of the large specialised herds, separated by species, of the *negdels*. New pasture and land use maps are urgently needed for many purposes, including pastoral risk management.

2.1.4 The new land law

In June 2002 Parliament approved a new Land Law, which became effective on 1 January 2003. The new law has made some small differences compared with the old law. The positive side is that it makes greater efforts to regulate the use of pastures. The negative side is that the law does not make explicit distinction between pastureland and urban streets or open spaces as totally open access resources, which can be used without reference to sustainability and management. Despite these deficiencies the law provides a reasonable legal environment to build sustainable management of key land resources (pastures, hayfields, wells) if adequately interpreted and implemented. More detailed discussion of the new land law is in sections 4.2 and 5.5 below.

The primary challenge for building sustainable management of land resources is to build capacities at different levels to implement the law adequately: the capacity of central and local government bodies, of professional organizations specialized in land use planning, mapping, certifying land quality, and the capacities of herder communities. There is an urgent need to design a comprehensive capacity building programme.

Ensuring tenure of winter-spring pastures; If herders are to limit their herd sizes to the carrying capacity of winter-spring pastures (as proposed in section V), they must have the assurance that other herders will not invade the pastures and use the grass they are conserving. The pasture possession contracts, allocated by *sums* to herder non-governmental organisations or other formal association, currently being experimented by several organisations including the Centre for Policy Research, can provide the solution to this issue. National land tenure legislation is not particularly clear on this, but seems to provide backing. Article 6.2.1 of the 2002 land law treats pasture as common-use land, with the same status as public land in cities and settlements, in contrast to the old law where only water and saltlick areas in pastures were regarded as common-use land. Although the term ‘common-use land’ is not defined, the fact that it includes public land in cities makes it similar to open access land, and makes management of critical winter-spring pastures impossible.

However, the issue became a major point of debate during parliamentary discussion of the new law. A compromise was adopted that reads ‘based upon local conditions and traditions, the carrying capacity of pastures and the opinions of *bag khurals*, *sum* governors can decide to allocate winter and spring pastures to groups of herders under conditions and contract for the purpose of preventing degradation, and of restoration’ (article 52.2 of the new law).

Summer, autumn, and reserve pastures shall be allocated to *bag* and *khot ail*, and be used in common. Based upon pasture conditions each year and the opinions of local inhabitants, *sum* governors may decide to ban livestock from some winter and spring pastures or make schedules for entering them. *Bag* governors shall implement these decisions (article 52.2).

Thus, it appears that winter and spring pastures can be contracted to herders’ groups. As for summer and autumn pastures, it depends on the interpretation of the term ‘using land commonly’ and whether common-use land strictly rejects any contractual arrangements. It can be argued that it is possible because pastures will be used commonly by those under contract.

Under the new law, *khurals* discuss and approve the land management plans of *aimags* and *sums* submitted by the respective governors (article 20.1.2). The plan incorporates a general schedule of pasture use in winter, spring, summer and autumn, with reserve areas based upon local conditions and traditions and requirements for sustainable use, protection and restoration (52.1). *Aimag khurals* establish inter-*sum otor* reserve pastures and their boundaries. However, inter-*aimag otor* reserve pastures are established by the government (52.9).

Sum governors decide and organize work on the possession and use of land by citizens, economic entities and organizations in accordance with land management plans approved by the *sum khural* of citizens’ representatives (Article 21.4.3). Respective governors also discuss and agree on emergency *otor* migrations to the territories of other *aimags* and *sums* in case of natural disasters (52.8).

Proposed actions by herders and herder groups

1. Organise into associations or NGOs capable under law of holding possession contracts for winter-spring pastures.

Proposed actions by sums

1. Promote a programme of allocation of winter-spring pasture possession contracts for herder groups.

2.1.5 Community organisation and the role of local government

Pastoral risk management is mainly a task for herders. But the experience of the last ten years of economic transition clearly shows that small households on their own lack the resources to undertake such important functions as managing land, preparing supplementary fodder, organising and co-ordinating *otor* migrations in a timely manner, and accessing relevant information. They thus become vulnerable to overwhelming natural risks such as *zud* and drought. It is not surprising that the last three consecutive years of *zud* has led to a sharp increase in awareness among herders about the importance of co-operation.

There is some useful experience of organising co-operation. An 18 month pilot project on herder groups implemented by the Centre for Policy Research and FAO/TCP project work showed that the ability of herders to manage risk can be increased if the functions listed above are organised in a collaborative way. The CPR project piloted community-based models for managing pastures and wells, preparing and delivering supplementary fodder, accessing veterinary services and organising marketing and alternative income-generation activities. As a result, the project communities achieved better results in terms of survival rate of animals during the 2000-2001 winter-spring season: non-project families lost 7 percent of their animals, while group member families lost only 5 percent; project families reared 88 percent of young animals, 8 percent higher than their neighbours.

However, the present model of national action to manage pastoral risk relies heavily on giving new tasks to the lowest levels of the administration, especially *sum* and *bag* governors and technicians, rather than organising herder groups and giving them responsibilities. The potential of herder communities is not yet fully recognised.

Normally *sum* and *bag* governors' involvement in grassland management is quite limited. At best, *bag* governors make herders agree orally on the scheduling of seasonal migrations at a meeting of *bag* members once a year, but the decision is often not implemented by herders and not monitored by the governors. The reason is simple. The *bag* is an administrative unit, not a natural resource management unit, and there are no formal *bag* boundaries. *Bag* membership is based on the location of *bag* members' winter camps, and this provides an informal delineation of the *bag* territory. However, it is uncommon that a *bag* has all four seasonal pastures in its 'own territory'. More usually members of different *bags* inter-migrate to each other's territories. This makes decisions at *bag* level very difficult to enforce and monitor. Furthermore, a *bag* is too big to be an effective natural resource management unit. According to the land law the *bag* governor is the lowest level in the administrative hierarchy, and is therefore the closest person to herders with authority to regulate pasture use. However, because *bag* territories are too big, *bag* governors can not fulfil this function effectively. Building good management of pastoral resources, which is a basic condition of effective risk management, is not possible without active participation from the herders.

These limitations of *bags*, and low participation of herders in *bag* activities, make it necessary to look for alternative forms of herder organisation for the management of natural resources

and pastoral risk. The most promising are area-based herder associations who already cooperate in the use of pasture, water, saltlicks, and other livestock-based activities, including preparation of fodder, collecting livestock products and marketing. Such associations are often based on customary natural resource managing groups such as well or valley communities, and could become a prime focus for pastoral risk management activities.

Work by the Centre for Policy Research on a UNDP project to strengthen customary herder communities has tested new approaches to pasture management based on such associations. The approach was community-based and tried to adopt traditional Mongolian best practice in the new conditions of the transition.

Herder groups, formed with project help, are the basic natural resource management unit. Formal land possession and use contracts between local government and the herder groups clarify and regulate their respective roles. To keep flexibility in household access to resources, and encourage conservative grazing behaviour, the contracts are based on existing informal arrangements and strengthen them rather than ignoring or destroying them.

Contracts are based on the following principles:

- they are based as far as possible on the existing allocation of pastoral resources among communities and families;
- they take account of regional distinctions;
- they confirm the normal patterns of herder migrations, and include specific provision for reciprocal grazing rights with other communities in case of emergencies;
- they confirm possession of 'point resources' such as *khot ail* and family camp sites, and allow the boundaries of camp sites and resolution of conflicts to be ruled by customary arrangements;
- they support the community's interest in possessing pastoral resources on an area-basis. This becomes possible where all users are members of the community, or where a community and non-member families agree on the use of common pastures;
- they combine the formal powers of local government at *aimag*, *sum* and *bag* level with informal, customary arrangements for resolving grazing conflicts between families and communities; informal arrangements always precede interventions by the formal powers;
- they include a provision that makes *bag* and *sum* governors responsible for negotiating *otor* movements during disasters.

Violation of customary grazing rules and anarchic use of pastures can not be stopped overnight. It requires a change in behaviour and in the mindset of both herders and local government officials. Furthermore, sustainable pasture management can not be fully achieved only through pasture management activities such as land use contracts and land use planning. Herders now try to maximize livestock numbers, which is a rational choice given the existing incentive structures. This is the primary challenge to building sustainable grassland management.

Although not tested during the pilot project, the content of grazing land possession contracts can be further elaborated to regulate entry and exit from the community and to prevent overstocking within the group. The contract may also be expanded to include the total carrying capacity, in sheep units, of contracted pastures in different years.

It is planned that grazing disputes will be resolved through negotiations by the community with the disputants, with the involvement of formal powers only in cases where agreement can not be reached in this manner.

The conclusion from the pilot community work is that herder groups can be strengthened on the basis of customary forms of co-operation, and that the strengthened communities more efficiently manage pastoral risks and natural resources. This has important implications for a national pastoral risk management strategy.

The best way forward is to encourage the creation of representative herder groups, registered under the law, capable with training and support of taking on increased management of natural resources and pastoral risk. A programme of pastoral risk management needs to promote the creation of such communities.

This does not mean that there is no role left for *bag* governors and the *bag khural*. They have important responsibilities in monitoring and enforcing the land law, especially herder pasture and hayfield contracts, monitoring winter preparedness of herders and herder groups, using social pressure through *bag* meetings on herders whose winter preparation is inadequate. They should also organize the delivery of other state functions directly or indirectly related to risk management, including information delivery, dealing with contagious animal diseases, quarantine and the delivery of relief assistance. *Bags* will have a key role to play in the annual winter preparedness report and pastoral risk forecast proposed in this report.

2.1.6 Proposals for improved natural resource management in view of risk reduction

Proposed activities by herders

Herders should be helped to explore the implications, advantages and disadvantages of more formal community organisation, including pasture leases, using existing models as examples.

Proposed activities at sum level

1. *Sums* should organise training for *sum* officials and *bag* governors in community mobilisation. Demonstration of best practice by successful officials and governors should be an important part of this training. The training should also include the role of government, the private sector and community-based organisations in local development, particularly what government should and should not provide the division of responsibilities between different levels of government, and leadership skills.
2. *Sums* should build awareness of *sum* and *bag* officials and herder communities of relevant legislation, policies and regulations for natural resource management. They also need basic knowledge and skills on land and risk management.

Proposed activities at national level

1. National policy should support the creation of area-based herder groups as the primary pastoral risk and natural resource management units. These should where possible be based on customary co-operative groups, but receive formal legal status under the law on non-governmental organisations or the co-operative law.

2. Registration of formal community-based organisations should be simplified. The NGO law that NGOs must be registered at the Ministry of Justice and Internal Affairs should be altered to allow NGOs to be registered at *aimag* or *sum* level.
3. The government should enact rules and procedures to implement the 2002 land law, prepare model land use contracts, land use plans, and pastureland mapping, and equip central, *aimag* and *sum* level land officers with the capacity to implement and enforce them.
4. The government should resolve outstanding institutional issues about responsibility for deep wells and for pasture management and use.

2.2 Micro-finance for risk management

Micro-finance can play an important role in pastoral risk reduction if well-adapted products are available to herders. Savings and credit can smooth consumption seasonally and between years. Credit can help herders replace livestock after drought. Insurance can protect herders from such losses in the first place. Credit can allow productive herding enterprises to expand, can diversify household income and can reduce vulnerability to future shocks.

But herders have so far benefited little from micro-finance programmes. This is mainly because of difficulties in targeting micro-finance to herders. The herding economy and herding society are little understood by micro-finance providers, herders are mobile, and do not have conventional collateral, and the pastoral economy is seen as inherently risky. To change this, micro-finance products must be designed to overcome the constraints faced by herders, in ways which are profitable to micro-finance providers. This means finding the right balance between achieving financial sustainability, without which any gains will be short-lived, and targeting benefits to clients at affordable rates.

2.2.1 Savings

Herders' income streams depend on highly seasonal events like milk or live animal sales, and their demand for cash is also highly seasonal. Cash savings would allow herders to smooth these uneven income and consumption streams. It would be wise to develop savings mechanisms for herders before further expanding micro-credit schemes, and in future ensure that savings mobilisation and micro-credit go hand in hand wherever possible.

However there are several reasons why herder cash savings are likely to remain small for the moment. At present there are no savings products designed to meet herders' needs and constraints. Poor herders have little spare cash, and under present conditions, especially low savings interest rates and lack of quick access to savings, are more likely to invest in alternatives, such as consumer goods or increasing their herd. Rich herders may provide a greater potential, but most of them have access to existing urban-based financial institutions.

In the medium term, cash savings could be an important risk management mechanism for herders. Government and private banks and savings-and-loan organisations need to work towards better savings products for herders. Several tasks need to be undertaken.

Micro-finance institutions need to develop new ways of working with clients, possibly involving mobile offices in some cases, and new savings products linked to herders' seasonal cash flows. The management capability of such institutions would in most cases need to be improved.

Organisational structure, and especially the geographic distribution of branches or outlets, is important, since it determines ease of access. For herders, branches at district level may be adequate in some cases. In other cases there may be a case for mobile branches, with a protected vehicle visiting recognised meeting places (for example water points) on a regular schedule.

The savings products on offer would be a key factor in herder acceptance, and need to be designed in close participation with potential herder savers. The critical factor will always be the opportunity cost of savings, or what alternative uses of the money are open to the household.

Herder organisations could play an important role in the development of herder savings accounts, as with other herder micro-finance. NGOs could absorb some of the transaction costs of herder micro-finance, reducing the cost of savings and loans.

2.2.2 Credit

Credit has grown rapidly in rural areas, but little has been targeted to herders. The role of credit in risk management is mainly in the recovery phase, when herders need to re-establish their capital base, especially their herd.

Restocking projects have been implemented by government, NGOs and major donors, although rarely if ever so far by banks and established micro-finance institutions. The latter cite high transaction costs, the high risk of lending to herders, and lack of conventional collateral as the main reasons why they cannot lend to herders. However recent research suggests that restocking can be undertaken through credit at market rates in Mongolia, if several conditions are met:

- careful targeting of beneficiaries, so that competent, experienced herders with enough labour are the priority beneficiaries
- close supervision by the lending agency
- adequate insurance to cover losses from catastrophic events such as *zud* during the loan repayment period.

2.2.3 Insurance

The problem with insurance as a risk management strategy is that the key pastoral risks are covariant: drought, *zud* and epizootic diseases affect all households in a particular area at the same time. Covariant risks are much harder to insure against than individual risks, since most

households in a given area are likely to have large losses. The pool across which insurance is spread will have to be very large, perhaps the national economy as a whole or, through international reinsurance, parts of the international economy.

A general strategy to develop herder insurance should promote private sector initiatives, and avoid subsidies on the grounds that they may displace private insurance arrangements and are unsustainable. However, it is generally accepted that the state has a responsibility to protect people against key uninsurable risks. As a result, some government subsidy is legitimate in designing insurance schemes to cover severe risks, especially when the subsidies are targeted to poor households. In such cases, subsidies should be explicit and time-bound. Subsidising the start-up costs of a livestock insurance scheme would be an example.

Individual livestock insurance against specified perils (for example, animal disease, drought, *zud*) addresses the main problem: death of livestock. It thus directly targets all those who have suffered a loss. Its disadvantage is that there are high transaction costs, and a danger of moral hazard (insured herders may indulge in riskier behaviour) and of adverse selection (if insurance is voluntary, herders in high risk environments will insure more than those in low risk environments).

The alternative to individual livestock insurance is index-based insurance. Index-based insurance works as follows: insurance contracts are written against specific events such as rainfall below a particular threshold or livestock mortality above a specified level, in a particular area. Insurance is sold in standard units (say US\$ 10 or US\$ 100), with a standard contract in the form of a certificate for each unit sold. The premium would be the same in each area, perhaps in each *sum*, and all buyers of certificates would receive the same indemnity per certificate if the insured event occurs.

Index-based insurance schemes can be based either on weather insurance, most probably on rainfall or snow, or on *sum* livestock mortality. In the case of the latter, the average death rate for all animals in the current year would be the basic loss indicator. Herders (or anyone else) could buy standard insurance certificates against higher than average levels of mortality in the district concerned. District mortality rates above a chosen level (for example, the mortality rate occurring on average once every five years or less) would trigger payment of an indemnity to all who had bought standard insurance certificates, regardless of their own personal loss.

Weather-based insurance would operate in the same way, except that a specified weather event, such as rainfall below a certain threshold, would be the trigger for payment of an indemnity. The only requirement for this would be accurate *sum* rainfall data.

The advantage of using mortality rates or weather as the index to trigger indemnity payment is that the data are readily available and simple to use, and that good behaviour is rewarded. All herders in the affected area who have bought insurance certificates receive an indemnity. But herders who have lower mortality rates than their neighbours receive an insurance indemnity based on the average of the district, and are thus rewarded for their skill or hard work. There is little opportunity for adverse selection or moral hazard. Administrative costs are low, since there is a single standard contract to be written, and rainfall and animal mortality data are available with a long historical data set.

Index insurance could fit well with a wider micro-finance strategy institutionalised through herder associations. Such groups might buy index insurance on behalf of the group as a whole, or facilitate individuals within the group who wished to buy. Index insurance, by providing protection against major risks, could be a good companion to credit.

The main threat to the success of weather or mortality-based insurance is the frequency and impact of periodic droughts and other hazards. High levels of covariant risk threaten the viability of insurers who face the possibility of very large pay-outs quite often. This risk would be especially dangerous in the early years of a scheme, while the insurance companies were building up reserves.

Such an insurance programme would be best managed by private sector insurers. However there are several aspects which might inhibit private insurers from setting up such a scheme. First, there are substantial start-up costs. These include: researching the frequency and impact of catastrophic events, educating herders about the value of insurance, establishing a regulatory framework, and underwriting the insurance until a sufficient volume of business has been established for national financial institutions and international reinsurance to come in. Government and donors should underwrite some of these costs.

There is also a role for government and donors in providing cover against major catastrophic risks. Government, with donor support initially, could provide its own index insurance triggered by a threshold value of rainfall or animal mortality that happened only very rarely, but with catastrophic consequences. Insurance firms could buy government options to protect themselves against such risks, which would permit them to develop successful index insurance for events with greater frequency. There is likely to remain a role for government and donors in providing, at least in the first years of a new insurance regime, a stop-loss insurance contract to private insurers. This would cover all losses over a specified level of event which occurs rarely but could bankrupt domestic insurers were it to occur, especially in the early years of a new insurance system while insurers are building up assets.

There is a potentially important role in insurance for herders' associations or non-governmental organisations. NGOs could pioneer pilot schemes by taking out index insurance on behalf of their members, providing a cautious introduction to insurance for households which may be sceptical at first. NGOs have detailed information about the needs and situation of herders, and could ensure that insurers are better informed. There may be economies of scale in offering insurance through NGOs, which would reduce the cost.

The development of new forms of insurance may initially face herder reluctance. However experience suggests that insurance, offered in a format adapted to the risks and constraints faced by herders, might be successful.

The World Bank sustainable rural livelihood project will experiment with index-insurance for herders. This experience will allow lessons to be learned for the design of a national livestock insurance programme for pastoral risk management.

2.2.4 Institutional framework for herder micro-finance

Many initiatives in micro-finance start well as a project approach, but are unable to scale-up to sustainable operation without intensive project management. Experience suggests that

micro-finance initiatives should in the longer-term be securely anchored in an established financial institution, whether a bank or micro-finance institution. There is no reason why a local initiative or project should not run a pilot programme, but scaling up to a national institution needs to be planned from the start. This could take the form of a business plan covering start-up, growth and scaling up of the initiative.

The high transaction costs of dealing with herders suggests that the involvement herders' associations may be helpful. Herders' groups can provide detailed local knowledge of individual household situations, about local potentials and constraints on productive activities, and about the viability of particular courses of action. The involvement of herders' groups or savings-and-loans organisations could substantially reduce the transaction costs for institutions wishing to start a micro-finance programme among herders.

2.2.5 Proposals for improved micro finance products for pastoral risk reduction

Proposed activities at national level

1. The Ministry of Food and Agriculture should explore in more detail the potential for index insurance using weather or mortality indices. It should associate the insurance companies with this work.
2. Banks and micro-finance organisations should explore the conditions under which herder groups can operate as financial intermediaries for savings and loans to herders.

III. RISK MITIGATION BY LOCAL GOVERNMENT AND COMMERCIAL UNITS

3.1 Fodder and hay production

3.3.1 Commercial Fodder and Hay production

Considerable amounts of hay were made during the collective period. By 1985 some 1,275,600 tonnes of hay were made annually, of which 25 percent by state farms, 49 percent by *negdels*, 18 percent by other state institutions and 8 percent privately by herders. Most of this hay was made by specialised brigades. Natural pasture was the main source, with some oat hay in wheat growing areas. Most of Mongolia is too dry to produce an adequate bulk of vegetation for haymaking except in the north-centre, where production was, and is, concentrated. Even in favourable areas the crop is light and production costs per unit of weight high. Hay is a bulky feed of low nutritive value, thus costly to transport. It can only be stored in good condition for one season. After economic liberalisation, the brigades were disbanded and their equipment passed to companies and individuals. Production fell rapidly, and by 2000 was about 689,000 tonnes, or 54 percent of the 1985 level. Commercial hay is still made mechanically. It is sold by weight without reference to quality and, apart from some legume hay from irrigated land in western Mongolia, quality is poor.

Hay-making companies are usually successors to state farm or *negdel* units, and much of the equipment dates from that time. But even with better equipment, it will be difficult to make a success of commercial hay production. The haymaking season and crop seasons are short,

tractors and equipment are idle for most of the year, and investment costs are high. The market for hay is uncertain. In the past few years most hay has found a ready market in relief projects. In more normal years, if the winter is not severe, herders are unlikely to buy much hay and producers may be left with large stocks.

Commercial haymaking is extractive; the natural herbage is cut and taken away, so considerable amounts of nutrients are removed from the soil which becomes progressively impoverished. While natural pasture would respond to fertilisers it is unlikely that they would be profitable under such low and unreliable rainfall.

Hay in Mongolia is not yet marketed on a quality basis. It is desirable, especially where purchases for emergency funds are concerned, that norms be established. It is also very desirable that weighing facilities be available for such purchases.

Although the area under crops is small, crop production is being rehabilitated. Wheat is the main crop, and this should increase the availability of straw and, perhaps, bran. In wheat growing areas, harvesting and storage of straw as winter feed should be encouraged and popularised through extension work with producers; it is not a high quality feed but is probably about as good as much of the natural hay. To be of use as feed, straw should be windrowed, turned and then baled as soon as dry enough; long weathering on the field will decrease its value.

Cultivation of oats for hay could readily be expanded, where wheat-growing machinery is available, if it were likely to be profitable. Some work on varieties and seed production might be required. Oat hay would probably find a specialist market for racehorses and, perhaps, town dairies.

Concentrate feeds have been produced in the past, often on the basis of ground straw or hay with some bran and legume hay with salt and perhaps minerals. Most of the manufacturing units are now working at a reduced level or are out of production. There are hardly any sources of material suitable for producing mixed feed of suitable quality for emergency reserves. Grinding hay and straw is expensive and does not greatly improve either intake or digestibility. The potential for expanding concentrate production is not obvious unless it becomes economically viable to import the basic materials. Bran is the main agro-industrial by-product and should be made full use of either directly as a feed, or as a component of mixed rations.

3.1.2 Smallholder irrigated fodder production

Irrigated cropping is only traditional on a small, but locally important, scale in the Great Lakes Basin; very high-quality fodder is, however, produced from there. There is, nationally, little irrigable land. Some small fodder irrigation areas were developed in the Gobi and elsewhere in the collective period but most have either been abandoned or switched to more immediately profitable crops such as vegetables and melons. The potential for smallholder irrigation is thus limited. Suitable sites are rare and investment in infrastructure is disproportionately costly in relation to the short cropping season. The very cold winters also require particularly high construction standards. There are some sites where irrigation is traditional and the terrain suits simple, gravity-fed systems.

Smallholder irrigation schemes must be planned and run in a logical, orderly and rational fashion. This involves proper management and user discipline. The change from collective to private management has led to degradation of infrastructure and lack of maintenance as well as uncontrolled water use. Agricultural and water management are primitive. In countries where irrigated farming is important under free market conditions, there are usually strong community structures and traditional rules governing water allocation and timing, maintenance of irrigation infrastructure and settlement of disputes. Such structures are not yet in place in Mongolia although there is some spontaneous development of small groups of irrigators in Tarialan *sum*, Uvs *aimag*. Although small, these irrigation sites provide very high yields of legume hay (lucerne – *Medicago* spp.) of excellent quality, suitable for use in emergency reserves and in feed manufacture. The quality of Uvs hay was recognised and it was the base stock for a major feed mill which used to supply the western *aimags*. Suitable legume fodders are known and well tested in this area and their seed can be produced locally.

Leguminous fodder is usually grown in rotation with cereals; this is an excellent practice since as well as providing a break in the pest and disease cycle of the fodder, the cereals benefit from the nitrogen accumulated in the soil under the legume. Fodder oats could also be grown if there were a demand, but the quality would not be so high nor would oats fit as well in a rotation.

Suitable sites should be located and listed, then surveyed for possible improvement or rehabilitation, keeping economic sustainability in mind. Policies should be developed for the management of such areas concentrating on users' participation, and the development of communal management. While the main infrastructure development would have to be financed by local or central government, all maintenance, management and running costs would have to be met by users. Careful costing and estimates of likely productivity would have to be made to assure that the outputs could cover a water fee and leave an adequate return for the irrigators.

Both water management and agronomic standards are low and equipment inadequate. Training of technical staff to further train farmers is necessary.

3.1.3 Proposals for improved fodder and hay production

Proposed activities at sum level

1. Sums should make an inventory of local commercial hay production, including how and where the hay is marketed, and the quantity available for purchase by the *sum* emergency fodder fund.
2. *Sums* should survey existing irrigated areas, and any other land potentially irrigable by gravity for smallholder fodder production. Before any development is contemplated an economic and technical feasibility study is essential since irrigators will have to pay for maintenance, depreciation, management and running costs as well as gain an adequate return on their inputs and labour.
3. Water and land use plans should be drawn up to assure the most sustainable use of a scarce resource. Existing customary rights should be taken into account when changing land or water use.

4. *Sum* staff and irrigators should be trained in proper maintenance of field irrigation infrastructure, field levelling and tillage, on-farm water management, and irrigated crop production. Suitable land-working equipment will be needed, since the few present ploughs are unsuitable.
5. *Sum* authorities must ensure the proper organisation of the smallholder irrigating community so that they can take over the routine maintenance and management of the scheme. Technical support will be needed, especially in the initial years.
6. Where new smallholder irrigating groups are former herders, *sums* should develop an appropriate form of community organisation to facilitate water sharing, maintenance of infrastructure (such as canal cleaning) and for equitable recuperation of water fees.
7. *Sums* should ensure that all irrigated land, headworks and all canals and infrastructure are protected from trespass and damage. In a herding situation it may be necessary to install water points at a distance from canals to allow herds access to water without damaging the irrigation works.

Proposed activities at aimag level

1. Based on the *sum* inventories, *aimags* should make an inventory of commercial hay production and quality. *Aimag* needs in commercial hay should be estimated, as a part of the over-winter carrying capacity estimates described elsewhere in this report, and related to commercial availability.
2. *Aimags* should set norms for the quality of hay to be purchased for *sum* fodder funds.
3. Wherever possible weigh bridges should be installed and used to weigh loaded trucks; until this can be achieved it will be necessary to check baled hay by taking several bales per load at random and checking their weight on a balance. The weight of long hay can be estimated, but only roughly, from volume tables.
4. *Aimags* should make a census of commercial haymaking equipment, and its age and condition, how long present equipment is likely to last and the replacement cost.
5. *Aimag* authorities should collect information on the commonly required spare parts for mowers, balers and other commercial haymaking equipment, seek information about availability from national suppliers, and facilitate access to spares by commercial producers.
6. *Aimags* with potentially, formerly or currently irrigated land for smallholder production should develop plans for its development and rehabilitation based on *sum* surveys. Where former irrigation areas exist, *aimags* should assist *sums* with feasibility surveys. Running costs must be met by users if irrigation schemes are to be sustainable; water fees will have to be sufficiently high to pay for depreciation, maintenance, management and running costs.

Proposed activities at national level

1. A national strategy should be developed to ensure that enough equipment is in working order to satisfy national needs in commercial hay.

2. The Ministry of Food and Agriculture should set national quality norms for hay traded by emergency reserves and advise on weighing methods.
3. The national potential for developing smallholder irrigation for fodder in rotation with subsistence crops should be assessed by the Minister of Food and Agriculture, and a national plan developed.

3.2 Emergency grazing and fodder supplies

3.2.1 *Inter-sum and inter-aimag otor and emergency grazing reserves*

TCP project research shows that there are large tracts of under-used or normally unused pasture which could be designated as emergency *otor* or grazing reserves. Many have been used in the past but their infrastructure, including water points and shelters, requires rehabilitation. Since such areas are usually isolated, they also need temporary supply points for household necessities during their season of use.

Rules for the development, use and maintenance of such reserves should be reviewed or developed. Rules should be clear about when reserves should be used, by what classes and numbers of livestock and by which households. They should specify which parts of the reserve would be used by which households or groups, and what class of livestock; dates for entry and departure from the reserve; herders' responsibilities for maintenance of infrastructure and respect of any environment protection restrictions. Where herders are expected to pay fees these should be clearly indicated in advance. Initial expenditure on infrastructure repair and development should be funded by local or central government.

Project research identified potential emergency reserves. Uvs *aimag* has several unused and underused pastures. One is the Nisekhiin Shugui continuation of Borigdel sands, in the north-east of Baruun Turuu *sum*. This covers 190,000 hectares of sand dunes and valleys between hills. In Zavkhan *aimag* (Sart Khairkhan), Baga-Khairkhan is an example, which was previously used as pasture. This area borders Durvuljin and Erdenehairhan *sums*, and covers 70,000 hectares. This pasture can feed 48,000 sheep for 30 days in winter. Historically in some years 100,000 head of stock wintered there, and herders from Durvuljin *sum* came in summer and autumn.

In Gobi-Altai *aimag*, the Argalant zone has a huge area of unused pasture. Previously families from *sums* of Zavkhan, Bayankhongor and Gobi-Altai *aimags* moved there with 20,000-30,000 animals during disasters. If Shaliin Khooloi is included, the total area covers 10,000 square km. There is little water. At present only 1,200 square km of this area is used and three wells out of 12 are working. During heavy snow in 1999, Shaliin Khooloi fed 8,000 animals from three *aimags*.

3.2.2 *Sum and aimag emergency fodder funds*

Government decree no. 48 on zud management takes account of a wide range of ecological conditions when deciding norms for the minimum quantities of hay which herders are required to make. For forest steppe the quantity is 30 kg/sheep unit, for steppe 10 kg and for Gobi 3 kg. This is only a very rough guide: haymaking capacity depends on small microclimates and special areas within a zone, and many *sums* will not be able to attain the

levels expected for their zone. The possibility of reaching the targets will be lower in drought years. For practical application of hay production norms, therefore, it will be necessary to determine the actual potential, sum by sum, and revise this periodically, sometimes annually, in the light of the weather and herbage growth. Probably many areas have little or no potential for developing hay reserves, and alternative emergency sources of feed will have to be sought. Basing reserves on grain and concentrates should be researched in such cases. Hay is a bulky fodder of relatively low feeding value; it is important as part of routine, locally produced, winter feeding but, as recent relief operations have highlighted, it is expensive to transport and store and is neither an efficient nor an effective feed to transport over large distances. In addition to hay and concentrates, adequate supplies of minerals, especially salt, must be provided. In some areas herders will be able to collect natural salt and should be encouraged to do so.

Emergency fodder funds will have to deal with the impact of drought. Poor rainfall in summer, whether zud is foreseen or not, will mean low availability of hay. In such cases the local administration may have to consider other feed sources as reserves. The economics of purchase of more concentrated feeds as reserves when hay is likely to be scarce needs to be studied and potential sources identified. The use of more concentrated feeds would require training of staff and herders and, if necessary, feeding studies.

While fodder funds and reserves are undoubtedly important, these norms only suffice for a few days feed per sheep unit. However, building up greater quantities would be expensive. The strategy should focus on getting stock sufficiently fat at the end of the grazing season. Emergency stocks must be reserved for extreme conditions.

The likely needs in emergency stocks will be estimated on the basis of the over-wintering carrying capacity study described in chapter V of this report. Each sum should establish its own emergency fund and aimags should hold reserve stocks to be allocated according to emergency situations. In areas where haymaking is feasible, sum stocks, and part of aimag stocks, will be in the form of hay, which in sums will be partly contributed by herders. Elsewhere calculations will be necessary to determine whether hay or concentrates provide the best value for money, taking feeding value, transport and storage costs into account: in areas distant from hay lands it is probable that bran and other feeds of relatively low bulk and high nutritive value (compared to natural hay) may be more economic. As a rule of thumb, at aimag level, emergency fodder funds should be made up of grain, cereal by products (bran) and concentrates. Concentrates require far less storage space than hay, are simpler, cheaper and easier to store, and have a relatively long storage life in Mongolia's cold, dry climate. They are suitable for emergency feeding of weak and young stock. They also have a high unit feed value, and have lower transport cost per feed unit than hay. Quality control is less of a problem than for hay, weighing is simpler, and turn-over of stock not required by spring would be far easier. Emergency fodder funds at sum level should be high quality hay (lucerne in western Mongolia) and bran if locally produced.

Aimag and sum emergency fodder stores need to be filled by mid-September each year. Emergency stores need to have adequate handling and weighing facilities. Proper book-keeping at aimag and sum emergency fodder stores will ensure that detailed records are available of quantities in store for incorporation into sum and aimag winter preparation reports and the September risk forecast.

Clean, weatherproof stores, easy to keep free of pests and rodents, must be available for all emergency funds, preferably with easy access for and loading and unloading of vehicles. Weighing and handling facilities must be available. Standard management and accounting practices must be set up for each fund, followed and audited regularly. The Agriculture Extension Centre has drawn up guidelines on management as well as general emergency fund matters.

The fund's stores should be procured as soon as possible after the likely needs have been estimated; where hay has to be bought it is usually much cheaper ex field than a few months later. Herders should be asked to contribute in kind as soon as they have completed their harvest.

The siting of stocks should be decided before winter weather makes transport difficult; in some cases sums may establish strategic sub-depots near winter pastures where they are likely to be needed. Aimags may establish stores in aimag emergency grazing reserves – such decisions will be made locally according to circumstances.

Distribution of emergency feed will have to be decided, often very rapidly, on the occurrence of obvious need or severe weather events as indicated by the pastoral risk forecasting system. Emergency feed is not a substitute for proper preparation of livestock through good grazing management and autumn otor. Preference in allocation of emergency feed should be given to households which have made good winter preparation, as outlined elsewhere in this report.

3.2.3 Proposals for improved emergency grazing reserves and fodder supplies

Proposed activities at sum level

1. Inter-sum reserves should be mapped by the sum working group as part of the mapping and land use survey described in chapter 5 of this report, their infrastructure checked and plans made for their use in emergencies.
2. Sums should decide priorities (stock classes and households) and rules for inter-sum emergency grazing reserves use in the light of the over-winter carrying capacity study.
3. Sums should implement the government zud decree by creating a sum level emergency fodder fund. Where possible this should be composed of high quality hay (e.g. lucerne), bran or concentrates. In sums where haymaking by herders is feasible, part of the sum fund may be in the form of hay supplied by herders.
4. Sums should ensure adequate storage, loading and unloading, handling and weighing facilities at the emergency fodder fund. Staff should be trained before the season and standard management and accounting practices followed.
5. Any fodder stocks remaining at the end of winter should be estimated in late spring or early summer and their proper storage assured; these should be checked again in late summer and any spoilt material disposed of before calculating, and receiving, the next year's stores.

Proposed activities at aimag level

1. *Aimags* must decide and publish rules for inter-*aimag* reserve use, in agreement with the other *aimags* concerned, based on guidelines prepared by the Ministry of Food and Agriculture.
2. Forage in the reserves should be estimated in late August, and infrastructure and water supplies checked at the same time. *Aimag* emergency stores should be filled by mid-September to allow estimates of their capacity to be included in the *aimag* winter preparedness report and risk forecast due by 1 October.
3. Where possible, *aimag* emergency fodder funds should be in the form of high quality feeds, including bran and concentrates.
4. *Aimags* should establish management and accounting rules for fodder funds, following national guidelines.
5. Quality of commodities in *aimag* emergency stocks should be estimated, as well as quantity.
6. Where possible, *aimags* should install weigh bridges which can be used for measuring reserve stocks.
7. *Aimags* should train *aimag* and *sum* staff in management and accounting for emergency fodder funds. *Aimags* should organise annual auditing of *aimag* and *sum* funds.

Proposed activities at national level

1. The Ministry of Food and Agriculture should provide guidelines for the establishment, management, accounting and auditing of emergency fodder funds. It should provide technical advice, as required, on matters including best storage practice and feeding techniques for emergency situations. It should also assist *aimags*, if necessary, in identifying sources of emergency feed, especially concentrate feeds and cereals.
2. The Ministry of Food and Agriculture should prepare guidelines on the management of inter-*aimag* emergency reserves to help *aimags* prepare the rules, and advise how the development, maintenance and operation of reserves can be funded in a sustainable way.

3.3 Veterinary measures

Veterinary measures are a key risk management activity at all levels. Healthy and well-fed animals usually overcome winter and spring hardship, even a *zud*, without major difficulties.

Under the command economy, *negdel* and state farm veterinarians were responsible for veterinary health. The state was also responsible for disease control among herders' private animals. Most contagious and parasitic diseases were controlled or prevented by vaccination and other preventive campaigns carried out by state veterinary staff at *bag*, *sum* and *aimag* level.

Since privatization of the animals, responsibility for disease control has been shifted to livestock owners and herders. Both public and private veterinary services exist. All *sum* based veterinary units were fully privatized in 1999. At present, private veterinary units carry out all veterinary interventions for herders on a contract basis. The state still provides the most

important vaccines free of charge to herders, based on orders from *sums* and *aimags* through private *sum* veterinary units. Fees for services have been also introduced.

However there are many constraints to the delivery of veterinary services to herders. These include low vaccination coverage because herders with a small herd cannot afford to pay service charges. Herders lack cash to buy expensive drugs for the prevention and treatment of parasitic diseases. There is insufficient supply of vaccines and pharmaceuticals, especially for ecto- and endo-parasite control. It is reported that only one-third of the livestock in Mongolia receive veterinary services. Private veterinary units lack financial resources to deliver an efficient service, and herders lack the cash to pay them.

Herders and herder groups should undertake appropriate veterinary measures as an important part of winter preparation. Herders should clean and disinfect winter shelters and camp sites to control parasites with the assistance of private veterinarians. Herders and herder groups should be responsible for the vaccination of all livestock against major diseases. Other important veterinary measures before the winter are spraying, de-worming and dipping of animals. Every herder and herder group should have a small stock of drugs for emergency care of livestock. *Bag* and *sum* livestock officers should monitor coverage of vaccination, de-worming and dipping of animals during winter preparation, and report the results in the winter preparation report. Where they exist, herder groups should take responsibility for major veterinary measures including vaccination and other preventive activities. Herder groups could make a contract for service on behalf of their members with private veterinarians to ensure full vaccination and other disease prevention. Herder groups can establish drug revolving funds in cash or kind for preventative measures, following the model piloted by the Centre for Policy Research.

3.3.1 Proposals for improved veterinary measures

Proposed activities at sum level

1. *Sums* and *bags* should make tripartite agreements with herders and veterinarians to ensure all necessary veterinary measures for winter preparations for herders or herder groups are carried out on time with satisfactory quality.
2. *Sums* should prepare an emergency veterinary contingency plan in case of serious disease outbreaks.
3. *Sums* should develop a strategy to assist poor herders to vaccinate all their animals. One option is that the *sum* could pay the service fees out of its budget for poor herders.

Proposed activities at aimag level

1. *Aimag* public veterinary service staff should provide technical guidelines for *sum* private veterinary units to deliver effective veterinary care and ensure they hold adequate stocks of vaccines and drugs. *Aimags* have the responsibility to monitor *sum* supervision of veterinary aspects of winter preparation, co-ordinate such activities at the level of the *aimag*, and report the results to the Ministry of Food and Agriculture.

Proposed activities at national level

1. The Ministry should develop emergency plans to prevent outbreaks of infectious diseases and create an emergency drug and vaccine fund. Government should ensure private veterinarians have access to loans to create drug revolving funds.

IV. RISK MITIGATION BY HERDER'S HOUSEHOLDS

4.1 Year round winter preparation

Year round winter preparation by herders is the key to effective pastoral risk reduction. Herders must prepare their animals by careful year round husbandry, and especially by late summer fattening on natural pasture, for the stress of winter, whether there is *zud* or not. Herder households need to store hay and winter feed for the animals, ensure they are healthy, and prepare their own winter camps.

4.1.1 Herder haymaking and storage

Herder haymaking is already common in some parts of Mongolia, especially in the mountain steppe and a few irrigated zones. The main criterion is that there should be enough vegetation to make hay in places suitable for herders. Planning of other haymaking, especially outwith traditional areas, must take into account the availability of suitable land. Botanical composition is not the only criterion for defining hay land; suitable topography, access, distance from where the hay is needed, possibility of protection from livestock, and reliability of rainfall at the site are among other factors to be considered. Because of high transport costs, hay is only really useful if it can be made and stored close to where it will be required in winter and spring; most herder hay will be loose, so loading and unloading must be avoided to minimise hay losses and labour.

Three methods are used by herders:

- ***Manual haymaking.*** This is laborious but the equipment is cheap and readily available; it can be used on uneven ground, uneven vegetation, steep slopes, swamps and other sites where machinery can not be used. Mowing is by scythe, turning and collection by rake, and loading and stacking by fork. Carts are essential for transport unless lorries can be hired. This is mainly a family activity.
- ***Horse drawn equipment.*** This was successfully used for many years during the collective period. More recently, some herders have adopted horse-drawn equipment, especially in the mountain steppe. It is suitable for small to medium areas but does require some land preparation, removal of big stones and stumps, and perhaps a little levelling. Mowing is by horse mower, windrowing may be by hand rake or trip rake. Loading and stacking will be by fork. Carts are essential for transport unless lorries can be hired. Most of the equipment used is old, having come from the *negdels*. There have been problems of procurement of mowers in recent times. Horse-drawn haymaking is suitable for large families, herder groups and in some cases, contractors.

- ***Partial mechanisation.*** Some herders have tractors and mowers, usually old. They may make their own hay, mow on contract, or both. Later operations may be by hand or partially mechanised; transport is needed. Whether this work is sufficiently profitable to allow renewal of the equipment is not known; this would have to be investigated before groups were encouraged to take it up.

Hay is not just a reserve feed for emergencies; it is an essential part of yearly routine stock management for supplementing weak stock, heavily pregnant dams, milking dams, and work horses. Where suitable hay land is available and sited accessibly to herders for both harvest and use, herders should be encouraged to make and store more hay: training, availability of equipment, title to hay land and protection from trespass will all play a part in popularising haymaking at household or group level.

Herder haymaking should be encouraged where, and only where, conditions of vegetation and access are suitable. There is little point in exhorting herders to make hay where conditions are poor. This still leaves plenty of opportunity for increasing household hay production. Some important issues in increasing hay production are:

Herders need equipment for haymaking; scythe blades and whetstones are generally available in *sums* with hay land. Most horse-drawn mowers are old but seem to last well; it is, however, often difficult to find even common spare parts locally (ledger plates, triangular knife segments, rivets). In *sums* where horse-drawn equipment is common, spares must be made available locally or at *aimag* level, preferably through traders. It has proved difficult to find mowers; if sources of new mowers can be identified then horse-powered haymaking would be a suitable activity to encourage through group activity. Much herder hay is mown on contract by tractor-owning herders or companies; this should be encouraged and their needs for spares taken into account.

Much herder haymaking is rough and ready; it could be improved at all levels through training, without need for increased external inputs. Even manual haymaking could be greatly improved by training in maintenance and use of scythes, especially for younger herders who seem to lack the skills of their elders. Training could be divided into two sections. Pre-haymaking training would deal with choice and preparation of land, yield increase techniques, protection from unauthorised grazing, maintenance of equipment, and ensuring that mowers and other implements are in working order before the season. Training during haymaking would include when to mow (growth stage of herbage), manual, animal powered and tractor powered mowing, turning and swathe formation, collecting, transport and storage (especially haystack building). Training in maintenance and repair of machinery is also desirable and an experienced mechanic or agricultural engineer would be needed for this.

Tenure security for hay fields; Hay land must be protected from unauthorised grazing throughout the growing and haymaking season. Herder groups and some large families may be able to afford to station a sentinel household all year on traditional hay lands in order to keep trespassers away, but this solution is not available to most herders. Support from the *sum* authorities will be needed. Under the 2002 land law, hayfields are allocated annually. *Sum* governors design and implement land management activities on hayfields in co-operation with professional organizations (article 53.1). They allocate hayfields each year to citizens, economic entities and organizations based upon the proposals by the *bag khurals* (53.2). This involves a potential annual change of users that does not give an incentive to users to make sustainable use of these resources and to invest in them, for example by clearing stones and

levelling the land. Instead it would be preferable for hayfields to be used or possessed under a contract that ensures both sustainable use and more or less equal access to the benefits of hayfields. This requirement is reflected in the article 53.5, which says 'upon decision by the *sum khural* of citizens' representatives, the *sum* governor may allocate hayfields that have been irrigated, protected, fertilized and planted [with windbreaks] to citizens, economic entities and organizations for possession under contract to those who invested in these improvements'. The Ministry of Food and Agriculture should review the land law, and rephrase it in a way that encourages investment in, and long term conservation of, the hay lands.

Manuring; Trials and demonstrations, supported by FAO, on improving haymaking in the mountain-steppe were undertaken by the High Mountain Research Station in Arkhangai in the late 1990s. Almost all haymaking is now from natural stands and yields are low: 600 – 700 kg/ha at 18 percent moisture. Treatments included spreading dung and ice irrigation. Ice irrigation involves spreading spring water, small streams or snow melt on selected areas of natural pasture to build up as thick a coat of ice as is possible; when this thaws, soil moisture is increased and spring growth encouraged. Responses were good in 1996 but lower in later years because of drought; responses in 1997 were 253 percent with ice irrigation and 407 percent with ice irrigation and dung. The demonstrations also involved successful use of horse drawn equipment. This technology could be widely applicable, and would help reverse the exhaustion of productivity of hayfields used every year (which is given as one reason for limiting leases of hayfields to one year at a time). Since manuring and ice field irrigation have a cumulative impact over several years and demand considerable work, they would only be practical if herders or groups had long leases on the land they were to improve.

Hay storage; Herder hay storage will mostly be in small stacks since hay is very bulky. Stacking must be done once the hay is properly dry and stacks should be constructed so as to shed rain and melted snow. They may be thatched with long grass or reeds and must be securely tied down as protection against wind. Stacked hay must be out of the reach of animals, either in fenced yards or on the roofs of winter shelters.

4.1.2 Animal fattening: Otor movements

Achieving better body condition of animals, and thus better winter preparation, also depends how *otor* migrations are done. *Otor* is classified into several types, depending on the duration, the distance animals move, and the involvement of household members:

- **Spring otor;** The purpose of spring otor is for the animals to graze young grass in places where there is early new growth. This helps animals recover quickly after the exhaustion of winter-spring. The specific patterns of this otor are:
 - herders move mostly to warm low areas (protected from direct wind day and night) near their spring camps;
 - all the family moves with their animals because all the animals are kept together.
- **Summer long-distance otor** For summer long distance otor, herds are moved to areas distant from normal summer and winter-spring areas, especially to high mountain pastures which are not suited for winter-spring grazing. In the sample *sums*, Turgen and Tarialan herders go for summer *otor* to mountain tops and steep valleys along the

major rivers. Lun herders tend to drive their animals to areas of more open and Gobi type, whereas herders of Erdene *sum* use suitable areas within their *bag* and *sum* territories due to insufficient grazing land. For summer *otor*, one or two herders tend to go with a small tent, taking mainly small stock, sometimes also camels and horses. Summer *otor* in most areas is mainly for fattening small stock. Households do not join together for summer *otor*. Summer *otor* is also an option for herders to graze areas with better feed in *gan* (drought) time.

- **Winter *otor***; Winter *otor* has several tasks: ensuring better survival, resting winter pastures, and finding better pasture in emergencies. In central Mongolia, including Lun and Erdene sums, herders practice regular winter *otor* to take large animals, mostly horses, to remote areas with good standing grass. This is to preserve better grazing on winter pastures for small stock (which herders call ‘short-legged stock’ meaning they are not able to walk long distances in winter).

An important purpose of winter *otor* is to escape *zud* and areas with poor winter pasture. In emergencies herders sequence their activities in order to make best use of labour, transport and other resources: first horses and male, non-pregnant and young cattle are sent off, followed by small stock if necessary. There is not much difference between the target sums in how they make emergency or winter *otor*. It depends on needs: herders from a group of families take horses in a pack and herd them together. In some cases, people take large stock to the mountains, where the grass is better, and do not herd them but visit them every second or third day. This was found in Turgen and Tarialan during the 1999-2001 *zuds*, and herders found that it was a good solution when not enough labour was available. In areas like Lun, where there are no closed mountain valleys, animals have to be attended by a herder at all times.

The various forms of *otor* are an essential part of overall grazing management. In every part of Mongolia, there are areas available for *otor* if herders wish to use them. The experience of recent years is that large-scale weather disasters in consecutive years are made much worse by the deterioration in grazing management almost everywhere:

- A shortage of grazing in their own territory forces herders to seek pasture in any part of the surrounding *bags*, *sums* and *aimags*. This can lead to anarchy. However, herders can be organised to make co-ordinated use of such areas.
- Legislation and rules are not observed or are simplified by all actors, including the local administration. *Aimag* and *sum* governors talk to each other and reach agreement on entry of stranger herds, including the permitted number of households and animals. This information is sent from *aimag* to *sums*, and *sums* pass it on to *bags*. However, in most cases herders are not told about the agreement. The idea of making agreements between officials should be to assist herders, who are the ones making difficult movements. No good organisation is provided for herders on *otor* and emergency movements, which leads to trespass and disputes. In the near future, certificates to winter-spring pastures may be issued throughout the country, and any entry to other pastures will be treated as a violation of grazing rights. Therefore there is a need to recognise *otor* as integral component of grazing management.
- Out-of-season grazing of autumn and winter pastures complicates overall grazing management and *otor* movements. Continued year round grazing not only destroys the area grazed, but also threatens other nearby areas. If one household gets away with it, others

will be tempted to follow, and the whole community faces a breakdown of traditional grazing arrangements and regulations enacted by the local administration.

Otor is complementary to the seasonal rotations of general grazing management. Different from both are unsanctioned movements by herds and households searching for winter grazing wherever they can find it without negotiation. This is a violation of laws and informal rules.

4.1.3 Proposals for improved year round winter preparation

Proposed activities by herders and herder groups

1. Herders should participate in mapping hay land. They should make increasing quantities of hay where conditions are right. They should experiment where appropriate with ice field irrigation and manuring of natural pastures.
2. Herders and herder groups should re-establish group-based *otor* schemes and rules, sanctioned by the *sum* and *aimag* administration. No individual households should be allowed to go on winter *otor* in areas under the control of other administrations without the agreement of the hosts. The priority for *otor* should be to use locally available resources (within the *bag*, *sum* or *aimag*) before moving to neighbouring territories.

Proposed activities at sum level

1. Sums should prepare up-to-date maps of hay land taking into account not only botanical criteria but also access, distance from summer camps, possibility of protection from trespass and other factors affecting usefulness.
2. Commercial hay areas within the sum should also be mapped. These maps should be prepared as a part of the mapping of pasture and land-use done for estimating over-winter carrying capacity.
3. Sum technicians require upgrading of haymaking skills through practical training on herders' fields with participation of the herders.
4. *Sums* should issue hay land certificates for several years wherever justification exists under the new land law.
5. Herder groups and *bags* should establish grazing areas where herders from that group are entitled to go on *otor*. Such areas would be protected and managed by the *sum* authorities as regular and emergency *otor* reserves.
6. *Otor* should be a major criterion for the *sum* evaluation of winter preparedness at herder group and *bag* level as a key component of grazing management and risk preparedness.
7. Clear *otor* arrangements for herder groups and *bags* should be given legal force through pasture possession contracts and *sum* land use planning.

Proposed activities at national level

1. The Ministry of Agriculture should develop a strategy for the gradual replacement of herders' haymaking equipment and assuring a supply of spare parts to outlying areas, principally through private traders. The Ministry should also assist in identifying sources of quality animal-drawn haymaking equipment suitable for herder use.

2. The Ministry of Food and Agriculture should review article 53.2 of the land law, relating to hay land tenure, in order to explore the possibility of rephrasing it in a way that encourages investment in, and long term conservation of, hay land.

V. PREPAREDNESS FOR EMERGENCY RESPONSE

5.1. Winter camp preparation

FAO project research in the main winter grazing areas in each of the four target *sums* showed that little winter preparation had taken place, and this is likely to be a national problem. Shelters, enclosures and corrals were not large enough to support current herds and did not provide adequate protection for the animals. Little hay was stored and no hay storage facilities were available. Winter fuel was not stocked.

Some shelters were ruined; some campsites lacked shelters. Many winter areas, especially campsites, had no water source. In some cases, herders had destroyed natural water sources by digging down to open them up. Wells were not operational and there were no attendants.

This situation results in part from economic liberalisation, where shared pastoral infrastructure was privatised in a way that made several herders part-owners of the same objects. With the separation of herding households, shelters are partly dismantled to provide building materials for new buildings which are not built, and well equipment is shared out, leaving few wells functional. Some sources suggest that over half of winter grazing areas lack accessible water and adequate shelters.

Warm and well maintained winter shelters, corrals and other facilities for keeping adult and new born animals are decisive in helping herders cope with natural disasters like *zud*, freezing rain, wind and predators. Experienced herders say that warm shelters can be responsible for half the survival of their herds.

5.1.1 Proposed activities for improved winter camp preparation

Proposed activities by herders and herder groups

1. Repair existing and build winter new shelters. Shelters of modern construction require regular maintenance. Shelter repair should be scheduled in August;
2. Gather enough household fuel in August each year;
3. Repair wells and other water sources;
4. Prepare enough special feed and other products needed to nurture new-born stock, weak animals, milking cows and riding horses;
5. Remove dung accumulated inside shelters and corrals, and stockpile enough dried dung for use as bedding material;
6. Clear weeds and other foreign materials from the winter camp area;
7. Disinfect shelters and bedding material to prevent the spread of parasites and worms.

Proposed activities at bag and sum level

Bag and *sum* governors should oversee winter preparation by herders and provide technical and organisational assistance. They should:

1. Revise existing procedures and rules for assessment of winter preparation at herder group and *bag* and *sum* levels;
2. Check actual needs for and provide licenses for cutting wood to repair and build shelters;
3. Assist veterinarians to deworm and disinfect winter shelters, and carry out other veterinary measures in a timely manner;
4. Assist herders to make and store hay and buy concentrates;
5. Settle disputes over winter campsites and winter pastures, through traditional and if necessary legal mechanisms;
6. Negotiate and make agreements with other *bags*, *sums* and *aimags* concerning emergency migrations as a response to unusually bad winters.

Proposed aimag level activities

Aimag governors should:

1. Work out a simple information flow from the bottom up about the status of winter preparation and integrate it into the pastoral risk forecast;
2. Revise the criteria used for ranking *sums* for their winter preparation status, with emphasis on preparedness and enhanced wintering capacity at levels below the *sum*, including *sum* organisations and businesses (not what has been done, but what has not been done, and why?);
3. Provide additional assistance as agreed with local and central bodies.

5.2 Adjusting herd size to over-winter carrying capacity

The single most important measure of winter preparation is to adjust livestock numbers to the available feed. In this chapter we propose a system to achieve this.

5.2.1 Estimating over-winter carrying capacity of natural pasture

An estimation of the carrying capacity of winter and spring pastures, set against the stock numbers likely to use them, is a key activity for forecasting and managing herding risk. It is not possible to avoid *zud* or drought, but trying to balance stock numbers with existing feed will reduce their impact.

Estimating likely feed availability for the winter-spring period has been part of the routine duties of livestock and local government staff for many years. It has probably become more difficult since decollectivisation since, instead of two or three hundred *negdels*, technicians now have to collect information from a much larger number of households. The system described below does not claim to be novel and is based on current practice using information

which is routinely collected or readily available. The main innovations are: (i) a simple and rapid method giving quantitative information, suitable for use by local technicians and experienced herders, for estimating the standing forage on pastures at the end of the growing season, and (ii) standardised reporting and handling of results, which will allow forecasts to be made on whether winter shortages are likely, and their possible severity.

Estimates of available forage have to be made when the pasture vegetation has reached its maximum growth, usually mid- to late-August. Since this work will eventually have to be done throughout Mongolia in a few weeks each year, a simple methodology, which can be used by *sum* officials and herders after training, is needed. Much of the data required is already collected routinely, or is available in *bag* and *sum* records. The output of the estimate should be a forecast as to whether there is likely to be a problem with winter feed and, if there is, how severe it is likely to be; it should provide enough pasture and livestock data to allow emergency planning.

The High Mountain Research Centre (Ikh Tamir), under contract to the FAO TCP pastoral risk management project, has developed a simple methodology to make such estimates. This can be undertaken rapidly by experienced herders and *sum* technicians with very simple equipment. The work will be easier where herder organisations can participate. No estimation of herbage will be done in situations where either there is obviously plenty of grass or where the herbage is so scarce that it is not worth measuring. The system combines visual assessment with simple measurements. It has been successfully field tested in the four project pilot *sums*. The methodology is described in a reference manual (*Visual Estimation of Carrying Capacity of Winter Pasture*) prepared for the project.

The procedures are:

- A *sum* level working group, composed of three experienced herders appointed by the *sum khural*, and *sum* livestock, environment and meteorology officers, and chaired by the deputy governor, is set up by the *sum* governor. One of its tasks is to ensure that all ecological monitoring being carried out in the *sum*, including for example the vegetation sampling done by the *sum* meteorological station, is co-ordinated and used in the winter preparedness report. Existing secondary information (including *sum* land use plans, livestock populations, existing herder groups, herder hay preparation, presence of outsiders and likely trespass) is gathered and analysed;
- Discrete grazing areas are defined: these will normally be subdivisions of *bag* grazing territories aggregated into ecologically similar units at *sum* level; where herding groups or communities exist, these are noted;
- Estimates are made within the different grazing areas of the same *sum* as close to each other in time as possible;
- Field estimates are made with the help of experienced local herders. The methodology includes visual estimation and simple sample measurements of grass growth and forage availability, converted to standard units.
- The likely feed needs of *sum* livestock are calculated, using standard coefficients, and compared with likely feed availability (standing and conserved). This allows a rough estimate of the likely adequacy of *sum* feed resources to feed *sum* livestock over winter, identifies needs for emergency reserves within or outwith the *sum* (and *aimag*), whether additional feed should be bought, or whether destocking is necessary.

It is important that existing data on vegetation yield are incorporated with the new estimates. A national system of pasture production monitoring down to *bag* level is organised by the Institute of Hydrology and Meteorology in the Ministry of Nature and Environment. This provides information on biomass production (obtained by vegetation clipping) in relation to weather. It does not, however, provide adequate information on the state of individual pasture types, including especially key winter-spring pastures. The number of stations is small, and the data are not yet fully processed. Field inspection, as well as estimating the actual areas involved, is needed to estimate over-wintering capacity and it is for this purpose that the simple methodology described here has been developed.

Some *aimags* already use a simple system of field visits and interviews to determine if stock may have to be moved on winter *otor*. The Ministry of Food and Agriculture also undertakes carrying capacity estimates, and these must be collated with the information collected through the estimation procedure described here. By incorporating these different data and undertaking its own countrywide survey using standard procedures, the methodology developed by the High Mountain Research Station will put carrying capacity estimation on a more systematic basis and allow simple quantification of the results. Such a standardised system will allow *aimag* and country-wide analysis and provide a powerful forecasting and planning tool.

Estimates will generate much data. This will be useful for immediate forecasting and planning but also, if properly stored and handled, for long-term analyses. Advice on suitable information technology for handling, storage and analysis of the results should be sought. One such system, designed for traditional pastoral systems, is described in an FAO Publication (Harris 2000)³; it can integrate data on vegetation, ecological conditions (soil, climate etc.) livestock and socio-economic factors.

Sum authorities, herders and technicians must all be involved in the assessment of over-winter carrying capacity since all have skills to contribute and all will be involved in executing emergency plans. The *sum* working group will have overall management responsibility.

An up-to-date pasture and land-use map at *sum* level is the basis for an estimate of over-winter carrying capacity, and is also needed for planning seasonal grazing. Earlier maps (described in chapter 2.2) will provide a starting point for these pasture maps. The map should show the main grassland communities, water points and other features important to grazing management, including infrastructure and shelters, as well as areas used by different communities for winter-spring grazing, by different classes of livestock, seasonal camp sites and *otor* areas. All areas already allocated to herders by certificate – mainly winter-spring camps and pastures, sometimes hayfields – should be shown on the maps. Any unused land should also be noted as should land vulnerable to trespass. Maps should be drawn and updated in consultation with experienced herders. The *sum* working group will organise this mapping. The Centre for Policy Research has developed a simple methodology for preparing such maps.

The working group will carry out the over-winter carrying capacity assessment annually. The methodology summarised above will be used, as described in the manual. Data from other existing monitoring systems will be incorporated.

³ Harris, P. S. 2001. *Grassland resource assessment for pastoral systems*. FAO Plant Production and Protection Paper 162. ISBN 95-2-104537-2. Rome.

The *sum* working group will check the information from the carrying capacity assessment and ensure that the *sum* has been fully covered. The data will be collated and analysed by the *sum* livestock officer. Field observations on yield will have to be converted to yield per hectare. Stock numbers and existing nutritional norms will allow estimation of fodder needs. Stock condition will be used to weight requirements using the existing scoring system. Information on household and *sum* fodder reserves will be taken into account. Based on the calculations the *sum* livestock officer, assisted by the working group, will draft a report in the standard format. The report should indicate whether or not severe feed shortages are likely to occur that winter. This information will be collated with other information in the *sum* winter preparedness report.

A reporting format is contained in the carrying capacity estimation manual; it is important that standard reporting be used throughout the country for rapid and easy handling, and to ensure comparability of the results. Results of *sum* estimates must be completed by 1 September each year, to allow time for them to be incorporated into the *sum* winter preparedness report transmitted to the *aimag* by 15 September. *Aimags* should assess the carrying capacity of *aimag* grazing reserves directly under their control and liaise with neighbours where inter-*aimag* reserves are concerned. This would include a survey of the water, shelter and other infrastructure of the reserve.

The over-winter carrying capacity assessment will form part of the consolidated *aimag* preparedness report submitted to Ministry of Food and Agriculture by 1 October each year.

The assessments will require many calculations and their results are needed rapidly. Computer programmes will need to be developed for:

- handling data at *sum* level, including converting field data into herbage yields, and stock numbers to nutritional needs;
- consolidation of *sum* reports and determining the need for and identifying pastures for inter-*aimag* *otor*; estimating necessary adjustments to *aimag* emergency fodder reserves;
- consolidating reports at *aimag* level.

Given the shared responsibilities between the Ministry of Food and Agriculture and the Ministry of Nature and Environment for pasture management and use and emergency forecasting, there needs to be close collaboration between these Ministries in estimating over-winter carrying capacity.

5.2.2 Estimating volume of available winter feed

Herders must, wherever conditions permit, make or procure hay for winter use to support stock through difficult periods. Other 'hand made fodders' should be encouraged where they are traditional and stock should have access to minerals or natural licks as required. In some areas, such as the Gobi, household haymaking will not normally be possible, and households should buy concentrates instead.

Although some bran and grain may be used, most household reserves, in areas where haymaking is feasible, will be in the form of long hay which is not easy to weigh domestically. The estimation of household hay and stocks at the onset of autumn will have to

be done by enquiry and estimation. Measurement is unlikely to be an option due to lack of equipment. These estimates should be part of the information collected during the estimation of over-winter carrying capacity as described in the previous section.

Estimating herder hay reserves is not easy. It should be possible to measure the volume of stored hay but the weight per cubic unit varies with the height of the stack; the higher the stack the greater the compaction. Hay takes time to settle and the age of the stack as well as the degree of compaction when it was built will also affect weight per cubic unit. There are national tables for estimating hay weight from volume. Hay quantities must not be estimated from the standing crop before mowing; it must be from the hay in store. There are many losses between mowing and storing including respiration, leaching, bleaching by the sun, and mechanical losses during turning loading and transport. At present herders' estimates may have to be used but these will generally be over estimates.

Estimation of *sum* stocks requires more care since, as well as being important for feed security, these stocks are traded. The weight of hay bales can vary greatly, even from the same machine; where there is no weigh bridge for weighing lorries, which will be the normal situation, a number of bales should be taken at random from each load and checked on a balance. Weigh bridges are useful for many trading purposes other than hay and the possibility of installing more at strategic sites should be studied.

Carry-over stocks are likely to be small at household level. Hay in open stacks will probably be useful for two seasons with some loss in quality and quantity. *Sums*, however, may accumulate carry-over stocks in a mild winter. *Sum* carry-over stocks should be checked at or before the following harvest. Quantities should not be assumed to be what was on the books at the end of the distribution season; there will be losses due to spoilage, damage and oxidation; carry-over hay must be protected from stray livestock, and also from children playing on it. Any spoiled hay and hay over two years old should be disposed of.

Hay quality should be taken into consideration, especially where purchase from commercial producers is concerned. Norms should be set by *aimag* specialists for hay quality standards based on botanical composition, appearance and visual quality estimation. Hay which supplies less than a maintenance ration should not be bought as emergency feed. An estimated feeding value of 0.45 oat units per kilo is probably a minimum standard.

Sum level stocks of concentrates and agro-industrial by-products require special care in storage since both their cost and feeding value are far higher than that of hay. Quantities should be checked in late summer. Weighing should be simple since this is usually delivered in bags.

5.2.3 *Adjusting the livestock-feed balance*

Estimates of over-winter carrying capacity of natural pastures, together with estimates of livestock feed reserves at household, *sum* and *aimag* level, outlined in chapters 5.2.1 and 5.2.2 make possible an approximation of the fodder and feed reserves available to livestock during winter and spring. By early September each year, it is theoretically possible to estimate whether *sums* and *aimags* have enough feed for the animals known to be present to last them through the following six to eight months before the natural pasture starts to grow again. Although there are many imprecise figures, and several unknowns, a pastoral risk

management forecast should start to estimate the order of magnitude of the main factors involved.

Livestock numbers are already known quite accurately. An annual livestock census is carried out each year during a seven to ten day period starting 15 December, with the results available in early January. These figures include not only animals belonging to herders but also animals belonging to absentee owners in *sum*, *aimag* and city centres. The census figures are updated quarterly by *sum* livestock officers, although these figures do not include animals belonging to urban owners. The quarterly data are transmitted to the *aimag*, and thence to the Ministry of Food and Agriculture and the National Statistical Office, so that updated livestock numbers are available in early April, July and October as a statistical package, although these updates are not published. By June each year, the *sum* has figures for over-winter survival, spring mortality, reproductive success, health and survival of new-born animals belonging to herders.

This means that by early September each year, after over-winter carrying capacity estimates have been made and other data concerning winter preparation have been gathered, it is possible to compare livestock numbers at herder group, *bag*, *sum* and *aimag* level with the total feed available for the forthcoming winter.

These estimates will necessarily be imprecise (particularly with regard to animals belonging to urban owners). But they should permit herders and local officials to make a preliminary, semi-quantitative, judgement about whether there will be enough pasture and stored feed for livestock at the herder group and *bag* level. By aggregating the figures at *sum* and *aimag* level, there should be a good understanding whether existing livestock populations will have enough feed, or whether there is danger of a serious shortage.

There are two major unknown factors in these estimates. The first concerns snow depth. Pasture in autumn may be abundant, but as a result of bad storms snow coverage and depth may be enough to deny the animals access for long periods. It will be impossible to take account of this in the winter preparation reports and risk forecasts. A margin of error needs to be left for such an eventuality.

A second problem arises when herds from neighbouring *aimags* are driven across the boundary because of shortage of pasture and stored feed at home. Such movements have become increasingly common. In some cases they are negotiated between *sum* or *aimag* governors in September when the scale of potential feed shortages for the forthcoming winter becomes apparent. These negotiated *otor* migrations can be included in the *sum* or *aimag* winter preparation plan. Unplanned migrations are different. The best that can be expected is that previous experience, and regular contact between *sum* and *aimag* governors and technicians, and between experienced herders in both places, will give a warning of likely movements of this sort, their scale, and the likely destination areas. As the allocation of winter-spring pasture certificates becomes more widespread and is accepted by other herders, and the use of inter-*sum* and inter-*aimag* emergency grazing reserves becomes more organised, such *otor* migrations across *sum* or *aimag* boundaries should become more manageable.

Estimating the total amount of feed available from different sources, and the number of animals which will be using it, is only useful if there are mechanisms to adjust the livestock population to the estimated carrying capacity if there are more animals than feed.

If the *sum* and *aimag* livestock population significantly exceeds the total feed available for the following winter-spring period, herders and the authorities can either buy in more feed, or reduce livestock numbers. In late August, when the carrying capacity estimates are made, it will be too late in the year to grow or produce more feed. The option of buying in more feed is unlikely to be available to most *aimags* because of budgetary constraints and insufficient growth of hay to cut.

There are five main ways for herders to reduce livestock numbers in order to adjust more closely to estimated over-winter carrying capacity:

- ***Increased autumn slaughter.*** Herders normally slaughter livestock to provide household winter meat supplies and carcasses for sale starting in November. If herders have confidence in the over-winter carrying capacity estimates, they are more likely to adjust to likely serious feed shortages in late winter and early spring by slaughtering more animals at the start of winter. This is particularly the case if they have guaranteed sole grazing rights to their winter-spring pastures. If they are confident that standing hay saved in early winter by the presence of fewer household animals will be available to feed the household flock later in the season, rather than remaining vulnerable to trespassers, they are more likely to reduce their livestock numbers in autumn. Negotiations between herders and *bag* and *sum* governors could reinforce this behaviour.
- ***Sale of animals.*** Herders sell animals mainly in May/June to livestock traders and slaughterhouses, and to herders using cash savings from previous autumn sales to build up their herds or take advantage of the summer fattening season. There are also some sales by herders in September and October to towns and cities for winter meat supplies. May/June is too early for sales to be adjusted to reflect conditions the following winter, but in September/October the likely over-wintering situation will be known. In the event of a serious forecast feed shortfall, herder groups and *bag* and *sum* governors should campaign for increased sales at this time.
- ***Additional otor migrations.*** Herders have the option, when a serious over-winter feed deficit is forecast, of taking their animals on an extended emergency and winter *otor* to better pastures by agreement with neighbouring herders or as trespassers. They can also go to inter-*sum* or inter-*aimag* emergency grazing reserves outside their own normal winter grazing territories. Such moves need to be negotiated with *sum* and *aimag* officials. Where herder groups are well-established, such negotiations on behalf of the group will be easier.
- ***Leasing out, contracting and giving away livestock.*** Herders say that one option for reducing livestock numbers in preparation for a bad winter is to lease or contract out animals to herders with small herds and enough labour, to herders who wish to go on long range *otor*, or herders in less vulnerable *sums* and *aimags*. Giving animals to other herders, in expectation of similar gifts in return in better times, is also cited as a possible strategy, although not a popular one.
- ***Reduced mating.*** When winters are expected to be very bad, experienced herders prevent the mating of some of their sheep and goats in October. This gives those that are mated a better chance of carrying their pregnancies to term and of ensuring that

pasture is available for the newly born lambs and kids in late March and early April. This strategy should be more widely extended, through training of new herders by experienced herders. A pessimistic over-winter carrying capacity estimate should trigger efforts by herder group leaders, and *bag* and *sum* officials to persuade herders to implement this strategy more widely.

Where large numbers of animals are owned by *aimag*- or *sum*-centre absentee owners, and are not grazed within the normal seasonal grazing rotation of *bags* and *sums*, there need to be special arrangements with the owners of such animals to make equivalent reductions in their numbers. Efforts to persuade herders to reduce their livestock numbers by the methods discussed above will be unsuccessful if urban livestock owners are not seen to be sharing the burden and also reducing their animal holdings. Absentee herd owners should be encouraged to provide hay and fodder for their animals.

5.2.3 Proposals for improved Adjustment procedures of herd size to over-winter carrying capacity

Proposed actions by herders and herder groups

1. Experienced herders should make time available to participate in the carrying capacity estimation, and receive training.
2. Herders should participate in updating pasture maps.
3. Herders should be active participants in the discussion and decisions about over-winter carrying capacity, and the responses to it.
4. Respond to the autumn carrying capacity estimations by adopting appropriate measures if local carrying capacity is exceeded, including:
 - increasing their autumn sales and slaughter rate
 - going on extended *otor*;
 - leasing out extra livestock;
 - reducing small stock mating.

Proposed actions by sums

1. Prepare or update pasture maps with the help of herders and herder groups (*sum* livestock and environment officers).
5. Train herders in mapping and pasture sampling.
6. Set up the *sum* working group to oversee the carrying capacity estimation.
7. Carry out the estimation work according to established procedures.
8. Incorporate secondary information.
9. Calculate the winter feed requirements of *sum* livestock and the adequacy of *sum* resources.
10. Plan how to meet shortfalls.
11. Prepare over-winter carrying capacity estimates for annual *sum* winter preparedness report

12. Promote a programme of allocation of winter-spring pasture possession contracts for herder groups.
13. Oversee the *sum* over-winter carrying capacity estimates, and prepare a winter plan based on the conclusions.
14. Negotiate with neighbouring *sums* to be aware of cross-boundary migration and to reduce unplanned *otor* migration and grazing trespass.
15. Discuss autumn slaughter and sales rates with herders in the light of over-winter prospects.
16. Negotiate on behalf of herders for access to pasture reserves for emergency *otor*.
17. Discuss possibility of reduced mating of small stock with herders as a response to potential winter-spring feed shortages.
18. Negotiate with *sum* centre absentee herd owners to reduce livestock numbers in a bad winter, to store hay and concentrates, and to observe good husbandry principles.

Proposed actions by aimags

1. Aggregate *sum* reports into consolidated *aimag* report.
2. Incorporate secondary information.
3. Estimate carrying capacity of inter-*sum* and inter-*aimag* emergency grazing reserves.
4. Provide technical support and training to *sum* staff, including local norms for livestock weights.
5. Collate *aimag* over-winter carrying capacity estimates, and survey of feed resources; prepare *aimag* over-wintering plan.
6. Negotiate with neighbouring *aimags* to reduce unplanned *otor* and grazing trespass.
7. Negotiate use of inter-*sum* and inter-*aimag* emergency grazing reserves. Estimate additional pasture available
8. Estimate level of *aimag* emergency fodder reserves and update rules of use.

Proposed actions at national level (Ministry of Food and Agriculture)

1. Ensure *aimag* activities are carried out on time and reported on schedule.
2. Provide nutritional norms for local calculations.
3. Provide computer software and standard reporting format for carrying capacity calculations to *aimags* and *sums*.
4. Collate *aimag* over-wintering plans into a single national plan.
5. Estimate likely national feed shortfall and decide whether feed imports are necessary.

1.3 Risk monitoring and forecasting

The two pillars of pastoral emergency risk planning in Mongolia are winter preparedness and risk forecasting system. Some key components of winter preparedness - feed production and availability, adjusting to estimated over-winter carrying capacity, winter camp preparation,

veterinary preparation - have been discussed in chapters 5.1 and 5.2. In this chapter, we outline the preparation of an annual *winter preparedness report* summarising the status of these activities.

Risk monitoring is a key part of winter preparedness, providing information about the risks and acute vulnerabilities of herders in the forthcoming winter. Mongolia has good weather forecasting, but if herders and government are to manage risk more effectively, there needs to be a risk monitoring system which integrates a much wider array of information concerning herding livelihoods: pasture, animal condition, economic and social conditions, human preparedness. Much of this information exists already, and only needs to be collated with other types of data; in a few cases, new methods are needed to gather information about critical indicators. Above all, this data needs to be organised into a management system, so that effective risk forecasts can be produced by government to guide the activities of herders, organisations and government, and trigger prompt responses.

Drought, and to some extent *zud*, are 'slow-onset disasters'. They do not occur overnight, but develop over weeks, months, even cumulatively over years. Often, growing stress or impoverishment over several years culminates in a sudden acute episode – *zud*, animal disease, animal theft – which precipitates herder households into extreme poverty. The proposed winter preparedness and risk forecast report is based on the premise that enough information already exists, or can be easily gathered and processed, to provide accurate and timely warning of the sort of deterioration in pastoral livelihoods which makes herders vulnerable to winter *zud*.

Three types of data are needed to monitor winter preparation and to forecast and manage pastoral risk:

- annual assessment each autumn of the general state of winter preparedness of herder households and groups, *bags*, *sums* and *aimags*;
- accurate seasonal weather forecasts for summer and winter, with the likelihood of drought or *zud*;
- timely warning of sudden unexpected emergencies, such as extreme frost, heavy snowfall, floods, storms or animal disease outbreaks.

5.3.1 Winter preparedness report

The winter preparedness report is based on a two-way flow of information - from herders through the layers of local government to central government, and from central government to herder groups and herders – so that problems, responses, needs and progress can be monitored and managed at each level.

People at lower levels in the system – herders, herder groups, *bags* and *sums* – need early warning information about risks and threats, information about available resources, the best types of preparation and response, and about how government can help in a crisis. People at higher levels in the system – *aimags* and central government, as well as donors, national NGOs, and the media – need information about events on the ground, the level of preparedness, what preparations and responses are being made, and what resources are required. The pastoral risk monitoring system may also be used to target rewards for desirable

types of action – such as good preparedness and rapid response – and to allow pressure and encouragement where actions on the ground are inefficient or slow.

A winter preparedness report is made late each summer, summarising the state of readiness of the countryside. The first report is by herder groups and *bag* leaders, or by *bag* leaders alone where there are no viable herder groups. This report covers the following items:

- livestock condition
- livestock health
- state of pastures
- autumn *otor* movements undertaken
- threats of grazing trespass on winter-spring pastures
- household feed reserves
- household winter preparations (state of barns, water, mineral stocks, household stores etc)
- likely household winter off take of livestock
- any other relevant information.

Standing reporting formats need to be developed for several of these headings.

This report is submitted by the *bag* governor to the *sum* by 1 September each year. At *sum* level, the information from herder groups and *bags* is collated and the following information added:

- the number of winter-spring pasture allocation and hay field certificates granted
- the degree of control achieved over winter-spring pasture use, and the threat of trespass
- level of commercial hay and fodder production, including irrigated production
- situation of inter-*sum* emergency grazing reserves and agreements made for their use
- veterinary situation
- status of *sum* emergency fodder funds (quantity and quality of stored fodder)
- *sum* level livestock marketing and offtake prospects
- results of over-winter carrying capacity estimates compared to *sum* livestock population and potential in-migrants and prospects for adjusting it
- the report also incorporates likely winter weather in the *sum*, derived from the *aimag* forecast which in turn is based on the national winter seasonal forecast.
- the conclusion is a *sum* over-wintering plan which proposes how *sum* herders and the administration will meet the requirements of households and their animals, together with an analysis of risks as herders and the *sum* perceives them.

The *sum* livestock officer is responsible for this report, working with the *sum* working group members and others including the *sum* emergency commission. Standard reporting formats need to be developed for these headings.

The *sum* report is submitted to the *aimag* by 15 September each year. At *aimag* level, the *sum* reports are collated and the following information added:

- *aimag* seasonal weather forecast, {based on the IHM seasonal forecast with additional information from the *aimag* meteorological station}
- *aimag* level estimates of hay and fodder production
- level of *aimag* emergency fodder funds (quality and quantity)
- situation of inter-*aimag* emergency grazing reserves
- potential large scale grazing trespass from other *aimags*

- veterinary situation and dangers
- livestock marketing achievement and prospects
- an *aimag* over-wintering plan incorporating all these issues, and an analysis of risks in the forthcoming winter as the *aimag* perceives them.

The *aimag* livestock officer is responsible for preparing this report, working with the *aimag* working group and other colleagues including the *aimag* emergency commission . Standard reporting formats need to be developed for these headings.

The *aimag* report is submitted to the Ministry of Food and Agriculture by 1 October each year. The Ministry of Food and Agriculture circulates the *aimag* preparedness reports and risk forecasts to other relevant Ministries and state bodies (Nature and Environment, Defence, Education, Culture and Science, Social Safety and Labour, Health, Infrastructure, the State Emergency Standing Committee, Civil Defence) for comment and additional information. This report should be a public document, made widely available to local government, the press and to individual citizens.

The Minister of Food and Agriculture submits a consolidated report on national preparedness and a national pastoral risk forecast to Parliament by 1 November each year. A national strategy should provide incentives to herders to work hard at winter preparation.

Government could provide an incentive through a rating system. Winter preparation reports would be prepared in early September by *bag* governors, as described in chapter 6 of the risk forecasting report and forwarded to the *sum*; the reports would also identify the five single best-prepared households or best herder group. After receipt, the *sum* governor (on the proposal of the *sum* livestock specialist) would rate the quality of each *bag*'s winter preparation plan on a scale from 1 to 5 as shown in the following table.

| Rating | Quality of bag winter preparation |
|--------|-----------------------------------|
| 1 | completely inadequate |
| 2 | poor |
| 3 | fair |
| 4 | good |
| 5 | excellent |

These ratings would be transmitted to the *bag* governor, and should be discussed in the following *bag khural* meeting. *Bags* with low ratings should be given the chance to improve their rating with the help of *sum* technicians, and encouraged to resubmit a better plan within one month. The criteria on which *bags* are rated include:

- total household animal feed reserves in relation to the local hay potential;
- efforts made by the households to adjust livestock numbers to estimated over-winter capacity;
- autumn *otor* undertaken;
- level of general household preparation, including the state of winter shelters, stockpiles of food and minerals, water availability, radio and batteries, and other essential commodities.

The same rating criteria are applied to identify best-prepared households or herder group. The rating should be done in relative terms and take account of the ability of households in the *bag*

to undertake thorough winter preparation, and especially the constraints on poor and single-headed or labour-short households. The rating is intended to reflect the effort made, not the amount of commodities stocked; poor households which have made a considerable effort within their means will be recognised specifically, and will contribute to a higher *bag* rating than rich households which have made little effort other than buying large amounts of hay. Where possible, the *sum* will offer extra assistance to poor households in making winter preparations, matching help that other herders or local herder groups provide.

The incentive for the five best prepared households or best prepared herder group per *bag* would be that in case of an emergency they would receive an extra share of any emergency relief coming in. The incentive at the level of the *bag* would be that in the event of a major *zud*, available relief would be channelled in priority to *bags* with a high winter preparation rating.

As the system develops, it may be desirable to add a summer preparedness report to this system, to be submitted each spring following the same procedure.

5.3.2. Weather forecasting

Weather forecasting as currently organised provide good warning of sudden events. The best way to transmit short term warnings to rural herders is through the radio. Herders say radio weather forecasts and the broadcast schedule are helpful. However, warnings are often too late, and do not help herders make management decisions in advance. About one quarter of all herders do not have access to working radios at present. This group relies on information from the *aimag*, *sum* and *bag* administration to reach them through direct face to face communication. For this group, warnings usually come too late.

Mongolia has a well-developed system of weather forecasting. The Institute of Hydrology and Meteorology (IHM) in the Ministry of Nature and Environment issues national and local weather forecasts for three, six, 12 and 24 hours, five days, weekly, ten days and monthly. It also issues seasonal bulletins in late August for the winter and in late March for the summer. In case of likely extreme weather the IHM issues warning messages for one to two days, sometimes up to five days, ahead of the expected event. In the four pilot *sums*, around three quarters of all herders listen to national radio weather forecasts most days. Herders consider short-term (daily and weekly) forecasts to be 85-90 percent reliable. Monthly and seasonal forecasts are considered less reliable for herder planning. However, herders unanimously agree that they do not move out of their habitual winter camps solely on the basis of a weather forecast. Decisions to move are determined by a wider set of considerations. These findings underline the urgent need for a more comprehensive set of indicators required for *zud* and other emergency warning and response. However, a warning system which integrates weather forecasting with other indicators to trigger emergency preparedness and response is not yet in place in Mongolia.

Better dissemination of weather forecasts and early warning messages tailored to the needs of herders may help to overcome these constraints. Forecasts of sudden climatic events should rely mainly on radio broadcasts. Herders say the most useful weather forecasts for early warning and management planning are the weekly and monthly ones, prepared by the IHM in Ulaanbaatar for four major regions and broadcast over national radio. Herders should no longer rely mainly on *bag* governors to warn them. The existing information flow, from national level to *aimag*,

sum, *bag* and herder, is too time consuming, and *bag* governors have too much to do, particularly in winter. The newly installed short wave radio telephones at *bag* centres can support the information chain, but cannot replace radio broadcasts in terms of transmission speed and coverage. All herding households or herder groups should have a functioning radio receiver and an adequate supply of batteries. This should be part of the winter preparation monitored by herder groups and *bag* governors. In future, solar panels may supply a more reliable source of energy.

Aimag meteorological stations should prepare an information sheet giving (a) a fixed schedule of weather forecasts (daily, weekly, monthly) by radio stations received in the *aimag* (national radio, *aimag* radio, foreign stations in some *aimags*) (b) the frequencies used; (c) the time and frequency when the “*sum* radio” described below will be broadcast. The information sheets should be given to *bag* governors and to herders, and their content transmitted by radio.

In future, *aimag* meteorological offices should provide, with help from IHM, more *aimag*-specific monthly and weekly weather forecasts through existing local radio stations. Based on national forecasts for the main geographic regions, *aimag* forecasts would add more detail for the main ecological sub-divisions within the *aimag*. In order to do this, *aimag* weather stations should have free regular access to NOAA satellite imagery through the internet. More importance should also be given to horizontal networking between *aimag* meteorological stations; technical officers at *aimag* level should be trained accordingly.

Aimag weekly and monthly weather forecasts and warnings should be broadcast regularly at a fixed day each week in the form of a one hour programme which includes the ‘*sum* radio’ proposed below. For *aimags* which do not have a radio station, negotiations should be held between IMH and national radio to provide a one hour weekly time slot on national radio to transmit the *aimag* weekly weather programme. *Aimag* weather forecasts are not meant to replace national radio forecasts. They are complementary, containing more *aimag*-specific detail, and focusing on weekly and monthly forecasting only. *Aimags* do not have the ability to provide short-term forecasts.

The quality of weekly *aimag* weather forecasts could be improved by including more detail, a wider range of data than weather alone, and more management implications. For example, in late spring the location of the snow line may be relevant information for herders in the mountains. This detail (which is common practice in other countries) is not provided currently. Weather forecasts and warnings tend to provide information on a ‘higher or lower than average’ basis. However many herders do not know what this means in practice, and the value for them would be greater if they were also informed what the averages are. Weather warnings should be more related to herders’ strategic planning concerns (for example, specific reference to weather during lambing, or during movements to and from winter camps). National as well as *aimag* broadcasts should also include acute weather warnings. *Aimag* forecasts should also contain animal disease information.

The best way for the *sum* authorities to reach all *sum* members without delay is through radio. This could be achieved through a short weekly ‘*sum* radio’ session. This does not imply that each *sum* should start its own radio station, but that *aimag* radio programmes should have a weekly slot devoted to each *sum*. The *sum* radio broadcast should coincide with the weekly weather forecast and any early warning information so as to attract more listeners. Where an *aimag* does not have its own radio station, a *sum* radio slot could be built into a regular *aimag*-specific programme on national radio. *Sum* radio would be a short broadcast within

the *aimag* weather programme, containing both weather and emergency forecasts, and messages relevant to the *sum*, as well perhaps as interviews with experienced herders.

Short wave radio telephones, powered by generators or solar panels, were introduced at *bag*, *sum* and *aimag* centres in 2001. Each *bag* has one telephone, usually located at the *bag* governor's camp. A similar unit is installed at each *sum* headquarters, usually in the governor's office or post office. Doctors and *sum* governors have mobile systems in their cars. These telephones could radically change communications in the countryside, and have important implications for weather and emergency forecasting. However, first year experience suggests the telephones are not a panacea and need to be used carefully to achieve an impact. *Sum* and *aimag* telephones should be operated 24 hours a day. In *sum* and *aimag* centres, telephones should be installed where they can be operated on this basis. Hospitals may be the best place. Staff need to be trained. The main advantage of the new radio telephones probably lies in improved opportunities for *bags* to communicate with other *bags* and with the *sums* (more than vice versa). In connection with the proposed *sum* radio, the telephones may offer the chance to establish a regular communication cycle.

Proposed actions by herders and herder groups

1. All herders should have a functioning radio.
2. Radio broadcasts should be confirmed as the main channel for communication of weather forecasts to herders.

Proposed actions by sums

1. *Sums* should prepare short messages for the proposed *sum* radio and telephone them to the *aimag* for transmission during the weekly *sum* broadcast.

Proposed actions by aimags

1. *Aimag* radio should make known as widely as possible the times and frequencies of all weather forecasts.
2. *Aimag* meteorological stations should add locally available information to the regional forecasts received from the Institute of Hydrology and Meteorology to provide forecasts specific to the conditions of the *aimag*. The aim should be to improve the quality and local detail of *aimag* forecasts.
3. *Aimag* radio should create a weekly slot for 'sum radio', broadcasting material specific to each *sum*, including weather-related information.

Proposed actions at national level

1. The rules governing use of radio telephones at *bag* and *sum* level should be changed in the interests of efficiency of use, including especially emergency use.

5.3.3 Hazard forecasting and early warning

The pastoral risk forecast should be prepared using information now available or easily gathered by herders or local technicians at *bag* or *sum* level using the simple methods proposed in this report.

The main inputs to the pastoral risk forecast are:

- the six month winter weather forecast for each natural region produced by the Institute of Hydrology and Meteorology and described earlier in this chapter.
- estimates of over-winter pasture carrying capacity, aggregated by *sum*, *aimag* and nationally, described in chapter 5.2 of this report;
- estimates of household and local authority fodder reserve stocks, described in chapter 4 ;
- estimates of the prospects for adjusting livestock numbers to available feed, described in chapter 5.2

Forecasting, and the warning stages discussed below, would be based on a general qualitative assessment of key indicators derived from these sources.

For the September risk forecast, the seasonal weather forecast plays a central role. This forecast, issued by the IHM in late August, should be expanded at *aimag* level with data available there, to become the authoritative statement of likely dangers facing herders within each *sum* over the following winter. This report is transmitted to the *sum* by 1 September each year, to be incorporated into the *sum*'s winter preparedness report and risk forecast.

For each indicator, an assessment would be made by the *sum* working group as to whether the indicator showed a situation approximately normal for the time of year, better than normal, or worse than normal. Potential indicators which are already available, and their sources, would be:

| <i>Indicator</i> | <i>Source</i> |
|---|---|
| Forecast temperatures | IHM/ <i>aimag</i> winter weather forecast |
| Forecast snowfall | IHM/ <i>aimag</i> winter weather forecast |
| Pasture biomass | <i>Sum</i> meteorological department clipped vegetation samples on unfenced areas in August |
| Estimated over winter carrying capacity | <i>Sum</i> winter preparation measurements |
| Household and local authority feed stocks | <i>Sum</i> winter preparation estimates |
| Index of relationship between over-winter carrying capacity and livestock numbers | <i>Sum</i> winter preparation estimates |
| Index of household winter preparedness | <i>Sum</i> winter preparation estimates |

As the procedures become established, it would be desirable to experiment with additional measures to improve the scope and accuracy of the risk forecasts. Potential additional measures include:

- *remote vegetation sensing*. The IHM already processes NOAA satellite imagery to measure the normalised differentiated vegetation index (NDVI) for rangeland areas throughout Mongolia, and NDVI data (based on SPOT 4 imagery up to October 2002, compiled by FAO/GIEWS) were made available on CD ROM to the Institute directly through the TCP project. Long term monitoring of NDVI at *aimag* and *sum* level could provide a more detailed understanding of the link between drought and *zud*.
- *economic threats to rural wellbeing*. A simple indicator of herder food security would be provided by an estimate of pastoral terms of trade, or the relationship between the price of key products herders sell (such as cashmere and live animals) and those they buy (such as flour). This provides a good indicator of herder purchasing power and vulnerability.
- *herder health and nutrition*. Measures of nutrition and health status are currently made, and could usefully be incorporated into the seasonal risk forecast.

Early warning stages

A system of warning stages should be introduced at *sum* level. After a discussion involving the *sum* governor and the *sum* level technical staff, *sums* assign themselves a warning level on the basis of their September winter preparedness report and pastoral risk forecast. The warning stages are a standardised way of summing up information from many sources into a single statement about the vulnerability of a *sum* to disaster in the forthcoming winter. The *sum* warning stage will be based on several sources of information. Bringing these together and assigning a warning stage should be done through open debate within the *sum* working group in consultation with other *sum* officials including the governor.

Sum warning stages need to be discussed by *aimag* technical staff and approved by the *aimag* governor. If the *aimag* governor disagrees with the *sum* designation, the matter is resolved by discussion between *sum* and *aimag* governors and their livestock technicians. *Sum* warning stages should initially be declared in the September risk forecast, but can be updated at any stage during the winter.

By defining and applying standard warning stages in response to the winter preparation report and pastoral risk forecast, different levels of response can be mobilised. The warning stages would be defined as: ‘normal’, ‘alert’, ‘alarm’, and ‘emergency’ as follows.

| | |
|------------------|--|
| Normal | All the main indicators – rainfall, snow, pasture production and availability, pastoral terms of trade – are likely to remain within normal ranges for the time of year. Winter preparations have been carried out satisfactorily. |
| Alert | Some indicators are outside their normal range and there are reasons for concern. Specific preparations are required locally. |
| Alarm | Most indicators are outside their normal range and the rural economy is under heavy stress. National support is required to overcome upcoming disaster |
| Emergency | The moment when <i>zud</i> has been officially declared |

The warning stages can be perceived as traffic lights: ‘normal’ is a green light, and life is normal; ‘alert’ is a yellow light, a sign that preparations must be made for possible trouble ahead; ‘alarm’ is a red light, signalling that a major reaction is needed to prevent an emergency developing. The first warning stage will be declared in the September winter

preparation report and risk forecast. Planned *sum* and *aimag* activities will be triggered by the warning stage declared.

| Warning Stage | Examples of planned activities triggered by the September winter preparation report and pastoral risk forecast |
|------------------|---|
| Alert | <i>Sums</i> and <i>aimags</i> increase emergency fodder stocks to emergency levels by buying feed <i>Aimag</i> veterinary officer stockpiles drugs for <i>zud</i> related diseases |
| Alarm | Emergency <i>otor</i> movements encouraged <i>Sum</i> and <i>aimag</i> authorities negotiate use of inter- <i>sum</i> and inter- <i>aimag</i> emergency grazing areas Special protected areas of opened for emergency grazing |
| Emergency | <i>Aimag</i> and <i>sum</i> emergency fodder reserves are opened Army and civil defence on stand-by for emergency road and mountain pass clearance |

Emergency response

A series of appropriate responses, prepared in advance and triggered by the early warning stages, needs to be developed. Responses are not considered here, but need to be defined in consultation with herders and technicians at *sum* and *aimag* level. The Ministry of Food and Agriculture, in consultation with the Ministry of Nature and Environment and the State Board for Civil Defence, should undertake this work.

Link to declaration of natural disaster

The winter preparation reporting and pastoral risk forecasting system described above deals especially with slowly developing threats, such as drought, and forecasts likely future dangers. *Zud* itself starts as a sudden event, with an unusual snowstorm or a period of extraordinary cold. In general it is the combination of the slow build-up of vulnerability (often resulting from a summer drought) and the sudden onset of winter *zud* which creates disastrous conditions. The risk forecasting system is designed to track and give warning of the build up of rural vulnerability. Present weather forecasting and civil defence procedures are well equipped to declare a *zud* according to procedures set out in government decree no.190 of 6 June 2000, although the definitions of dangerous events in this decree are of uneven severity, and need to be revised to give greater coherence.

Zud is the most important potentially catastrophic event. More research is needed on past *zud* events to define the unique characteristics which make it so dangerous, so as to be able to define it more clearly in terms of meteorological measurement. As well as being important for the risk forecasting system, such a definition will be useful in setting up a new weather-based insurance system. A working party from the Ministry of Nature and Environment, the Ministry of Food and Agriculture, the State Board for Civil Defence and the National Agricultural University should be set up to research past *zuds* in order to refine the meteorological definition of *zud* for the early warning system and perhaps its use in insurance.

Proposed actions by herders and herder groups

1. Key actions to be undertaken by herders and herder groups, to contribute to the winter preparation report and risk forecast, are listed in the main text above. They include a broad range of reporting tasks to be accomplished by 1 September each year.

Proposed actions by sums

1. *Sum* reporting tasks are listed in the main text, to be accomplished by 15 September each year. They include an assessment of *sum* over-winter carrying capacity, and preparation of a *sum* over-wintering plan.
2. On the basis of their winter preparedness report and pastoral risk forecast, *sums* assign themselves to a particular warning stage each autumn. This can be revised during winter as new information becomes available.

Proposed actions by aimags

1. *Aimag* reporting tasks are listed in the main text, to be accomplished by 1 October each year. They include an assessment of *aimag* over-winter carrying capacity, and preparation of an *aimag* over-wintering plan.
2. *Aimags* discuss and approve *sum* warning stages, or ask for changes

Proposed national level actions

1. The Ministry of Food and Agriculture takes the lead in co-ordinating winter preparedness reports and the pastoral risk forecast. It involves other Ministries within their area of competence, especially the Ministry of Nature and Environment, and the State Board for Civil Defence.
2. The Ministry of Food and Agriculture prepares a consolidated national winter preparedness report and pastoral risk forecast based on the *aimag* plans. It circulates this to all relevant Ministries and State Bodies, and incorporates additional information from them.
3. The Minister of Food and Agriculture submits a consolidated report on national winter preparedness and a pastoral risk forecast to Parliament by 1 November each year.
4. The Ministry of Food and Agriculture, with the Ministry of Nature and Environment and the State Board for Civil Defence, should prepare a programme of appropriate responses to be triggered semi-automatically by the declaration of different warning stages.
5. A working group convened by the Ministry of Food and Agriculture should consider the operational definition of *zud*, and the conditions under which *zud* is declared, in order to revise and update government decree no. 190 of 6 June 2000.

VI. MANAGEMENT STRUCTURE

A consolidated system of winter preparedness reports and pastoral risk forecasting requires an appropriate management structure and allocation of responsibilities.

Since the proposed system concerns herder livelihoods, the Ministry of Agriculture should take the lead in implementing the measures proposed here. The Ministry of Nature and Environment and the State Board for Civil Defence have important functions in this respect which must be defined.

At *sum* level, a winter preparedness and risk forecasting working group should be set up by the governor, comprising the *sum* livestock, environment and meteorology officers, and three experienced herders appointed by the *sum khural*. It is chaired by the deputy governor, and works closely with the *sum* standing emergency commission. This working group takes overall responsibility for all winter preparedness and risk forecasting activities at *sum* level, including the preparation and timely submission to the *aimag* of the annual winter preparedness report and risk forecast.

At *aimag* level, the governor appoints an *aimag* working group composed of *aimag* livestock, environment and meteorology officers, together with three experienced herders appointed by the *aimag khural*. It is chaired by the deputy governor, and works closely with the *aimag* standing emergency commission. This working group takes overall responsibility for all winter preparedness and risk forecasting activities at *aimag* level, including the preparation and timely submission to Ulaanbaatar of the annual winter preparedness report and risk forecast.

The Ministry of Food and Agriculture is the national lead agency for winter preparedness reporting and pastoral risk forecasting. It receives and consolidates *aimag* reports into a single national draft winter preparedness report and pastoral risk forecast. This draft is circulated to all interested organisations, especially the Ministry of Nature and Environment, the State Emergency Standing Committee, and the State Board for Civil Defence, for discussion and comment. The amended report is submitted to Parliament by the Ministry of Food and Agriculture by 1 November each year.

Proposed activities at sum level

1. *Sum* governors should appoint *sum* working groups. *Sum khurals* appoint the three herder members of the working group.
2. *Sum* working groups are responsible for preparing winter preparation reports and risk forecasts and their timely submission to the *aimag*.

Proposed activities at aimag level

1. *Aimag* governors should appoint *aimag* working groups. *Aimag khurals* appoint the three herder members of the working group.
2. *Aimag* working groups are responsible for preparing winter preparation reports and risk forecasts and their timely submission to Ulaanbaatar.

Proposed activities at national level

1. The Ministry of Food and Agriculture consolidates *aimag* winter preparedness reports and risk forecasts, consults with other interested parties, and prepares a final report for submission to Parliament by 1 November each year.

ANNEX I

SUMMARY OF PROPOSED ACTIVITIES BY LEVEL OF EXECUTION

I. ACTIVITIES BY HERDERS AND HERDER GROUPS

Risk reduction

- Herders should be encouraged by local government explore the implications, advantages and disadvantages of more formal community organisation, including pasture leases, using existing models as examples.

Risk mitigation

- Herders should participate in mapping hay land. They should be encouraged to make increasing quantities of hay where conditions are right. They should experiment where appropriate with ice field irrigation and manuring of natural pastures.

Winter preparation by households

- Herders and herder groups should undertake detailed winter preparation tasks, including:
 - Repair existing and build winter new shelters. Shelters of modern construction require regular maintenance. Shelter repair should be scheduled in August;
 - Gather enough household fuel for winter in August each year;
 - Repair wells and other water sources;
 - Prepare enough special feed and other products needed to nurture new-born stock, weak animals, milking cows and riding horses;
 - Remove dung accumulated inside shelters and corrals, and stockpile enough dried dung for use as animal bedding material;
 - Clear weeds and other foreign materials from the winter camp area;
 - Disinfect shelters and bedding material to prevent the spread of parasites and worms.
- Herders and herder groups should re-establish group-based *otor* schemes and rules, sanctioned by the *sum* and *aimag* administration. No individual households should allowed to go on winter *otor* in areas under the control of other administrations without warning the hosts. The priority for *otor* should be to use locally available resources (within the *bag*, *sum* or *aimag*) before moving to neighbouring territories.

Adjusting to over-winter carrying capacity

- Herders should organise into associations or NGOs capable under law of holding possession contracts for winter-spring pastures.
- Herders should be active participants in the discussion and decisions about over-winter carrying capacity, and the responses to it. Experienced herders should make time available to participate in over-winter carrying capacity estimation, and receive training. Herders should help *sum* technicians estimate their winter hay stocks.

- Herders should respond to the autumn carrying capacity estimations by adopting appropriate measures if local carrying capacity is exceeded, including:
 - increasing their autumn sales and slaughter rate
 - going on extended *otor*;
 - leasing out extra livestock;
 - reducing small stock mating.

Winter preparedness reports and risk forecasts

- Radio broadcasts should be confirmed as the main channel for communication of weather forecasts to herders. All herders should have a functioning radio.
- Key actions to be undertaken by herders and herder groups, to contribute to the winter preparedness report and risk forecast, are listed in chapter 6. They include a broad range of reporting tasks to be accomplished by 1 September each year.

II. ACTIVITIES BY SUMS

Risk reduction

- *Sums* should organise training for *sum* officials and *bag* governors in community mobilisation. Demonstration of best practice by successful officials and governors should be an important part of this training. The training should also include the role of government, the private sector and community-based organisations in local development, particularly what government should and should not provide, the division of responsibilities between different levels of government, and leadership skills.
- *Sums* should build awareness of *sum* and *bag* officials and herder communities of relevant legislation, policies and regulations for natural resource management. They also need basic knowledge and skills on land and risk management.

Risk mitigation

- *Sums* should survey existing irrigated areas, and any other land potentially irrigable by gravity for smallholder fodder production. Before any development is contemplated an economic and technical feasibility study is essential since irrigators will have to pay for maintenance, depreciation, management and running costs as well as gain an adequate return on their inputs and labour.
- Water and land use plans should be drawn up to assure sustainable use of a scarce resource. Existing customary rights should be taken into account when changing land or water use.
- *Sum* staff and irrigators should be trained in proper maintenance of field irrigation infrastructure, field levelling and tillage, on-farm water management, and irrigated crop production. Suitable land-working equipment will be needed, since the few present ploughs are unsuitable.
- *Sum* authorities must ensure the proper organisation of the smallholder irrigating community so that they can take over the routine maintenance and management of the scheme. Technical support will be needed, especially in the initial years.

- Where new smallholder irrigating groups are former herders, *sums* must develop an appropriate form of community organisation to facilitate water sharing, maintenance of infrastructure (such as canal cleaning) and for equitable recuperation of water fees.
- *Sums* must ensure that all irrigated land, headworks and all canals and infrastructure are protected from trespass and damage. In a herding situation it may be necessary to install water points at a distance from canals to allow herds access to water without damaging the irrigation works.
- *Sums* should make an inventory of local commercial hay production, including how and where the hay is marketed, and quantity available for purchase by the *sum* emergency fodder fund.
- Inter-*sum* emergency grazing reserves should be mapped by the *sum* working group as part of the mapping and land use survey described in chapter 3, their infrastructure checked and plans made for their use in emergencies.
- *Sums* should decide priorities (stock classes and households) and rules for inter-*sum* emergency reserve use in the light of the over-winter carrying capacity study.
- *Sum* authorities should ensure that private veterinarians collect all orders from herders for vaccines and parasitic drugs and procure them on time.
- *Sums* and *bags* should make tripartite agreements with herders and veterinarians to ensure all necessary veterinary measures for winter preparations for herders or herder groups are carried out on time with satisfactory quality.
- *Sum* livestock technicians and *bag* leaders should monitor the quality of work of private veterinarians and their vaccine and drug stocks. They should assist private vets to expand their drug revolving fund.
- *Sums* should prepare an emergency veterinary contingency plan in case of serious disease outbreaks.
- *Sums* should develop a strategy to assist poor herders to vaccinate all their animals. One option is that the *sum* could pay the service fees out of its budget for poor herders.
- *Sums* should implement the government *zud* decree by creating a *sum* level emergency fodder fund. Where possible this should be composed of high quality hay (e.g. lucerne), bran or concentrates. In *sums* where haymaking by herders is feasible, part of the *sum* fund may be in the form of hay supplied by herders.
- *Sums* should ensure adequate storage, loading and unloading, handling and weighing facilities at the emergency fodder fund. Staff should be trained before the season and standard management and accounting practices followed.
- Any fodder stocks remaining at the end of winter should be estimated in late spring or early summer and their proper storage assured; these should be checked again in late summer and any spoilt material disposed of before calculating, and receiving, the next year's stores.

Winter preparation by households

- *Sums* should prepare up-to-date maps of hay land taking into account not only botanical criteria but also access, distance from summer camps, possibility of protection from trespass and other factors affecting usefulness. Commercial hay areas within the *sum*

should also be mapped. These maps should be prepared as a part of the mapping of pasture and land-use done for estimating over-winter carrying capacity.

- *Sum* technicians require upgrading of their haymaking skills through practical training on herders' fields with participation of the herders.
- *Sums* should issue hay land certificates for several years wherever justification exists under the new land law.
- *Bag* and *sum* governors should oversee winter preparation by herders and provide technical and organisational assistance. They should:
 - Revise existing procedures and rules for assessment of winter preparation at herder group and *bag* and *sum* levels;
 - Check actual needs for and provide licenses for cutting wood to repair and build shelters;
 - Assist veterinarians to deworm and disinfect winter shelters, and carry out other veterinary measures in a timely manner;
 - Assist herders to make and store hay and buy concentrates;
 - Settle disputes over winter campsites and winter pastures, through traditional and if necessary legal mechanisms;
 - Negotiate and make agreements with other *bags*, *sums* and *aimags* concerning emergency migrations as a response to unusually bad winters.
- Herder groups and *bags* should establish grazing areas where herders from that group are entitled to go on *otor*. Such areas would be protected and managed by the *sum* authorities as regular and emergency *otor* reserves.
- *Otor* should be a major criterion for the *sum* evaluation of winter preparedness at herder group and *bag* level as a key component of grazing management and risk preparedness.
- Clear *otor* arrangements for herder groups and *bags* should be given legal force through pasture possession contracts and *sum* land use planning.

Adjusting to over-winter carrying capacity

- *Sums* should prepare or update pasture maps with the help of herders and herder groups (*sum* livestock and environment officers). *Sums* should train herders in mapping and pasture sampling.
- *Sums* should promote a programme of allocation of winter-spring pasture possession contracts for herder groups.
- *Sums* should set up a working group to oversee the over-winter carrying capacity estimation. They should calculate the winter feed requirements of *sum* livestock and the adequacy of *sum* resources, and plan how to meet winter animal feed shortfalls.
- *Sums* should estimate the quality of commodities in *sum* emergency stocks, as well as quantity.
- *Sums* should prepare a winter plan based on the conclusions of the *sum* over-winter carrying capacity estimates.
- *Sums* should negotiate with neighbouring *sums* to be aware of cross-boundary migration and to reduce unplanned *otor* migration and grazing trespass.

- *Sums* should discuss autumn slaughter and sales rates with herders in the light of over-winter prospects.
- *Sums* should negotiate on behalf of herders for access to pasture reserves for emergency *otor*.
- *Sums* should discuss possibility of reduced mating of small stock with herders as a response to potential winter-spring feed shortages.
- *Sums* should negotiate with *sum* centre absentee herd owners to reduce livestock numbers in a bad winter, to store hay and concentrates, and to observe good husbandry principles.

Winter preparedness reports and risk forecasts

- *Sums* should prepare short messages for the proposed *sum* radio and telephone them to the *aimag* for transmission during the weekly *sum* broadcast.
- *Sum* winter preparedness reporting tasks are listed in chapter 6, to be accomplished by 15 September each year. They include an assessment of *sum* over-winter carrying capacity, and preparation of a *sum* over-wintering plan.
- On the basis of their winter preparedness report and pastoral risk forecast, *sums* assign themselves to a particular warning stage each autumn. This should be revised during the winter as new information becomes available.
- *Sum* governors should appoint *sum* winter preparation working groups. *Sum khurals* appoint the herder members of the working group.
- *Sum* working groups are responsible for preparing winter preparation reports and risk forecasts and their timely submission to the *aimag*.

III. ACTIVITIES BY AIMAGS

Risk Mitigation

- Based on the *sum* inventories, *aimags* should make an inventory of commercial hay production and quality. *Aimag* needs in commercial hay should be estimated, as a part of the over-winter carrying capacity estimates, and related to commercial availability.
- *Aimags* should set norms for the quality of hay to be purchased for *sum* fodder funds.
- Wherever possible weighbridges should be installed and used to weigh loaded trucks; until this can be achieved it will be necessary to check baled hay by taking several bales per load at random and checking their weight on a balance. The weight of long hay can be estimated, but only roughly, from volume tables.
- *Aimags* should make a census of commercial haymaking equipment, and its age and condition, how long present equipment is likely to last and the replacement cost. *Aimag* authorities should collect information on the commonly required spare parts for mowers, balers and other commercial haymaking equipment, seek information about availability from national suppliers, and facilitate access to spares by commercial producers.
- *Aimags* with potentially, formerly or currently irrigated land for smallholder production should develop a plan for its development and rehabilitation based on *sum* surveys. Where former irrigation areas exist, *aimags* should assist *sums* with feasibility surveys. Running

costs must be met by users if irrigation schemes are to be sustainable; water fees will have to be sufficiently high to pay for depreciation, maintenance, management and running costs.

- *Aimags* must decide and publish rules for inter-*aimag* emergency grazing reserve use, in agreement with the other *aimags* concerned, based on guidelines prepared by the Ministry of Food and Agriculture.
- Forage in the reserves should be estimated in late August, and infrastructure and water supplies checked at the same time.
- *Aimag* veterinary staff should monitor and check that *sums* have procured all vaccines and drugs in time for herders. They should collate orders for vaccines and parasitic drugs and submit them in time to the Ministry of Food and Agriculture.
- *Aimag* public veterinary service staff should provide technical guidelines for *sum* private veterinary units to deliver effective veterinary care and ensure they hold adequate stocks of vaccines and drugs. *Aimags* have the responsibility to monitor *sum* supervision of veterinary aspects of winter preparation, co-ordinate such activities at the level of the *aimag*, and report the results to the Ministry of Food and Agriculture.
- Where possible, *aimag* emergency fodder funds should be in the form of high quality feeds, including bran and concentrates.
- *Aimags* should establish management and accounting rules for fodder funds, following national guidelines.
- *Aimags* should ensure that *aimag* and *sum* funds are operational and fully stocked by mid-autumn.
- *Aimags* should train *aimag* and *sum* staff in management and accounting for emergency fodder funds. *Aimags* should organise annual auditing of *aimag* and *sum* funds.

Winter preparation by households

- *Aimag* governors should:
 - Work out a simple information flow from the bottom up about the status of winter preparation and integrate it into the pastoral risk forecast;
 - Revise the criteria used for ranking *sums* for their winter preparation status, with emphasis on preparedness and enhanced wintering capacity at levels below the *sum*, including *sum* organisations and businesses (not what has been done, but what has not been done, and why?);
 - Provide additional assistance as agreed with local and central bodies.

Adjusting to over-winter carrying capacity

- *Aimags* should aggregate *sum* reports into consolidated *aimag* report, also incorporating secondary information.
- *Aimags* should estimate carrying capacity of inter-*sum* and inter-*aimag* emergency grazing reserves for the autumn pastoral risk forecast.
- *Aimags* should provide technical support and training to *sum* staff, including local norms for livestock weights.

- Aimag emergency stores should be filled by mid-September to allow estimates of their capacity to be included in the *aimag* winter preparedness report and risk forecast due by 1 October.
- Quality of commodities in *aimag* emergency stocks should be estimated by *aimags*, as well as quantity.
- Where possible, *aimags* should install weighbridges which can be used for measuring reserve stocks.
- *Aimags* should consolidate *aimag* over-winter carrying capacity estimates, surveys of feed resources; prepare *aimag* over-wintering plan.
- *Aimags* should negotiate with neighbouring *aimags* to reduce unplanned *otor* and grazing trespass.
- *Aimags* should negotiate use of inter-*sum* and inter-*aimag* emergency grazing reserves, and estimate additional pasture available
- *Aimags* should estimate level of *aimag* emergency fodder reserves and update rules of use.

Winter preparedness reports and risk forecasts

- *Aimag* radio should make known as widely as possible the times and frequencies of all weather forecasts.
- *Aimag* meteorological stations should add locally available information to the regional forecasts received from the Institute of Hydrology and Meteorology to provide forecasts specific to the conditions of the *aimag*. The aim should be to improve the quality and local detail of *aimag* forecasts.
- *Aimag* radio should create a weekly slot for ‘*sum* radio’, broadcasting material specific to each *sum*, including weather-related information.
- *Aimag* reporting tasks are listed in chapter 6, to be accomplished by 1 October each year. They include an assessment of *aimag* over-winter carrying capacity, and preparation of an *aimag* over-wintering plan.
- *Aimags* should discuss and approve *sum* warning stages, or ask for changes

Management

- *Aimag* governors should appoint *aimag* winter preparedness working groups. *Aimag khurals* appoint the herder members of the working group.
- *Aimag* working groups are responsible for preparing winter preparation reports and risk forecasts and their timely submission to Ulaanbaatar.

IV. ACTIVITIES AT NATIONAL LEVEL

Risk reduction

- As a matter of national policy, government should support the creation of area-based herder groups as the primary pastoral risk and natural resource management units. These

should where possible be based on customary co-operative groups, but receive formal legal status under the law on non-governmental organisations or the co-operative law.

- Registration of formal community-based organisations needs to be simplified. The law that NGOs must be registered at the Ministry of Justice and Internal Affairs needs to be altered to allow NGOs to be registered at *aimag* or *sum* level.
- The government should enact rules and procedures to implement the 2002 land law, prepare models of land use contracts, land use plans, and pastureland mapping, and equip central, *aimag* and *sum* level land officers with the capacity to implement and enforce them.
- The government should resolve outstanding institutional issues about responsibility for deep wells and for pasture management and use.
- The Ministry of Food and Agriculture should explore in more detail the potential for index insurance using weather or mortality indices. It should associate the insurance companies with this work.
- Banks and micro-finance organisations should explore the conditions under which herder groups can operate as financial intermediaries for savings and loans to herders.

Risk mitigation

- A national strategy should be developed to ensure that enough equipment is in working order to satisfy national needs in commercial hay.
- The Ministry of Food and Agriculture should set national quality norms for hay traded by emergency reserves and advise on weighing methods.
- The national potential for developing smallholder irrigation for fodder in rotation with subsistence crops should be assessed by the Minister of Food and Agriculture, and a national plan developed.
- The Ministry of Food and Agriculture should prepare guidelines on the management of inter-*aimag* emergency grazing reserves to help *aimags* prepare the rules, and advise how the development, maintenance and operation of reserves can be funded in a sustainable way.
- The Ministry of Food and Agriculture should ensure production and delivery of vaccines and drugs on time to *aimags* and *sums* based on the orders. They should monitor *aimag* and *sum* veterinary departments to collect orders from herders on time. Government should provide an adequate budget to produce all necessary vaccines and imported drugs for parasitic disease control and ensure their quality.
- The Ministry of Food and Agriculture should develop emergency plans to prevent outbreaks of infectious diseases and create an emergency drug and vaccine fund. Government should ensure private veterinarians have access to loans to create drug revolving funds.
- The Ministry of Food and Agriculture should provide guidelines for the establishment, management, accounting and auditing of emergency fodder funds. It should provide technical advice, as required, on matters including best storage practice and feeding techniques for emergency situations. It should also assist *aimags*, if necessary, in identifying sources of emergency feed, especially concentrate feeds and cereals.

Winter preparation by households

- The Ministry of Agriculture should develop a strategy for the gradual replacement of herders' haymaking equipment and assuring a supply of spare parts to outlying areas, principally through private traders. The Ministry should also assist in identifying sources of quality animal-drawn haymaking equipment suitable for herder use.
- The Ministry of Food and Agriculture should review article 53.2 of the land law, relating to hay land tenure, in order to explore the possibility of rephrasing it in a way that encourages investment in, and long term conservation of, hay land.

Adjusting to over-winter carrying capacity

- The Ministry of Food and Agriculture should ensure *aimag* activities are carried out and reported on schedule.
- The Ministry of Food and Agriculture should provide livestock nutritional norms for local calculations to *aimags* and *sums*.
- The Ministry of Food and Agriculture should provide computer software and standard reporting formats for carrying capacity calculations to *aimags* and *sums*.
- The Ministry of Food and Agriculture should consolidate *aimag* over-wintering plans into a single national plan.
- The Ministry of Food and Agriculture should estimate any likely national feed shortfall and decide whether feed imports are necessary.

Winter preparedness reports and risk forecasts

- The rules governing use of radio telephones at *bag* and *sum* level should be changed in the interests of efficiency of use, including especially emergency use.
- The Ministry of Food and Agriculture should take the lead in co-ordinating winter preparedness reports and the pastoral risk forecast. It should involve other Ministries within their area of competence, especially the Ministry of Nature and Environment, the State Emergency Standing Committee, and the State Board for Civil Defence.
- The Ministry of Food and Agriculture should prepare a consolidated national winter preparedness report and pastoral risk forecast based on the *aimag* plans. It should circulate this to all relevant Ministries and State Bodies, and incorporate additional information from them.
- The Minister of Food and Agriculture should submit a consolidated report on national winter preparedness and a pastoral risk forecast to Parliament by 1 November each year.
- The Ministry of Food and Agriculture, with the Ministry of Nature and Environment and the State Board for Civil Defence, should prepare a programme of appropriate responses to be triggered semi-automatically by the declaration of different warning stages.
- A working group convened by the Ministry of Food and Agriculture should consider the operational definition of *zud*, and the conditions under which *zud* is declared, in order to revise and update government decree no. 190 of 6 June 2000.