

Exploring Options to Institutionalize the *Dzud* Disaster Response Product in Mongolia

*World Bank Study on
Structuring Dzud Disaster Preparation, Financing and Response to Increase
Resilience of Herder Households to Climatic Risk*

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Executive Summary

Although the importance of the agricultural sector in its overall contribution to the national economy of Mongolia is sharply declining over the last decade, livestock continues to be an important economic and cultural way of life for its rural population. Hence, the Government of Mongolia (GOM) recognizes that implementation of the comprehensive agricultural policy would play an essential role in reducing rural poverty, decreasing rural migration and developing sustainable rural livelihoods.

The nomadic pastoralism, characterized by low population density, mobility, and complex information systems, is currently facing a number of threats including damaging snow conditions, extreme cold weather, drought, floods, wildlife-livestock conflicts, animal theft and social conflicts, disease and market failures. The global climate change effects increased both frequency and severity of the natural catastrophe events such as *dzuds* creating not only direct impact on animal and human mortality, but also causing major rural livelihood instability and poverty.

As some researchers note, absence of the policy towards pastureland management, winter preparedness strategy and insufficient forage reserves are the foremost reason for higher livestock losses during *dzud* disaster events. Furthermore, analysis of the last two decade's national *dzud* management strategy revealed that, although it allows a rapid response to the catastrophe events once it has happened, it still lacks ex-ante approach of risk management. Hence, recognizing such need for pro-active risk management strategy aimed to support adaptation to the changing environments, balancing resources of the land and mitigating and transferring associated risk, the Government of Mongolia is exploring some options.

For instance, the pilot of the Index-Based Livestock Insurance started in 2005 has proven that use of index-based mortality rate for estimating livestock losses against *dzud* and other losses is feasible. However, delivering the social protection service together with the commercial insurance product through the private-public partnership has faced great challenges. Thus, it was recognized that separate government insurance program is required to reduce effects of high covariant risks caused by extreme catastrophe events.

This study aims to provide the guiding principles to the Government of Mongolia towards creating comprehensive ex-ante risk management strategy based on the assessment of the pros and cons of historical approach of livestock risk management as well as best practices around the world. For instance, it proposes an option for the National Disaster Indemnification Program (NDIP) that acts as a state insurance enterprise and provides social insurance protection to herders against extreme *dzud* disaster events.

This proposal aims to assist the Government of Mongolia in making operational the insurance reserve fund and subsequently moving to a more comprehensive sponsored insurance program. It evaluates several alternatives for creating some form of the compulsory insurance based on the institutional and regulatory framework, sustainability criteria, and basic principles for such social program such as issues to be considered, eligibility requirements, participation fee alternatives, service delivery choices

This research is based on the analysis of the current national *dzud* disaster management framework, economic and social consequences of *dzud* disasters, and *dzud* disaster risk assessment using the last 40 years data. It also contains an overview of the historical approach and current management of livestock insurance initiatives in Mongolia.

For instance, the study suggests treating *aimags* in accordance to their risk exposure level. At first, all *aimags* were divided into three exposure zones (low, moderate and high) based on the probability of livestock losses exceeding 30 or more percents in any given year. Then, composite mortality index that is based on the sheep proxy has been applied to determine the possible government exposure to the risk. With herd insurable value set at 50 percent of the sheep's market value and utilizing total number of livestock as reported by the National Statistical Committee, the total insurable value of the national herd would be approximately 1.21 billion USD with the GOM's exposure to the financial risk of about 18 million USD.

Depending on the GOM's willingness for financial expose, however, the level of this risk exposure could be managed at some degree by adjusting the insurable value of the herd or by regulating participation fee rates.

In order to be successful, this program should be created in close collaboration with the other GOM's initiatives and, particularly, with the National Livestock Program which was approved by the Parliament in 2010 and sets the basis for the development of the livestock sector management, industrialization and strengthening risk reduction measures. Creation of the NDIP should provide incentives for both the GOM and as well as individual herder households to better manage *dzud* related risks through introduction of structured ex-ante risk mitigation and transfer approaches. To eliminate high administrative costs and moral hazard issues, such NDIP need to be set with some degree of compulsion.

By introducing NDIP, the GOM would have an opportunity to introduce the social safety net product, publicly provided and financed, to respond quickly to herders most affected by extremely high levels of livestock losses following major *dzud* event. If appropriately established and adequately managed, the NDIP would assist the Government of Mongolia and international donors to structure and distribute *dzud* related disaster financing in a systematic, timely and transparent manner, while keeping high covariate risks manageable.

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1. Need for the Study (Background and Purpose)

For centuries pastoral livestock production was the only livelihood basis for Mongolia. Although last century brought industrialization and development of other productive industry and services, agriculture is still a major sector of Mongolian economy (Gooptu et al., 2007). Because of Mongolia's harsh climate, most cultivations have not be suitable for Mongolia and only 1% of the arable land in Mongolia is cultivated with crops, amounting to 1,322,000 hectares in 2008 (NSO, 2010). The agriculture sector, therefore, remains heavily focused on nomadic animal husbandry with 75% of the land allocated to pasture.

Today, livestock provides the direct basis of livelihood for about one third of Mongolia's population and often the only way out of poverty. The rural dwellers make a living by herding horses, camels, goats, cattle and sheep for milk, cashmere, meat and other livestock products, which is the only source of income for them.

Nomadic pastoralism in this semi-arid country is a risky business that is severely dependant on extreme weather and climatic conditions throughout a year starting with extremely dry summers and continuing with severe freezing winters. While practical responsive mechanisms to such ecological conditions have been developed during centuries of nomadic herding lifestyle, recent climate change effects and human actions have challenged efficiency of these traditional risk management techniques. Mongolia became prone to a unique weather phenomenon: a combination of heavy snowfall, sudden winter warming and/or cooling, and wind storms, which subsequently creates ice sheets on the ground surface (Punsalmaa et al., 2007:74-77, Mahul and Skees, 2007a). This phenomenon, in turn, creates the major disaster event called *dzud*¹ that is exclusive to Mongolia.

For instance, during 1918 to 2007 on average the country has experienced *dzud* event once in about ten to fifteen years with average livestock losses of about 11 percent (NSO, 1991, NSO, 2008). However, it should be noted that in the nomadic pastoralism even in the most weather favorable years other unforeseen circumstances cause on average livestock mortality of around 3 to 4 percent (Skees and Enkh-Amgalan, 2002).

By the beginning of the 1950s, as part of the centrally planned economy, the socialist Government of Mongolia launched collectivization of agricultural sector restricting private ownership of livestock and land (Milne et al., 1991, p. 6). Since ownership of the livestock shifted to the state, the GOM has created the risk management system against *dzud* disasters. During 1960s to 1980s, the State Insurance Organization (SIO) offered compulsory livestock insurance to state farms and agricultural cooperatives against natural hazards such as *dzud*, drought and contagious diseases on premium basis. To reduce the risk of the SIO, the GOM obtained reinsurance from 45 international reinsurers such as Lloyd's of London,

¹ *Dzud* is the natural disaster event that results in high livestock deaths due to harsh winter conditions leading to hardships for herders, and even creates unemployment, urban migration, deep poverty and economy-wide income losses.

Munich Re and others. Historical evidence, however, confirms the fact that the livestock mortality risks in Mongolia were extremely high often forcing some of these reinsurers to leave this market. For instance, because of 4 largest losses in the livestock sector since 1960s, Lloyd's of London terminated its livestock reinsurance contract with Mongolia in 1975 (Otgontogs, 2005). Therefore, high covariant risk problem needs to be carefully re-evaluated before proposing any insurance programs related to *dzud* events.

Collapse of the centrally planned economy and privatization of once state-owned livestock to herders in early 1990s affected the breakdown of the compulsory livestock insurance and reinsurance systems. The livestock insurance became the matter of demand and supply forces. However, it did not progress since neither herders were informed about risk protection measures such as voluntary insurance nor private insurers were interested in getting exposed to such extreme risks and high costs.

On the other side, both frequency and intensity of livestock losses due to extreme weather conditions has been increasing over last two decades as reported by the Institute of Meteorology and Hydrology of Mongolia (2004). For example, the country experienced three consecutive *dzuds* from 1999 to 2002 to which the nation has lost about 11.2 million of herd or 25 percent of total national livestock. Subsequently, *dzud* phenomenon occurred during 2009-2010 winter affected over 80 percent of the country, causing loss of about 9.73 million livestock (15 percent of the national herd) and affecting almost half of the total herder households of the country (NSO, 2010).

Since sustainable livestock herding is of high importance to the GOM, some efforts to create social safety net through introduction of the new alternative risk management structure always existed. However, since 1995 three attempts of the GOM to introduce new livestock insurance system have failed. Each draft law to create and implement mandatory livestock insurance has been rejected by the Parliament due to the lack of feasibility and expected high administrative cost and excessive exposure to financial costs during the event (Skees and Enkh-Amgalan, 2002).

At last, joint efforts of the GOM and international donor agencies aimed to introduce ex-ante *dzud* related disaster management has achieved some success through piloting of the Index-Based Livestock Insurance Project (IBLIP). Under IBLIP, during 2005-2009, the GOM has introduced two innovative products to manage climatic risk. If average sub-regional level livestock losses fall between 6 to 30 percent, the Livestock Risk Insurance (LRI) - a commercial insurance product - is being offered which herders can purchase at market priced premium rates from local insurance companies. For losses beyond this level, which are to be considered catastrophic events and non-insurable, a second product – the Disaster Response Product (DRP) turns up (IBLIP, 2009).

The DRP was designed as a social safety net product, publicly provided and financed, to respond quickly and transparently to herders most affected by extremely high levels of livestock losses following major (though infrequent) *dzud* events. But results of the pilot revealed that channeling such social insurance product along with the private insurance sales was not appealing for insurance agents and somewhat confusing for herders. Therefore, it has been decided to separate the product from IBLI project and link with the GOM disaster management policy. While IBLIP continues to support the commercial insurance, operating through the insurance market, support for the DRP ended as of 2010.

Therefore, the GOM requested the World Bank to further work on delivery mechanisms for DRP, and also on financing the DRP, the fiscal exposure of which is beyond the funds available under IBLIP. Based on this concept note, this study is to explore how DRP could be taken forward as part of a more structured ex-ante financing mechanism for *dzud*. Options may include contingent budgeting, drawing on emergency lines of credit, depending on international aid, or insurance. The DRP is considered as a potential tool to help to structure and distribute state financing for disaster in a systematic, timely and transparent manner.

This study will explore the potential institutional and financial arrangements through which the GOM could adopt the DRP as part of its emergency management system. The appropriate institutional framework for the administration of the DRP, including roles and responsibilities of different government agencies (State Emergency Commission, National Emergency Management Agency, Ministry of Finance, Ministry of Food, Agriculture and Light Industry, National Statistical Office, Social Insurance General Office), development partners (IFIs, bilateral agencies and international NGOs) and civil society will be considered.

2. National *Dzud* Disaster Management Framework

Mongolian pastoral systems are subject to high levels of variability and risk from environmental, economic and social causes. Catastrophe events such as *dzud* create not only direct impact on animal and human mortality, but also undermine rural development strategies, and are a major cause of rural and urban poverty. Without appropriate strategy and institutions to deal and control risks sustainable development would not be achieved in Mongolia.

2.1 Historical Approach

A pastoral risk management strategy has to involve active participation of the following groups: (i) the herders or wider informal groups of herders in the neighborhood; (ii) formal groupings of herders created for specific purposes such as livestock marketing; (iii) the local administration; (iv) government officials at different levels of the administration; (v) private sector participation. Traditionally these actors have played various roles, in a shifting relationship to each other, during this century in relation to pastoral risk management.

For example, state involvement in nomadic pasture regulation dates back to the 13th Century, when Genghis Khan's Ministry of Horses started to preserve pastureland for imperial military horses (Ykhanbai and Bulgan, 2006). Later during 16th to 19th century, the pastoral societies got managed through politico-territorial units headed by feudal and Buddhist monasteries. While such structure ensured minimal level of subsistence for the most of households with a considerable cost to their personal freedom (Swift, 1999), land utilization managed by few of Mongolia's nobility and imperial administration was very effective. Sneath (2003) considers that these operations were highly sophisticated with ability to involve specialist herding while managing varied pastures for different types of species through four seasons making best use of the local ecological resources at given times of the year.

Socialist system, which initiated collectivization of the herding economies in early 1950s, institutionalized a more substantial safety net through membership of a herding collective which provided: (i) an employment guarantee with paid employment, pension and social security payment; (ii) restocking with collectively-owned animals in case of loss; (iii) livestock insurance through the collective against accidental losses; (iv) collective provision of free services such as human and veterinary health and education, including emergency fodder provision. Though, citizens had almost no right to own livestock. During this period, the state has been heavily investing in agriculture sector, through allocating pastureland, setting aside reserves of land for use in emergencies, controlling number of herd and outbreaks of animal disease, providing and maintaining fences, preparing reserves of fodder in case of hazardous weather conditions.

With the shift to the market economy, state social service provision as well as functions regulating pastureland use and managing livestock production system has been lost. However, privatization of livestock to herders provided an asset to support their families as source of food, transport, heating materials, and purchasing power and the access to the medical services and children's education. In spite of this opportunity, lack of risk management knowledge and coordinated winter preparation strategy

created extreme livestock mortality losses during successive *dzuds* of early 2000s, declining rural poverty level to about 40 percent. There are several reasons that effected on social instability in response to *dzuds*: (i) after reform herders have been left on their own, mostly inexperienced in traditional herding business and without proper training on risk preparedness and mitigation; (ii) four season pastureland rotation has been barely applied due to immobility of modern herders; (iii) the government lost control over land use, total herd numbers and breed quality lacking any further incentives and/or policies; (iv) climate change resulted in water resource limitation and forage shortage; (iv) herders' desire to increase number of herd as a mean to accumulate more income created further degradation of pastureland.

Since livestock has been a main source of income for majority of Mongolians, GOM has never left this subject unattended. However, its policy towards risk avoidance and pastureland management was not broad enough to cover all different aspects of the issue. For instance, its policy has been limited to the attempt to introduce some form of mandatory livestock insurance for breeding and/or special breed of livestock and imposition of the personal income taxation on private animal breeders payable to the local budget. While it was assumed that the later would keep livestock numbers within the pastureland density capacity, it created mass under-reporting of actual livestock numbers and further intensification of pasture degradation problem. After annulment of the personal income taxes imposed on livestock owners, there is ongoing discussion regarding the imposition of some type of pasture land utilization fee that would be partially used for the livestock risk management purposes as well (Parliament of Mongolia, 2009).

The proposal for mandatory insurance for breeding animal and/or special breed of the stock, on the other hand, was never ratified by the Parliament due to huge financial exposure and lack of viability. As suggested by Jamsranjav (2009) herders as well as the local authorities are aware of excessively large number of animals, inappropriate herd composition and inappropriate management practices that are leading to degradation of pasture and are now searching for solutions.

Most of the disaster related programs implemented during last two decades by the GOM, civil society or international donor agencies were directed toward post disaster emergency response. While important this focus often failed to emphasize the individual and collective actions that can be taken prior to the disaster including actions for risk reduction, mitigation and avoidance. It even left out promotion of the responsible herding practice whereas herders or herders' group would remain in charge for the productivity and management of their herding business with only limited state subsidy.

Therefore, above-mentioned issues need to be closely considered in the comprehensive risk management techniques of this country while still taking into consideration uniqueness of its nomadic pastoralism.

Optimal national disaster management strategy should be closely linked to the existing administrative structure of the country and consider all aspects of risk avoidance, mitigation and adaptation techniques. Moreover, it should incorporate widespread issues such as (i) better coordination of disaster risk management programs implemented by the state, public and international agencies (Swift, 1999); (ii) public awareness and education on risk management techniques through systematic training and inclusion of the subject in the curriculum of rural schools); (iii) promotion of livestock production and

livestock raw material processing including intensified farming and special breeding animals (Shagdar, 2002).

2.2 *Dzud* Disaster Management Policy of the Government

Since Mongolia's regional administrative structure is divided into the pyramid system of the *aimags*, *soums*² and *bagas*³, central government policies are implemented through the local governor's offices established at each level. These offices are also authorized to define and implement rational local policies, if required. Evidences suggest that while *aimag* and *soum* level services are fairly functioning, transfer of government tasks to serve at *baga* and herders' level is very limited due to the lack of financial, infrastructure and human resources (Sneath, 2003). This needs to be carefully considered while designing the National Disaster Management Framework.

At the national level, there are two distinct government institutions such as the Ministry of Food, Agriculture and Light Industry (MoFALI) and National Emergency Management Agency (NEMA) that become involved in the case of occurrence of hazardous conditions created by drought, *dzud*, or any other weather-caused phenomena. While the implementation of the government measures taken prior to and following the immediate *dzud* disaster effect is operated by MoFALI, overall *dzud* management actions shift to NEMA's responsibility as soon as the hazardous situation has been assessed and declared disastrous.

For instance, MoFALI is the main GOM body responsible for the national livestock policy, rangeland and water well management strategy and veterinarian services. Therefore, it is obligated to regulate most of the risk mitigation, adaptation and avoidance programs, including livestock winter preparedness, stocking density management, restocking and other relevant activities. Review of the MoFALI's policy documents reveals that the following programs and coping mechanisms are to be implemented until 2015 in order to reduce the impacts of *dzud* related disasters: (i) promote livestock fodder production throughout the country with public-private sector involvement (GOM, 2007), (ii) improve quality of the livestock production and their breeds (GOM, 2006), (iii) support development of intensive and semi-intensive farming (GOM, 2003), (iv) initiate community based rangeland management system including preservation and restoration of overgrazed area (Parliament of Mongolia, 2003b), and (v) educate herders on how to run sustainable livestock business in a community environment (Parliament of Mongolia, 2009).

Alternatively, all disaster management activities in Mongolia, whether it is caused by natural phenomena like *dzud* or created by any other man-made activities, are carried out by NEMA in accordance to the Disaster Protection Law (Parliament of Mongolia, 2003a). Within this framework, as part of the *dzud* risk reduction and mitigation procedure, NEMA is responsible for the *dzud* disaster research and assessment

² Each *aimag* is sub-divided into the lower administrative units called *soums*. There total of 350 *soums* throughout the country.

³ Each *soum* is sub-divided into the smallest administrative unit called *baga*. Depending on the territory and population size each *soum* consists of 3-5 *bagas*.

as well as accumulation of the state reserves on hay and fodder that are to be preserved throughout the country.

When the actual disaster occurs, the State Emergency Commission (SEC) established under the Prime Minister acts as a headquarter for the disaster management and executes all actions through NEMA, its secretariat. The SEC is chaired by the Deputy Prime Minister and composed of members from line ministries, related agencies and civil society.

In case of *dzud* disaster response, as soon as the situation is officially declared in one third of the *soum* or *aimag* territory, the SEC establishes a working group on the *dzud* disaster management. For example, the working group on 2009-2010 *dzud* disaster management has been co-chaired by the Minister for Food, Agriculture and Light Industry and consisted of high-ranking officials from the Ministry of Finance, Ministry of Social Protection and Labor, Ministry of Health, Ministry of Education, NEMA and their respective agencies.

Similar structure is enforced at the *aimag* level in the event of an emergency. The *Aimag* Emergency Commission (AEC) chaired by the *aimag* governor would operate through the *Aimag* Disaster Management Office. Often for the better *dzud* risk management, AEC does not only function in case of the occurrence of the event but also works during fall controlling winter preparedness and risk mitigation planning activities. In particular, each *soum* government office conducts pastureland capacity estimation, assesses summer drought level, preserves hay and fodder for *aimag* reserves, assigns *otor*⁴ areas to targeted herders (Benson, 2010).

While some limited funding for disaster management is preserved at the *aimag* and *soum* level, most of the required funding is provided from the GOM. There are two types of reserves available from the state: (i) the Government Special Fund (or reserve), which is held in form of cash and used for a wide range of unforeseen circumstances including *dzud* and pandemic disease; and (ii) the State Reserve Fund, which holds actual goods required for emergency relief such as equipment, food, warm clothes, fuel as well as grains and fodder. The later one is reserved particularly for the period of *dzud* disasters.

According the information received from the Ministry of Finance, government spending from its Special Fund on the natural disaster management and coping activities in particularly related to the drought, *dzud*, flooding and contagious animal diseases totaled about 11.1 million USD for the period of 2008 to 2009 (MoF, 2010).

In general, neither financial nor fodder reserves are sufficient to cover necessities of the rural communities effected to the moderate or extreme *dzud* disasters. In such situations, the GOM would attempt to adjust its budget and reallocate more resources as well as approach international, national and multilateral institutions for financial aids. Historical records show that Mongolia received substantial donor assistances during 1967-1968, 1999-2002 and 2009-2010 *dzud* disasters (Table 5). According to the 2009-2010 *dzud* expenditure report issued from NEMA, the state spent 5.7 million USD for the *dzud* risk

⁴ Otor is the reserved pastureland used in winter when heavy hay and fodder shortage occurs often caused by the preceding drought. However, often times low-income herders with few animals are not able to move to the reserve areas due to the shortage of transportation.

reduction measures (transportation of hay and fodder, construction of wells, health services to affected herders, carcass removal, transportation of warm clothes, food and medical supplies etc.), while contributions of international aid totals to 38.1 million USD.

Table 1: International Donor Community Support during Dzuds

<i>Dzud</i> Years	Donors	Amount	From of Support
1967-1968	USSR, PR of China, other Soviet system countries, Canada Red Cross, Swiss Red Cross	17.4million MNT	Concentrated fodder factory, Corn, equipment such as helicopters, trucks, jeeps, medicine, and cash
1976-1977	USSR	7.4 million MNT	Services of helicopter, trucks, and labor force
1999-2002	UN Agencies, USAID, CIDA, World Vision, EU, governments of 27 countries, their Red Cross organizations and communities	23.7million USD	1.9 million USD was in non monetary form
2009-2010	UN Agencies, ADB, WB, USAID, SIDA, governments of Russian Federation, PRC, Japan, Turkey, and national institutions	38.1million USD	Hay and fodder, carcass removal, transportation, food, medicines and other health supply

Source: Ministry of Finance, NEMA 2010

Most of the *dzud* disaster support received at the *aimag* and *soum* level from the GOM was in the material form (hay, fodder, bio-supplements, petroleum, food, medicine, warm clothes etc.), while international donor agencies and disaster relief non-governmental organizations provided assistance in both monetary and material forms. Although most of the assistance reached herders in a reasonable short time period, integrated and coordinated aid distribution system or structure appears to be missing.

Although the GOM was able to rapidly respond to the current *dzud* disaster, some areas of disaster preparedness, response and coordination need improvement. While NEMA operated quickly using its national and local networks, its technical capacity, communications and emergency coordination with government agencies and external organizations were not sufficient (UNDP Country Team, 2010). Some challenges that were observed during the 1999-2002 *dzud* such as the reliance on occasional donor assistance, absence of aid coordination, lack of timely and detailed information of current situation, lack of information management and geographic mapping still existed.

Hence, in order to successfully decrease effects of the *dzud* on the national economy and on herders' livelihoods improvement in the *dzud* preparedness structure need to be reconsidered. More attention has to be placed on the issues relating to the sustainable pastureland management, quality of herds versus quantity, responsible herding management practices, technical improvement and capacity building of human resources at all governmental and regional levels, and adequate financial planning for the anticipated *dzuds*.

Case Study: Management of Dzud at the Regional Level

One of the *aimags* that was heavily affected by the 2009-2010 *dzud* was Uvurkhangai. This *aimag* is located in the central part of Mongolia on 62,900 sq. km territory, with Khangai Mountain stretching in the North-West, with the steppe lining in the middle and the Altai Mountain towering in the south-west. Its administrative unit includes 19 *soums* and about 118,400 populations. Agricultural sector contributes about 70% of the total *aimag* GDP showing high dependence on the livestock sector. Uvurkhangai is considered as one of favorable locations for nomadic herding with large access to pastureland and water providing grazing to the total of 3.62 million livestock that supports livelihoods of 16,855 herder households (NSO, 2010).

According to the information received from the National Agency of Meteorology, Hydrology and Environment Monitoring, this *aimag* experienced the hazardous weather conditions that has begun with heavy drought in late summer followed by intense snow storms (with 38 times of deep snow fall) and very low winter temperatures (below -40 C) which led to the *dzud* disaster conditions.

According to the *Aimag* Emergency Management Department information, they were aware of the possible *dzud* situation by September of 2009 and, therefore, attempted to better prepare for the forthcoming winter by reserving twice more hays and fodder. It also encouraged herders to move into otor area and negotiated such opportunity with governors of Arkhangai, Bulgan and Tuv *aimags*. Those who moved for otor lost only up to 40 percent of their livestock.

During the period of December 2009 to May 2010, 42.0 percent or 1.5 million livestock was reported dead causing 57.7 billion *tugrugs* direct damage to herders. For instance, out of 19 *soums* of Uvurkhangai *aimag* 4 lost more than 60 percent of livestock and 10 lost 30-50 percent of the livestock. Moreover, 2,000 herder households completely lost their livestock while 7,600 herder households lost more than 50 percent of their livestock.

Since the *aimag* was declared to be in the emergency situation by the State Emergency Commission, it was able to receive the most available support from both the government and international donor agencies (UNDP, UNESCO, FAO, WB, ADB as well as World Vision and Red Cross International). As a consequence, it has received about 1.045 billion *tugrugs* for *dzud* disaster relief, most of which were used to purchase and deliver animal fodder & bio-supplements as well as food and durable goods to the affected herders.

At a glance, it appears that the *soum* under disaster condition was able to receive more support during the disaster period. Two *soums*, Bayangol and Khujirt that have experienced large livestock mortality, were reviewed in detail. While both *soums* have suffered from more than 50 percent of livestock losses, Bayangol *soum* (lost about 62 percent of the total livestock) that has suffered from early livestock losses has been declared to be in a disastrous situation and has received sufficient amount of aid. In contrast, Khujirt *soum* (lost about 52 percent of the stock), which endured herd losses in the start of spring, has not being assessed to be in the disastrous situation and, therefore, received much less aid.

Aimag and *soum* officials state that several factors besides the abnormal harsh winter have caused such large deaths of animal: (i) weaker animal condition due to the grass feed deficiency originated by drought

in summer, (ii) heavy pasture overgrazing problem with the carrying capacity exceeded by 3-4 times, (iii) inability of the majority of pastoralist to move to the otor are, mostly due to the lack of transportation, (iv) lack of sufficient amount of hay and fodder reserves.

2.3 Livestock Protection Fund

After encountering financial challenges in coping with the 1999-2000 *dzud* disaster, the Government of Mongolia (2001) created the Livestock Protection Fund at the national, *aimag* and *soum* levels. This Fund is one of the twenty two special government funds established in accordance with the Law on Special Government Funds (Parliament of Mongolia, 2006). Livestock Protection Fund is operated by the Livestock Breeding and Veterinary Service Agency of MoFALL.

The main purpose of the Livestock Protection Fund is to support *dzud* preparedness and risk reduction activities through financing of the relevant research and risk assessment works, development of sufficient fodder reserves, otor management, preparation of bio-supplements for animals, purchase of hay-cutting equipment, well repair, and other activities associated with the *dzud* response and management.

Despite the fact that the most the GOM's special funds are entirely financed from the fiscal budget, the National Livestock Protection Fund is required to be established from the national and international donor aid and assistance. According to the recent audit conducted on the performance of the Livestock Protection Fund (National Audit Office, 2010), during 2005-2009 the Fund accumulated about 1593.4 million *tugrugs*. The Fund reserves were allocated from the loan repayments of other livestock related programs as well as from the fiscal budget with no contributions from the international aid and assistance so far. It was identified that the Fund was generally used to provide discounted loans to individuals and/or organizations that requested financing for some livestock management related activities. However, the report states that the Fund did not meet its main objective and lacks capabilities to identify, assess and provide financing for the activities that are aimed to decrease and mitigate *dzud* related risks.

At the *aimag* level building up of the *Aimag* Livestock Protection Fund is mainly completed through accumulation of no less than 30 percent of personal income taxes collected from herder households and no less than 50 percent of pastureland utilization fee.

Based on the review conducted in Uvurkhanga *aimag*, its Livestock Protection Fund is directly managed by the *aimag* governor and is mainly built up from the personal income taxes collected from herders, locally known as the livestock taxes. Generally, some portion of livestock taxes would be retained by the *soum* government to contribute into next year's *soum* budget, including provision of funding to the *Soum* Livestock Protection Fund. The Uvurkhanga *aimag* administration was allocating about 15 percent of the total livestock taxes collected into such Fund on semiannual basis with total accumulation of about 40 million *tugrugs* right before the 2009-2010 *dzud* disaster event. The Fund is currently exhausted with all of money spent on purchase of hay and fodder.

Meeting with about 50 herders of Bayangol *soum* that were heavily affected by recent *dzud* revealed that livestock insurance is considered as one of the acceptable risk hedging strategies. On the whole, herders

were willing to pay insurance premiums or pasture utilization fees instead of the livestock taxes that were imposed under the Personal Income Tax Law. However, these herders were not aware that some of the emergency aid they received during the *dzud* was actually financed from the Livestock Protection Fund or in other words, from the portion of livestock taxes they paid to the state.

Moreover, because of the amendment to the Personal Income Tax Law of Mongolia dated June 11, 2009 clauses pertaining livestock taxes were annulled. With the main source of funding seized and without fixed budgetary obligations there no reason to promote further operation of the Livestock Risk Protection Fund.

2.4 Mongol Livestock Program

At the moment agricultural and economic development policy of Mongolia demands sustainable risk management activities that should concentrate on the comprehensive risk management approach covering aspects of *dzud* related risk assessment, risk mitigation, risk reduction and risk transfer measures. Fiscal decentralization of local governments and capacity to adequately manage pastureland utilization and implement other risk reduction activities is another challenge that needs to be resolved.

Experiences from both the developed and low-income countries demonstrate that some form of the governmental financial support is needed to reduce the cost of insurance associated with the high covariant risks caused by catastrophe events. In general, insurance allows more cost efficient alternative to disaster assistance to meet the escalating costs of recovery form physical and economic damages caused by disasters to communities and the national economy. In case of Mongolia, the GOM is still coping with more fundamental risk issues like economic development and sustainable livelihoods of those affected.

Since the GOM makes considerable expenditures on post disaster catastrophe assistance such as restocking, carcass removal, health and food services etc., it decided to adopt a more efficient tool to manage *dzud* disasters. Furthermore, substantial decrease in the post disaster aid provided by the international community during last *dzud* event increased the GOM's incentive to allocate some portion of the scarce budgetary resources to the disaster management activities. Now, the GOM plans to implement more systematic approach in ex-ante risk management and also seeks options on directing national and international aid received during the disaster in a more structured way.

On the other hand as the intensity and frequency of catastrophes is predicted to enhance, thereby increasing costs of disaster consequences to the Government and society, financing of catastrophe losses need to be properly planned, institutionally structured and reflected in the fiscal budget through creation of a reserve fund.

For these reasons, after comprehensive analysis the Parliament issued a decree to implement Mongol Livestock Program for the duration of five years starting from 2010 (Parliament of Mongolia, 2010). This national program covers issues pertaining to the pastureland utilization, livestock genetics and breeding, industrialization of livestock production, and regulation of livestock veterinarian services. Advanced livestock data registration information system management with detailed records of breeding

information, medical treatments' inventory, purchases and sales, weights and carcass data is to be also developed. In addition it will attempt to introduce standards to meet international export requirements on meat and other livestock production. In order to strengthen risk reduction measures, creation of fodder production facilities as well as water reserves including bumps, wells and irrigation system is to be financed. Furthermore, education campaign on risk management, livestock services and production development is to be organized among herders and local specialists.

The program also proposes to legalize issue pertaining stocking density and pastureland utilization through introduction of the land utilization fee to be imposed on herders set in accordance to the geo climatic classification of the area and type and total number of species.

Although previous activities of the GOM towards risk management were hardly financed from the fiscal budget, mostly relying on international and donor support, the Mongol Livestock Program is entitled to receive funding from the fiscal budget in the amount equal to the 3 percent of the total budget. Moreover, "Mongol Livestock" Development Investment Fund is to be created from the proceeds of the mining production income as well as national and international assistance and donor aid.

At a glance it can be concluded that the program was capable to set a national framework for managing agricultural shocks through institutional framework and state research organizations. This includes assessment of the national risk profile, introduction of national disaster prevention, mitigation, warning systems, and education on ex ante planning for natural disaster. Establishment of the proper financial management with contingency financing for *dzud* disasters as well as legal and regulatory framework is the key to success for this program.

3. *Dzud* Disaster Risk Assessment

3.1 The Nature of Risk

Nomadic pastoralism is a risky business that is severely dependant on extreme weather and climatic conditions throughout a year. Mongolian weather is harsh and small percentage of livestock losses occur every year. Even in very normal winters and springs the sector carries a loss from about 0.8 to 1 million heads of livestock, which averages to about 4 percent of the total national livestock (Shagdar, 2002).

Tachiiri et al. suggest that *dzud* related livestock mortality is dependent on the snowfall in winter, the vegetation condition in the previous summer, and the density and health condition of the livestock (Tachiiri et al., 2008). Recent study conducted by the United Nations Development Programme (2010) defined four major factors that have an impact on occurrence of *dzud* disaster situation: (i) summer drought that affects pastureland throughout the country, (ii) increasing number of national herd, (iii) occurrence of unusually cold winter with heavy and frequent snowfall, (iv) lack of sufficient reserves of hay and fodder.

Major assessment criteria for *dzud* are (i) snow layer thickness on pasture as of end of ten-days or month period, its density, (ii) a number of days when livestock unable to go to pasture reaches due to extreme cold weather and strong wind compared to average of several years, and (iii) lowest temperatures of from -35° to -50°C depending on regions (GOM, 2008). However, since different types of weather combination (refer to Table 2) as well as some human actions cause varied levels of *dzud* disaster, comprehensive risk management approach that considers all these causes would be required.

Table 2: Natural Disasters that Cause Huge Livestock Mortality

Disaster Type	Weather condition	Causes and Effects	Management Technique Required
Tsagaan (white) <i>dzud</i>	average level of snow layer thickness on pasture land reaches in high mountain and forest region above 21 cm, in steppes above 16 cm, gobi region above 10 cm, and snow density reaches 0.20 g/cm^3 and above in any region	The most common and disastrous if affects large area and prevents animals from grazing	Prepare livestock shelter, prepare enough hay and fodder, remove snow from the animal's body before it freezes and hardens, keep animal warm with coverlet
Har (black) <i>dzud</i>	no snow during winter, monthly or ten-day's average temperature is below 5.0°C of several years' average	Causes water supply shortage and often aided by lack of winter grass	Need to have access to water well, prepare enough hay and fodder
Tumur (iron) or glacier <i>dzud</i>	establishment of glacier on pasture due to rapid change in temperature stock unable to reach pasture and snow density reaches 0.30 g/cm^3 and above	Prevents access to the grass	Prepare enough hay and fodder
Hoof <i>dzud</i>	The most severe dry weather	Causes complete depletion of grass due to drought	Prepare enough hay and fodder, slaughter some weaker animals in autumn

Havsarsan (combined) <i>dzud</i>	Two or more of the above occurring simultaneously	Some combinations of the above	Some combinations of the above
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Source: (GOM, 2008)

Studies conducted by fellow researchers suggest that traditionally there is a high correlation between the ability of the animal to gain sufficient weight during the summer and capability to survive harsh winter conditions. Mongolian livestock should obtain over 90 percent of its annual feed intake by grassing year-around on open pastures with their maximum weight obtained from early summer until the end of autumn when high quality grass is available (Punsalmaa et al., 2007). If enough weight was not gained during this period, livestock would struggle to survive Mongolian long winter and spring, the most difficult season for livestock because new grass is not yet available while it is still cold, dry and extremely windy with occasional snowfall.

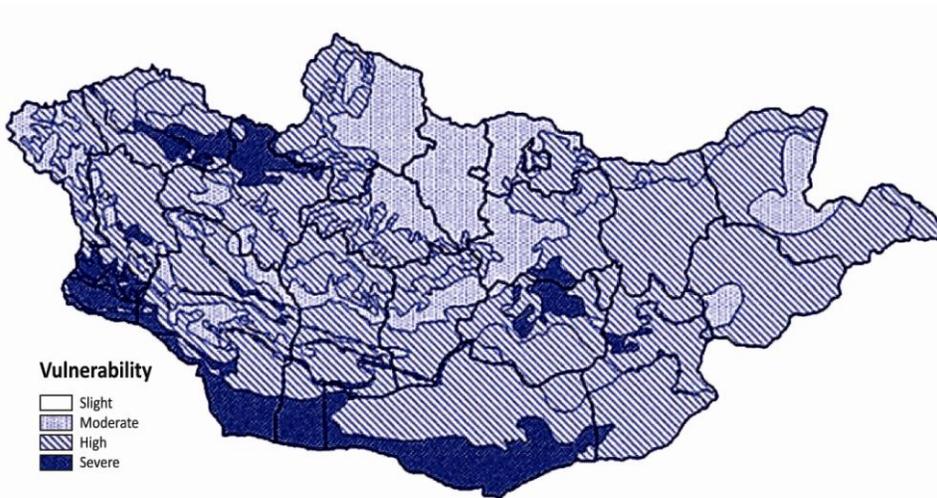
Generally, in case of *dzud* event livestock deaths are to continue for about 6 months from December to May of the next year with earlier livestock deaths mostly due to hazardous winter weather conditions and later deaths from starvation and freezing due to shortage of pasture and/or fodder and hay (Goodland et al., 2008).

While feeding is vital for the livestock, accessibility of grass is lessening sharply due to drying of the climate over last 40 year period. It was revealed that often times heavy *dzud* disasters are preceded by drought condition during the summer (Collier and Skees, 2009 p.4). According to the Ministry of Environment (2009), Mongolian climate is warming and getting drier with slightly decreasing precipitation leading to increase of severe drought and drying up of water resources. Furthermore, it was observed that during the last decade about two-thirds of the Mongolian land was affected by severe drought and about 3,000 water sources have dried up. The UN Convention to Combat Desertification (2007), evaluated the territory of Mongolia to be naturally susceptible to land degradation/desertification. The study also notes that this grassland degradation further causes sustainability risk to Mongolia’s nomadic pastoralism, aided by human activities such as overgrazing and irresponsible mining.

Figure 1 below illustrates results of the analysis conducted by the group of researchers using meteorological and hydrological data demonstrate that about 90 percent of Mongolia’s land is prone to moderate, high and/or severe *dzud* and drought conditions (Punsalmaa et al., 2007, p.77-78).

Pastureland ecosystems in Mongolia are fragile, highly susceptible to degradation and slow to recover, primarily due to the cold, dry climate. Some estimates show that more than 76 per cent of the pastureland is subject to overgrazing and desertification (MNE, 2003). Scholars identified several explanations for this occurrence. Firstly, a drought and desertification process is reducing vegetation yield and leading to low production of hays and fodder. Dry summers and droughts have been observed to decrease rangeland productivity by 12-48 percent in high mountains and by 28-60 percent in desert steppe.

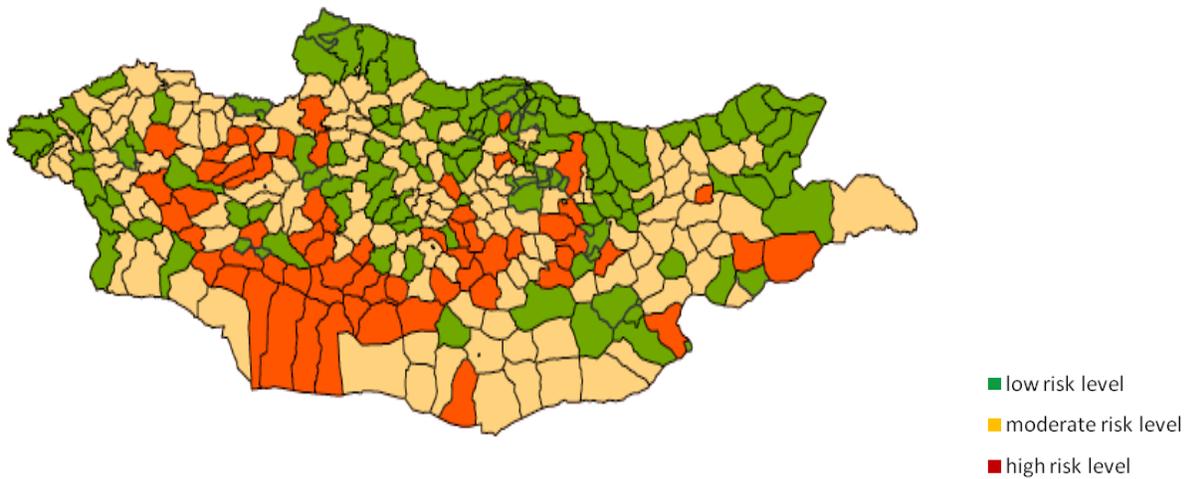
Figure 1: Areas Vulnerable to Dzug and Droughts



Source: (Punsalmaa et al., 2007)

Study conducted by the Institute of Meteorology and Hydrology (2004) in Gobi and Steppe *soums* of Zavkhan *aimag* shows 60 to 100 percent decrease of vegetation species and 20 to 50 percent vulnerability of pasture. These results in average are representative for the whole country. What is more, such desert steppe and high mountain areas also have experienced higher livestock mortality following the *dzud* event. In attempt to identify relatively identical groups based on selected characteristics of livestock mortality pattern and similarity measures, cluster analysis approach has been applied.

Figure 2: Areal Map for Livestock Mortality



Source: (Author's estimates based on the NSO data)

This analysis used livestock mortality data by each of the species and *soums* for the period of 36 years from 1972 to 2008. According to such analysis the country may be divided into 3 zones: (i) low risk exposure level – with historical livestock mortality less than 30 percent, (ii) moderate risk exposure level – with historical livestock mortality up to 45 percent, and (iii) high risk exposure level – with frequent livestock mortality often exceeding 50 percent (Figure 2). For the full list of *soums* by each of the risk exposure zone please refer to the Appendix C. Furthermore, harsher the geographical and climatic condition more prone the animal to the death, which is evidenced by higher loss ratios in the western and southern regions.

Secondly, while livestock was privatized to herders in early 1990s pastureland remained state-owned. This open access commons condition developed poor management practice of the pastureland among rural communities during last 20 years. Fratkin and Mearns (2003, p. 117-118) emphasizes that rapid decollectivization in Mongolia with pastureland constitutionally excluded from private ownership, would originate environmental risks and create rural poverty unless continued provision of a safety net by the GOM is appropriately introduced.

At current, most of the total of 112.8 hectare of the country's open pasture land areas is experiencing heavy greasing pressures affected by increased livestock numbers and inability to relax and preserve land. While livestock numbers from 1934 to 2007 increased by 62.7 percent, pasture area decreased by 14.7 percent with the carrying capacity exceeded by 40 percent in 1990-2006 (Dorligsuren et al., 2008). Its evidenced that 80 percent of the pasture land is degraded with stocking density capacities overrun 1.3-3.5 times in rural areas and with up to 5-10 times in peri-urban areas (Dorligsuren, 2006, Shagdar, 2002). On the other hand, compared to the pre-reform years, preparation of hay and fodder was reduced by 25 times as of 2006 (GOM, 2007). Furthermore, it is evidenced that herders are rapidly increasing their goat populations because of the high price of cashmere wool on the international market. At the same time scientists identified that goats are the most harmful in destroying pastureland soil because of chewing the grass down to the roots.

It needs to be restated that lack of policy towards pastureland management, winter preparedness strategy and insufficient forage reserves are the foremost reason for higher livestock losses during *dzud* disaster events. Therefore, unless these challenges are solved implementation of the viable and sound disaster insurance program would not be economical.

3.2 Economic and Social Consequences of *Dzud* Disasters

Although the greatest financial losses from weather-related catastrophes were experienced by developed countries due to high concentration of assets (AON Benfield, 2008), largest economic impacts and social vulnerabilities were evidenced in the emerging nations (World Bank, 2001).

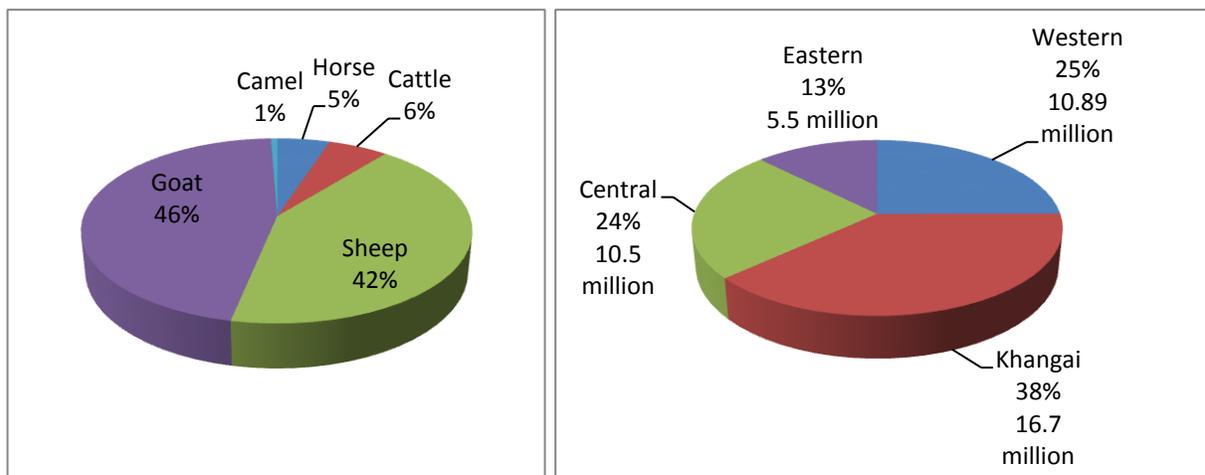
In Mongolia Livestock herding has been important source of income and livelihood for rural community that composes almost 40 percent of the national population (Gooptu et al., 2007, p. 46-47). Livestock husbandry continues to be an integral component of the country's economy and according to 2007 national statistics, livestock sector has contributed for 17 percent of Mongolia's GDP and accounted approximately 43 million head of livestock (NSO, 2008) (Table 2).

Table 3: GDP Composition by Sector, in percentages

	1940	1960	1970	1980	1990	2000	2009
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Industry	12.19	19.98	32.61	44.48	49.43	20.05	24.14
Agriculture	75.77	35.52	28.21	16.03	14.37	29.10	22.82
Construction	1.44	11.23	9.87	12.09	10.10	1.90	2.21
Transport and Communication	0.93	10.36	10.38	11.83	10.90	11.01	39.59
Other	0.10	22.90	18.94	15.58	15.20	37.94	11.23

Source: National Statistical Office 1991, 2008, 2010

By the end of 2008, Mongolia owned total of 43.6 million of livestock with about 88 percent composed by sheep and goat (Figure 3). It shall be noted that number of goat has sharply increased reaching almost half of the total animal population as opposed to about quarter of total stock in early 1990s (NSO, 1991). Such sudden shift was driven by the high market value of raw cashmere collected from goat and herders' desire for more cash income. It can also be noted that some regions⁵ with more favorable climate conditions tend to graze larger number of animals.

Figure 3: Composition of Livestock as of 2008

Source: Author's estimate based on NSO data

During last 100 years, the country experienced heavy *dzuds* in 1944-45, 1967-68, 1999-2002, and 2009-2010 (please see Table 3). Although both frequency and severity of the *dzud* hazards seem to increase causing larger livestock mortality, *dzud* is not a purely natural phenomenon.

⁵ Territory of Mongolia is categorized into Eastern (Dornod, Sukhbaatar, Khentii), Western (Bayanolgii, GobiAltai, Zavkhan, Uvs, Khovd), Central (Gobisumber, DarkhanUul, Dornogobi, Dundgobi, Umnugobi, Selenge, Tuv), and Khangai (Arkhangai, Bayankhongor, Bulgan, Orkhon, Ovorkhangai, Khovsgol) regions

As defined by Otgontogs (2005) the negative consequences of *dzud* are directly linked to the response action of the affected people (herders) and the GOM. For instance, although 1976-1977 winter *dzud* was the most severe natural phenomenon (heavy snow, low temperature, and strong blizzards), due to the proper preparation and management, the country experienced modest disaster losses, in particular, 1.7 million or 8.6 percent of total livestock. It even managed to overcome this harsh winter without substantial external aid.

While subsequent few *dzud* hazards have not created extreme economic and/or social disasters, three consecutive *dzuds* from 1999 to 2002 that affected 13 *aimags*⁶ of Mongolia created a major shock to the rural community. During these years the country experienced 8.9, 13.1 and 10.5 percent of livestock losses each year with total losses of about 11.2 million of adult livestock worth of USD 300 million (Otgontogs, 2005) (see Table 4).

Experts say that besides extreme weather and climatic conditions, several social factors such as i) sharp increase in the total number of herd and thus overgrazing pastureland, ii) inexperienced herders that have returned to herding after reform, and iii) breakdown in the traditional herding methods including wells, otor routes and forage reservation triggered such extreme losses and created almost 40 percent rural poverty.

Table 4: Dzud Occurrence and Related Losses

Years with Disasters	Type of Disasters	Affected <i>soums</i> and <i>aimags</i>	Total Livestock Losses (in millions of heads)	
			In numbers (adult)	In percentage (adult)
1944- 1945	drought, <i>dzud</i>	65% of 9 <i>aimags</i>	8.1	33.2
1954-1955	<i>dzud</i>	9 <i>aimags</i>	1.9	8.2
1956-1957	<i>dzud</i>	11 <i>aimags</i>	1.5	6.2
1967-1968	<i>dzud</i> , foot and mouth disease	80% of 13 <i>aimags</i>	7.8	11.9
1976-1977	<i>dzud</i>	90% of 15 <i>aimags</i>	1.7	8.6
1986-1987	<i>dzud</i>	80% of 11 <i>aimags</i>	0.8	3.6
1993	<i>dzud</i>	30 <i>soums</i> of 3 <i>aimags</i>	1.6	6.4
1996-1997	<i>dzud</i>	69 <i>soums</i> of 11 <i>aimags</i>	0.6	2.1
1999-2000	<i>dzud</i>	157 <i>soums</i> of 12 <i>aimags</i>	3.49	8.9
2000-2001	drought, <i>dzud</i>	147 <i>soums</i> of 13 <i>aimags</i>	4.75	13.1
2001-2002	<i>dzud</i>	114 <i>soums</i>	2.91	10.5
2009-2010	drought, <i>dzud</i>	95 <i>soums</i> of 17 <i>aimags</i>	7.5	15.0

Source: (National Statistical Office, 1991, NEMA, 2010)

It took several years for the country to stabilize its GDP rate from 1.0 percent to the pre-disaster rate of 5.6 percent. The most recent *dzud* phenomenon hit Mongolia during 2009-2010 winter, which alone covered over 80 percent of the country, causing loss of about 7.5 million livestock (15 percent of the national herd) and affecting 97,500 herder households of which 8,700 households have lost all of their

⁶ *Aimag* is the administrative division of Mongolia. The country is divided into 21 *aimags*.

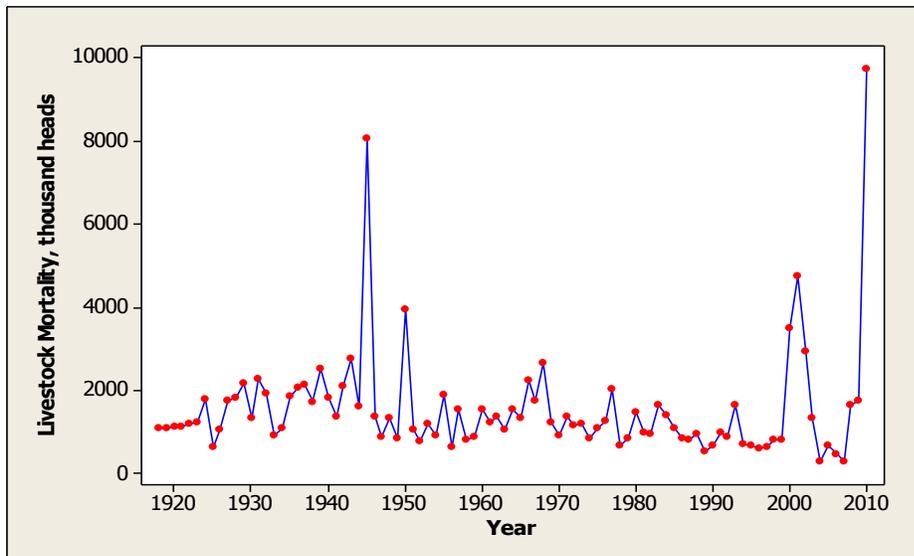
livestock and 1400 households migrated to urban areas (NEMA, 2010). Estimated amount of direct losses are approximately USD 375 million.

Pastoral risk is a major cause of poverty in the countryside, both in the herding economy itself, and at the local *soum* level. When *dzud* and other disasters occur often families are left without any or below the minimum viable level of herd, households often route into extreme poverty. In most cases these herder households do not have any additional source of income to support their daily life and/or labour skills to switch to a different work (Swift, 1999).

3.3 Exposure to the Risk

Analysis of the total livestock mortality for the period of 91 years from 1918 to 2009 showed that the country would face large livestock losses in about every 9-15 years (Figure 3). The first high level of the livestock exposure has been recorded for the winter of 1944-45. Records state that cold winter preceded by red drought created a loss of 8.1 million adult livestock or about 32.2 percent of the total stock. It took about 11 years for the country to recover after this *dzud* (NSO, 1991).

Figure 4: Livestock Mortality Trend (1918-2009)



Source: Author's estimates based on the NSO data

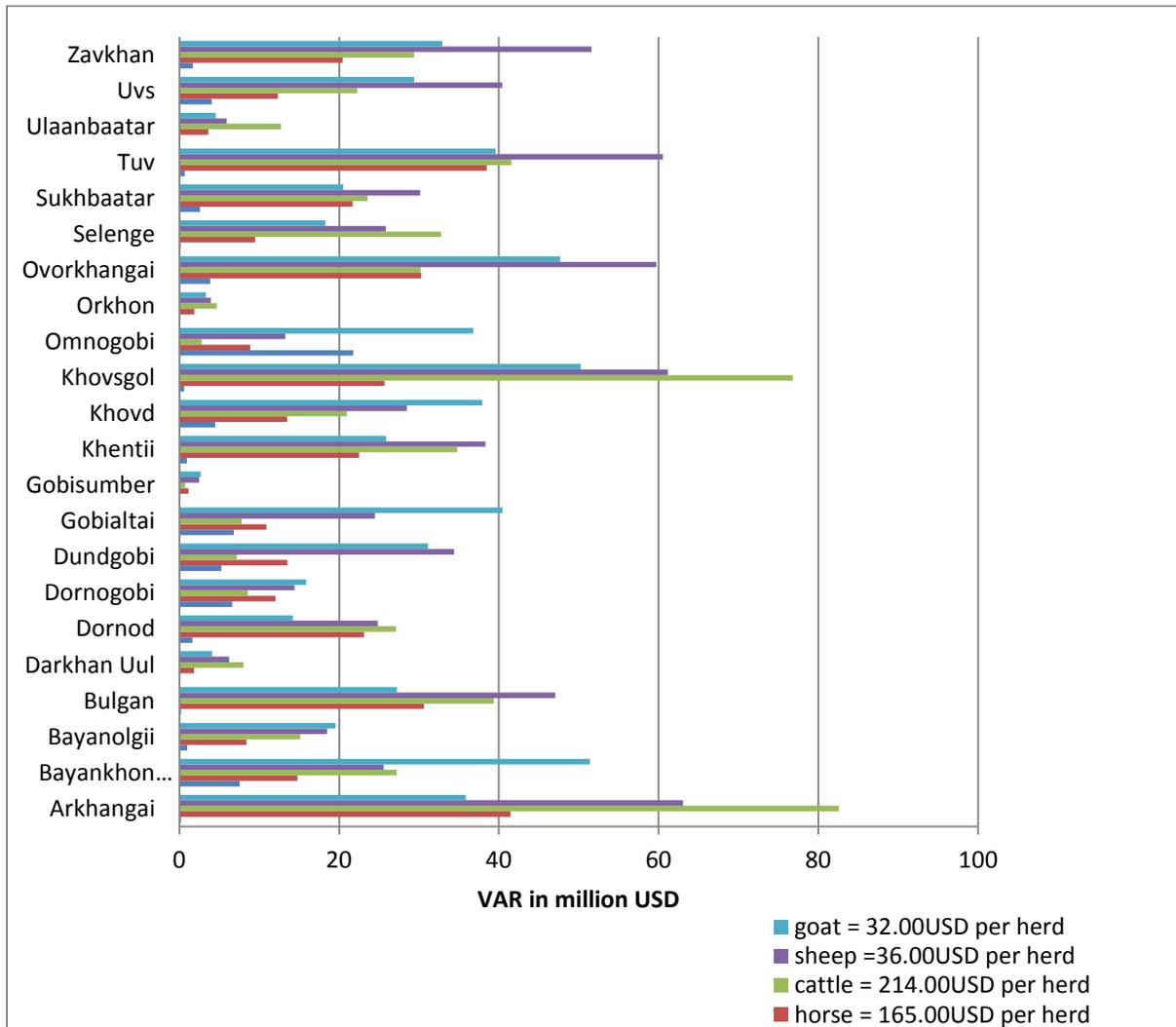
Historical evidences suggest that the socialist government was capable to manage risks associated to the *dzud* and keep livestock mortality rate at the low level through systematic winter preparation strategy. Therefore, although harsh weather conditions have been experienced few times during 1950-1993, the country avoided huge livestock losses.

Consecutive sudden incidents of heavy snowfalls, low temperatures and winter storms, preceded by drought and pasture overgrazing occurred during 1999-2002, have caused a mass death of livestock in 157 sums of 13 *aimags* over the three years. In total 8.9 million adult livestock was dead. Horse and cattle were the most affected, with their number reduced by 26.0 and 42.2 percent respectfully.

The winter of 2009-2010, is the latest record of huge livestock losses causing death of about 9.73 million or 15 percent of the total national herd.

To identify probability of possible future losses in case of *dzud* disasters the assumption that the past is a good predictor of the future has been used. It has been assumed that likely future distribution of disaster patterns and associated losses are to be representative of what happened during last few decades. Therefore, mortality loss estimates of last 37 years as well as current number of animals have been used for further calculations. Animal numbers were converted to financial value by using the estimates of value of animal by species and by *soum* for 2009 that were kindly provided by the NSO.

Figure 5: The Value at Risk by Species and Aimags as of 2009



Source: Author's estimates based on the 2009 NSO data

Value for each of the livestock species per *soum* was calculated using following formula:

$$HerdValue_{ij} = NumberHerd_{ij} \times UnitValue_j$$

where,

i = *soums* and j = *herd species type*

Taking into consideration price estimate for each species issued by the National Statistical Office, total livestock value at risk was estimated to be around 2.2 billion USD. Arkhangai and Khovsgol have the highest risk exposure compared to other *aimags* (see Figure 5). If considered by species, the substantial cattle exposure is in Khovsgol and Arkhangai, the highest sheep and goat exposures are in Arkhangai, Ovorkhangai, Tuv and Zavkhan *aimags*. In addition, Arkhangai, Bulgan, Ovorkhangai and Tuv *aimags* are at the higher exposure related to horse mortality. However, camel risk is excessive only in Omnogobi *aimag*. Cattle, sheep and goat constitute about 81 percent of the total exposure with 24 percent for cattle, 30 percent for sheep and 27 percent of exposure for goat.

Different approaches and/or triggers have been used in order to determine factors that have influenced on livestock losses during *dzud* disaster events. For instance, some scholars attempted to predict livestock mortality using the data related to the previous year's vegetation condition and livestock number as well as current year's snow condition and livestock mortality. Tachiiri et al. (2008) identified that low Normalized Difference Vegetation Index (NDVI) associated with drought only weakens but does not kill the livestock in many cases. Also their model indicates that there is an inherent carrying capacity of livestock numbers and, if it is exceeded, more livestock are prone to abnormal deaths and *dzuds* control the livestock number. They concluded that in order to reduce *dzud* related risks, systematic monitoring of snowfall in winter, the vegetation condition in the previous summer, and the density and health condition of the livestock is required. Attempts of Collier and Skees (2009) to determine drought conditions using satellite measures for estimation of the density of vegetation in an area suggested that while some NDVI relation with extreme losses exist, there are many other factors that affect the livestock losses during *dzud*.

Such weak correlation of the certain weather parameters with predicting massive livestock mortality are due to the fact that *dzuds* are typically caused by different combination of weather and climatic phenomenon (see paragraph 1.2). Mahul and Skees (2007b) noted that weather-based parameters are inadequate in predicting livestock mortality due to the distant location of the weather equipment and their poor infrastructure.

Therefore, this research used mortality rate of adult animals in a given area for predicting *dzud* disaster risk exposure. In particular, historical mortality data for five livestock species such as cattle, sheep, goat, horse and camel from 1972 to 2008 were obtained by *aimags* and *soum* level from the National Statistical Office. The GOM's exposure to risk or loss potential has been determined based on the

approach that the proposed Government's Disaster Response Product: (i) would provide insurance coverage for livestock mortality losses using composite index at 30 percent above *soum* average; (iii) participation fee payable by herders would be set up depending on the regional risk exposure zone; and (iii) the GOM's payouts would be based on the 50 percent of the estimated value of insured herd.

Table 5: Correlation Matrix of Livestock Mortality Rate (1971-2008)

	Cattle	Sheep	Goat	Horse
Sheep	0.790			
Goat	0.775	0.889		
Horse	0.812	0.816	0.787	
Camel	0.404	0.544	0.553	0.504

Source: Author's estimates based on the NSO data

A high positive relationship of livestock losses among four species: cattle, horse, sheep and goat was also identified with the correlation coefficient ranging from 0.775 to 0.889 were indentified (Table 5). The reason why camel mortality differs from those of other species may be due to its undersized population and concentration in one region only.

Since there is evidence that when one of the species is exposed to high mortality risk other species are also prone to the similar level of risks under similar weather conditions, composite mortality index can be applied for estimation of livestock losses due to the catastrophe *dzud* events. Such composite mortality index is estimated using sheep proxy that is applied by the National Statistical Office for the estimation of pasture density capacity and calculation of required hay and fodder reserves (Table 6).

Table 6: Sheep Proxy Conversion Rate

1 camel = 5 sheep
1 horse = 7 sheep
1 cattle = 6 sheep
1 goat = 1 sheep

Composite mortality index of livestock losses was calculated using historical livestock number and mortality data by all five species based on the below formula.

$$CMI_t = \left(\frac{6MCattle_t + 7MHorse_t + MSheep_t + MGoat_t + 5MCamel_t}{6TCattle_{t-1} + 7THorse_{t-1} + TSheep_{t-1} + TGoat_{t-1} + 5TCamel_{t-1}} \right) \times 100\%$$

where,

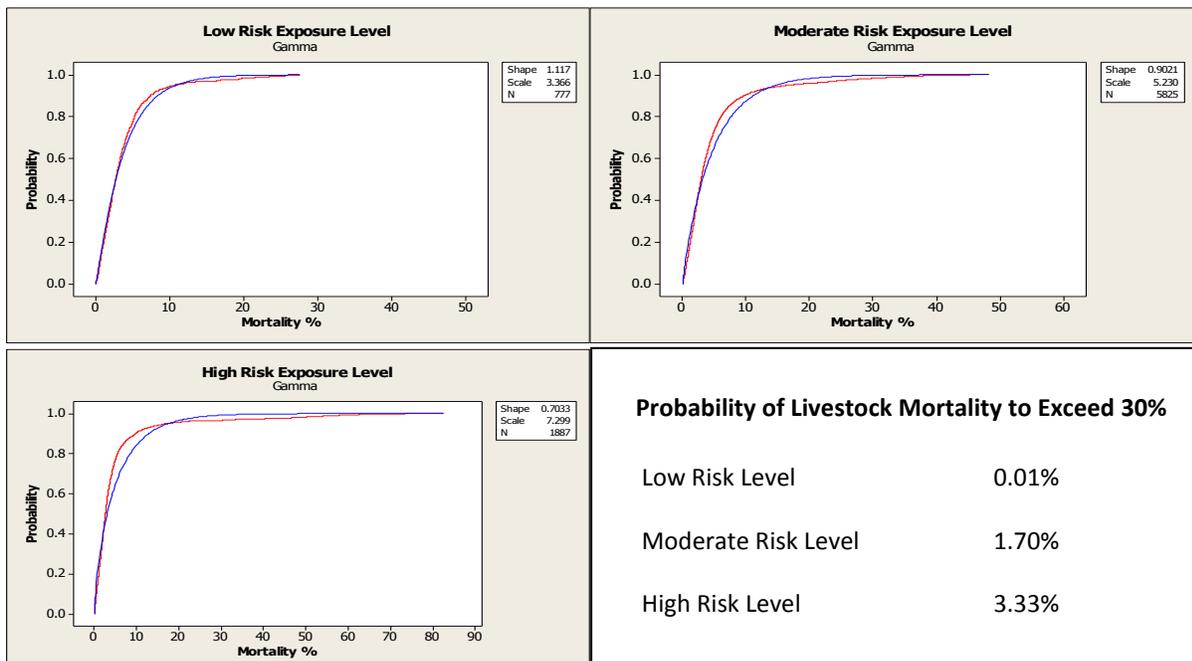
CMI- Composite mortality index for the *soum* at time *t*, percentages

MCattle, *MHorse*, *MSheep*, *MGoat*, *MCamel* – mortality of livestock at time *t*, head units

TCattle, *THorse*, *TSheep*, *TGoat*, *TCamel* – total number of livestock at time *t-1*, head units

Probability of livestock losses exceeding 30 or more percents in any given year was estimated for each of the low, moderate and high risk exposure zones that were identified earlier (for details please see paragraph 3.1 and Figure 2). There are 94 *soums* throughout Mongolia that have been exposed to less than 30 percent of livestock mortality based on the *soum* level and thus, classified under low risk exposure zone with 0.01 percent of risk occurrence probability. 164 *soums* have historical livestock losses of up to 45 percent at *soum* average and are classified under moderate risk exposure zone with 1.70 percent of probability exposure losses above 30 percent in any given year. Remaining 61 *soums* have evidenced historical livestock mortality beyond 46 percent and are categorized under high risk exposure zone with 3.30 percent probability of losses exceeding 30 percent based on the composite mortality index in any given year (Figure 6). Considering these risk occurrence probabilities and total number of livestock for each of the risk exposure zones, amount of required GOM reserve funds has been identified.

Figure 6: Empirical CDF of Livestock Mortality (1972-2008)



Source: Author's estimates

Consequently, to measure the financial impact of *dzud* disaster catastrophes and identify the expected GOM's exposure to *dzud* related risk below formula has been used. Possible loss amount was defined by multiplying total insured value of the livestock to the probability of *dzud* risk causing herd mortality losses in excess of 30 percent.

$$Loss = \sum_{i=1}^n [InsuredValue \times Pr(RiskOccuring)]$$

$$Loss = \sum_{i=1}^n (IValue_{low.riski} \times 0.001) + \sum_{j=1}^m (IValue_{mo.riskj} \times 0.017) + \sum_{k=1}^l (IValue_{high.riskk} \times 0.033)$$

Taking into consideration composite mortality index based on the sheep proxy, insurable value for the herd unit was set as USD 18.00 or in other words 50 percent of the sheep value as determined by NSO from the average market price. According to calculations insurable value of all national herds is approximately 1.21 billion USD with GOM's exposure to the financial risk of about 18 million USD (Appendix D).

4. Chronological Review of Livestock Insurance in Mongolia

4.1 Management under the Socialist Structure

In order to decrease state's financial exposure to the effects of uncertain losses and be able to coordinate economical application of resources more systematically, the Government of Mongolia has established State Insurance Organization (SIO) in 1934. As livestock evolved into main source for the economic wealth, providing resources for major export products, the Government of Mongolia has started to search for more comprehensive risk sharing strategy and starting January 1, 1964 it introduced the livestock insurance for the cooperatives' livestock. This was a mandatory property insurance against the natural disasters like *dzud*, drought, and animal contagious diseases on a premium basis. In addition to the livestock insurance other risk mitigation measures including proper preparation for winter were obligatory.

Insured cooperatives used to pay the premiums for each of the species as percentage of its price value and regardless of the geographical or climatic risk exposure zone. For instance premiums for camel were equal to 1 percent of its price, while premium rate of all other species such as horse, cattle, sheep and goat were fluctuating around 1.7 to 2 percents (Mongol Daatgal, 2010). When insured herder cooperatives would experience a loss for a specified peril, they were required to make a 'claim' against the SIO for the actual losses along with the supporting documents from the police, veterinary services and the local administration.

In order to have reliable repayment funding, the livestock insurance was reinsured with international reinsurance companies through the London's insurance market. During 1980s, purchasers of the Mongolian livestock insurance contracts under the quota share treaty were major international reinsurers such as Loyds of London, All Risk Insurance, Sedgwick Group, Munich Re and other reinsurance brokers on the London and Milan reinsurance market as well as some reinsurance companies from the socialist system. Under the proportional reinsurance, SIO was purchasing about 30 to 50 percent of the quota share treaties on the international reinsurance market spending 80 to 90 percent of the livestock insurance premiums collected for such purposes (Mongol Daatgal, 2009).

According to the SIO reports for the period of 1964 to 1978, reinsurers' experienced financial losses during 1964, 1968, 1975, 1977 years in total amount of 4022.9 thousand USD, while have gained a profit of 2055.1 thousand USD during the other years. The difference between these amounts has resulted in the accrued profit of approximately 2 million USD for the SIO.

However, since 1960s there were 4 biggest losses in the livestock sector Mongolian livestock re-insurance has been considered as a "bad contracts" and many large re-insurance companies started terminating their contracts. Although few foreign re-insurers were still entering into the livestock reinsurance agreement with SIO, the privatization of the state livestock to herders as well as privatization of the SIO after shift to the free market economy terminated the mandatory livestock insurance.

4.2 Livestock Insurance Challenges during Early Market Economy in 1990s

Since livestock sector continued to be one of the principal economic sector and supported livelihoods of the majority of rural population, the GOM has never set aside its research for the various livestock insurance options. The GOM proposed compulsory livestock insurance draft laws three times to the Parliament: (i) in 1995; (ii) in 1998 offering insurance cover for breeding animals and crop seed; and (iii) in 2001.

While Mongol Daatgal, successor of the SIO established after economic reform and Tushig Daatgal, another state owned insurance company established to provide agricultural insurance services, were providing traditional livestock insurance products with 6 percent flat premium rate and payment of losses for a 100 percent of insured value less any proceeds from the sales of skin and bones after animal's death, had a very low intake. Without any success to develop livestock insurance law, as soon as the two companies were privatized in early 2000s, the new management considered livestock insurance operations too risky and seized such line of business. Mongolian immature insurance market had neither financial or technical capacity nor interest to continue livestock insurance business in Mongolia.

Though some form of livestock insurance was required, traditional insurance approach with option to indemnify based on the actual losses of animal from the specific peril was not appropriate under the Mongolian condition due to its high regional covariate risks. Also, operational expenses under such insurance system were extremely high. Especially, consideration of both the social and market dimensions of such insurance would have huge negative impact the state's limited fiscal budget.

After *dzud* disaster experiences in 1999-2002, the Government of Mongolia approached international donor organizations seeking assistance in creating appropriate livestock risk management system. With financial assistance from the World Bank, in 2002 the GOM identified that the index-based insurance scheme would be the most effective and cost efficient ex-ante catastrophe risk management tool for the rural community of Mongolia. In general, advantages of the index-based insurance are (i) elimination of the problem of moral hazard because the policyholder's behavior cannot impact whatever the index is measuring, (ii) reduce adverse selection because both buyer and seller should have equal knowledge regarding the likelihood of the weather event that will trigger payments, (iii) low administrative cost with loss adjustment costs cut down, (iv) incentives to individual farmers to continue to manage their business so as to minimize the impacts of major weather events since indemnities would be paid irrespective of their individual losses (Barrett et al., 2008, Alderman and Haque, 2007, Cummins and Mahul, 2009).

4.3 Introduction of the Index-Based Livestock Insurance Products in 2005

After thorough research and appraisal work during next three years, together with participating private insurance companies the GOM launched a pilot project on mortality rate index-based livestock insurance in the selected three *aimags*. The implementation activities as well as a contingent fund for the indemnity payments exceeding accumulated resources were financed by the World Bank development credit, Government of Japan grant, and, later, by the Swiss International Development Agency and Government of Korea grants.

Under the pilot, two voluntary insurance products were tested: (i) the Livestock Risk Insurance (LRI) – the commercial insurance product for infrequent losses above 6 percent of the *soum* mortality rates that take place in about 5 to 20 years, and (ii) the Disaster Response Product (DRP)- the social product that cover catastrophic losses, occurring approximately once every 25 years or more. While purchase of the LRI requires payment of the commercial rated premium that includes risk load set for each *soum* based the on its assessed risk zone and administrative load, participation in the DRP involves payment of small service fee (operational cost for a unit of livestock is as follows: sheep 40 *tugrugs*, goat 40 *tugrugs*, cattle 160 *tugrugs*, horse 120 *tugrugs* and camel 240 *tugrugs*) only. Delivery of insurance sales was performed through individually trained insurance agents of the participating insurance companies.

In order to ensure sales incentives, system integrity and full indemnity payments in case of catastrophe risks without default to the insurance companies' business operations, the syndicate pooling arrangement (Livestock Insurance Indemnity Pool or LIIP) was established. Participating insurers are obligated to build up annual collective reserves into the LIIP and in return the GOM provides a stop loss reinsurance contract at 105 percent of the insurance premiums. After all claim payments have been made, any remaining money in the LIIP is to be refunded to the participating insurance companies based on the share of funds they put into the LIIP during the previous sales year along with the accrued interest earnings.

Table 7: The Index-Based Livestock Insurance Sales

Outcomes		2006	2007	2008	2009	2010
Participating insurance companies	in numbers	3	4	4	4	4
Participating <i>aimags</i>	in numbers	3	3	3	4	9
Participating herders	in percentage from total	8.50%	12.90%	14%	15.90%	10.50%
Herders with knowledge about indexed insurance	in percentage from total	51.90%	72.90%	76%	93.60%	-
Total livestock insured	in numbers	292628	437653	493623	789038	1056048
LIIP Reserve	million MNT	87.9	126.8	140.0	192.0	416.1
Indemnity payments	million MNT	1.1	378.8	389.7	1,800.0	-

Source: (IBLIP, 2009)

During the five cycles of the index-based livestock insurance sales in the selected *aimags* 7000 herders insured their livestock valued at about 153 billion MNT for the total premium of 770 million MNT (Table 6). At current the GOM is planning to expand the services of the index-based livestock insurance nationwide to all 21 *aimags* by the end of 2011.

According to the Annual Field Surveys conducted by the Project Implementation Unit, intake of the DRP was extremely low during the pilot period. Percentage of herders that participated in DRP in three *aimags* ranged from 0.3% in 2006 to 2.6% in 2008 (IBLIP, 2009). During 2006-2008 only 1637 were signed

for DRP compared to total of 8537 herders who purchased LRI (Table 7). Based on the project outcome, it is confirmed that linking market insurance product with the socially targeting one is not suitable. Insurance companies and their agents were more interested in selling products based on market rules for which they can receive commission and, hence, had no desire or incentives to promote the social product. On the other hand, for the majority of herders with limited knowledge about insurance and other financial services as well, understanding main differences between two insurance products and making well-versed decisions was quite a challenging task.

Table 8: Disaster Response Product

Outcome		2006	2007	2008	Total
Herders purchased DRP	in numbers	200	671	766	1637
Livestock Insured for DRP	in numbers	46,033	150,968	184,616	381,617
DRP fee collected	in million MNT	2.4	7.9	9.0	19.3

Source: (IBLIP, 2009)

For this reason, offering of the DRP under the Index-Based Livestock Insurance provided through participating insurance companies was discontinued from 2010. Since DRP is targeted to provide assistance to herders in case of large scale extreme disasters as a part of the social safety net services, it has to be linked with the GOM disaster management policy.

Several options for further development of the DRP services through the existing GOM's disaster risk management framework are feasible. However, while financial mechanisms are significant in the management of large periodic risks affecting the region, regulatory as well as structural measures to lower physical vulnerability should be also given high priority since such measures can sharply reduce risk exposure in permanent ways.

It appears to be that catastrophe insurance is primarily concerned with meeting a community need, as opposed to an individual need, and consequently local economic, social, and political factors play a major role in developing an acceptable and sustainable system. Hence, based on the lessons learned from the other countries diverse approaches, Mongolia has to determine the system that would be the most suitable for its economic, social and financial conditions.

Since the main objective of the DRP is to prevent those vulnerable to the *dzud* disasters shocks from falling below a certain poverty level by providing some form of the socioeconomic safety net from the public sector, it should be based on the principles of affordability and accessibility while still promoting desire for risk reduction among insured. As a state sponsored scheme it is to be funded by taxes and/or premiums paid by participants, although premium amount would probably be heavily subsidized to allow participation of those vulnerable.

Several possibilities that can be offered by the state for reducing catastrophe risks in ex-ante approach are available for the future consideration: (i) the GOM may act as an insurer and offer *dzud* disaster response insurance to herders in case of extreme events with extremely subsidized premium rates, (ii) the GOM may provide reinsurance through the private insurance sector by hedging extreme losses with

its contingent funding (iii) the GOM may establish national fund to coordinate and direct domestic and international donor assistance in case *dzud* disaster through a more comprehensive system.

Taking into account current situation of Mongolia, the state insurance system that would offer affordable *dzud* disaster response insurance may be the most efficient option. However, it should consider following comparative characteristics that would have major financial impact on the government's risk exposure can be defined and evaluated for the proposed options:

- Cost of the Insurance to the Government –additional budgetary expenditure requirements arisen from realization of the proposed insurance scheme
- Moral Hazard – increase in the insurers or the GOM's costs due to the behavioural changes of the insured, since they no longer bear the full costs of the risk occurred.
- Adverse Selection - a situation when potential insured is more informed about their risks than insurer does, leading to participation by high risk individuals and nonparticipation by low-risk individuals.
- Administration and Management – additional costs required to deliver the service, control and monitor activities, conduct risk assessment and process claims.

5. National Disaster Indemnification Program as an Effective Ex-ante Financing Mechanism for *Dzud* Losses

As the *dzud* disaster loss amounts are enormous relative to the economic resources of Mongolia, the Government of Mongolia attempted to cope with such catastrophe risk through introduction of a systematic risk transfer mechanism. Although piloting of LRI, the commercial livestock insurance product was viable with almost 20 percent of participation rate, catastrophe insurance or Disaster Response Product was not able to attract herders' interest. Several reasons for that are (i) lack of desire to promote social product by private insurance companies' commission based agents, (ii) herders concern on the occurrence of such a low frequency event and, thus, being indemnified, and (iii) lack of tradition and proper knowledge about insurance among the community members.

In many countries of the world, governments offered state protection against high covariate risks of natural disasters through establishment of the natural disaster relief fund that provides compensation for those who suffered from the natural hazard events. Majority of natural disaster related agricultural insurances around the world's developing and emerging countries are offered in collaboration with the government.

The nature of the involvement can range from schemes which are wholly owned and managed by governments with the role of commercial insurance companies only to collect the premiums to schemes which are dependent on private–public partnerships between the government and insurance companies. For instance there are several examples of the wholly state-owned schemes such as Spanish Insurance Consortium, National Flood Insurance Program in United States, New Zealand Earthquake Commission, and Turkish Catastrophe Insurance Pool. All these funds are managed as government business enterprises and expected to be sustainable with the assistance of government guarantees for very extreme events.

Other examples of catastrophe insurance pool include weather-based crop insurance in India, Malawi, Thailand and Ethiopia, index-based livestock insurance in Kenya, the Turkish Catastrophe Insurance Pool that offers efficiently priced earthquake insurance to homeowners. The Caribbean Catastrophe Risk Insurance Facility (CCRIF) is a unique program that offers Caribbean countries budget insurance akin to business interruption coverage that will provide immediate liquidity in the case of a major hurricane or earthquake.

Although introduction of the IBLIP brought some advantages of ex-ante risk management approach against *Dzud* disasters, due to high risk exposure of *dzud* related losses and undercapitalization issues, domestic insurers are able to retain only limited portion of risk exposure. Considerable support in form of state and/or international reinsurance is required to expand the services nationwide.

Based on the lessons learned from the previous attempts of the IBLIP pilot activities to engage domestic insurance companies in developing livestock insurance markets, it became clear that combining and delivering the social protection product together with the commercial insurance product has been confirmed not feasible. Commission based insurance agents of the participating insurance companies

tend to promote only commercial products often withholding information about the availability of the social protection product and its benefits.

On the other hand as a consequence of the limited domestic insurance coverage for catastrophic risks provided by local markets, and a lack of economic incentives to engage in ex ante risk management, the Government of Mongolia had to respond to *Dzud* disasters after the fact, relying on donor grants and domestic budgets, including diversion of resources from other planned development projects.

Therefore, rearrangement of the Disaster Response Product offered under the Index-Based Livestock Insurance Project is required. At least it should assist the GOM in making operational the insurance reserve fund and subsequently move to a more comprehensive sponsored insurance program.

5.1 Initial Issues for Resolution

If the Government of Mongolia plans to develop a comprehensive ex-ante risk management program and designs a social insurance scheme against catastrophe livestock mortality due to *dzud* disasters, a number of questions need to be initially resolved.

What is the intended coverage of the scheme? Is it just to provide coverage for all five species of livestock mortality in case of *dzud* related disasters for individual herder households or to all entities that own livestock? What should be the principles of such scheme and what is the threshold for indemnification?

If it is to be a government-based scheme, what will be the role of government? Will it be undertaken by a government business enterprise similar to the New Zealand scheme, or can it be distributed through existing channel of private insurance companies with the GOM providing the legislative framework and overall supervision of the scheme?

Will it be voluntary or compulsory? If it is to be compulsory, in what way will it be compulsory, and how will it be enforced? If it is to be managed by a separate government business enterprise, who will collect the premiums (or participation fee) and manage the processing of indemnity payments?

Should there be any premiums charge and if, yes, to what extent should it be subsidized by the government. Will there be fixed premiums or fixed premium rates, varying only at the provincial level, or will premiums be variable based on individual building risk?

What will be the form of the indemnification structure? Will it be based on full replacement value of livestock or a fixed amount subject to a defined parametric value? Will claims be limited by significant deductibles, and/or an upper limit?

How are the financial risks to the scheme arising for the insured livestock risk to be managed? Will it be from the contingent funds provided from the GOM, reinsured in one form or another form nationally and/or internationally, or funded through international donor aids or by any combination of these options?

What will be the relationship between the scheme and mitigation? Poorly planned schemes can become a disincentive to mitigation and create massive adverse selection and moral hazard issues which in turn

may create challenges in the sustainability of the program. The Program should encourage and support implementation of other risk preparedness and mitigation activities in rural Mongolia.

These issues are not technical but until they are resolved, much of the detailed technical analysis required to ensure the sustainability of a proposed scheme cannot be undertaken. Depending on the answers to these questions, the design of the *dzud* disaster insurance program can vary significantly. Subsequent paragraphs will attempt to provide some options that may be feasible based on the existing conditions and raise questions for further deliberation.

5.2 Institutional and Regulatory Framework for NDIP

The Government of Mongolia may consider establishing National Disaster Indemnification Program (NDIP) that acts as a state insurance enterprise and provides social insurance protection to herders against extreme *dzud* disaster events.

The development of the catastrophe insurance system such as National Disaster Indemnification Program will take a long-term effort that would require a well designed and managed scheme and a coordinated effort among the central and local government, the donor institutions and herder community. Therefore, a separate entity regulated by statute with adequate technical and financial capacity should provide the services. Such an institution should have some form of local representation at *soum* and *aimag* administrative levels as well.

5.1.1 Institutional Structure of NDIP

As the state enterprise, NDIP may operate under the authority of a GOM member in charge of either social insurance issues (Ministry of Labor and Social Welfare) or *dzud* related disaster management (most probably Ministry of Food, Agriculture and Light Industry or National Emergency Management Agency). Overall policy guidance and supervision of activities of the NDIP including improvement of its products, systems and operations, approval of eligibility requirements, participation fee and reserve fund releases as well as monitoring and quality assurance ensure its proper implementation, and promotion among participating governmental and non-governmental organizations, economic entities and individuals shall be provided by the NDIP Board.

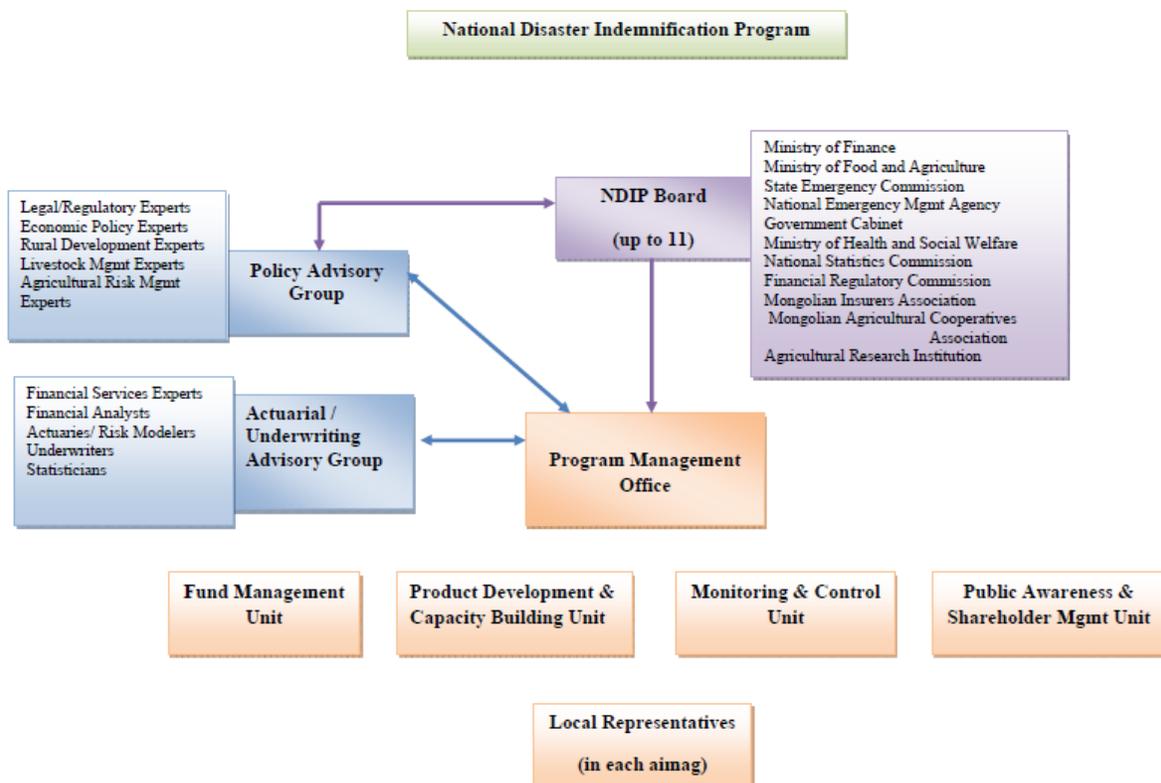
The NDIP Board should consist of the non-staff members equally representing the relevant government agencies, representation of the non-governmental and research institutions collaborating in the area of sustainable agricultural and rural development and insured.

All day-to-day management and implementation of the NDIP shall be operated through the central office of the NDIP. Such as central office should conduct activities such as management of reserves and other funds, product development, capacity building of related institutions in particular service providers at local levels of administration, conduct monitoring and control, disseminate information and raise public awareness. In order to provide the NDIP with expertise knowledge and advice on the related policy and regulatory issues as well as assist in the development of the actuarially sound and financially viable social insurance scheme a panel of experts should also be established (Please see Figure 7 for the management structure of the NDIP). Policy and Actuarial/underwriting advisory groups are aimed to consult the central

office in developing the most effective and efficient mechanism towards delivering comprehensive social protection services in case of extreme *dzud* disasters. Advisory group members could be individuals with comprehensive and proven expertise in the designated field or be representatives of private/non-governmental institutions specialized in the relevant area. Their service should be compensated based on the market principles and commercial rates.

Furthermore, in close collaboration with *aimag* governors NDIP's representation should be established at the *aimag* level and be able to keep communication with all soums within the *aimag*. Close collaboration with local administrations at all levels and their full engagement is vital to the long-term sustainability of such program.

Figure 7: Management Structure of the NDIP



In order to encourage risk prevention and risk avoidance activities among herders and ensure stability of the NDIP, close collaboration with other government programs that promote *Dzud* related risk management such as Mongol Livestock Program, Livestock Quality Improvement Program, Sustainable Livelihood Program and IBLIP is extremely important. Most of the activities promoted by these programs to herders in rural communities are created to support disaster risk management activities such as better preparedness, infrastructure development and creation of other risk mitigation tools as well as delivery of sound veterinary and livestock quality improvement services. Therefore, some mechanism that

promotes prioritization of service delivery to those herders who is registered for NDIP should be established.

NDIP should also closely collaborate with government activities towards pastureland management. Although the draft pastureland management law is still under the discussion and review by the Parliament, there is a long-time negotiation towards implementation of the pasture-land management fee. If such fee takes an effect, some portion of it can be set up towards the protection from the extreme *dzud* risks into the NDIP.

5.1.2 Legal and Regulatory Requirements for NDIP

As mentioned in the above paragraph, the NDIP needs to be established as an independent statutory body governed by a separate National Disaster Indemnification Program Law. Furthermore, some aspects of the NDIP operations such as eligibility criteria for participants, establishment and management of reserve funds and indemnity payment conditions, arrangement of participation fees and possibility of combining it with other relevant service fees and/or tax levies have to be regulated by the Government Decree.

Brief overview of Mongolian laws and regulations indicates no restriction in establishing NDIP as an independent statutory body similar to the Social Insurance Organization. Though, some other models for structuring the NDIP may need to be considered and compared. It may include: (i) establishing the NDIP as a fund under the relevant government institution (similar to Mongol Livestock Program); (ii) founding the NDIP as a state company formed under the Company Law; (iii) managing the NDIP under one umbrella with other micro-financial and/or micro-insurance service organizations.

Regardless of which of the models is selected while drafting NDIP Law, full account must be taken of the Constitution of Mongolia, the Civil Code, the general Insurance Law, and Regulations made under the general Insurance Law, Disaster Protection Law, and all other relevant Laws of Mongolia. To obtain certain allocation from the GOM for the contingency funds under the NDIP, amendment to the Law on Special Government Funds should be required. This law should provide guiding principles on the accumulation, eligible expenditure, disbursement, reserve requirements, level of coverage, reporting and monitoring requirements of the National Disaster Indemnification Fund (NDI Fund) activities.

If any amendments are required to these Laws, the necessary amendments should also be drafted for consideration by the Government of Mongolia and the Parliament. If some action is to be taken towards combining risk preparedness and mitigation activities with this *dzud* related social insurance scheme, then some revision and amendments to the proposed Rangeland Management Law, the State Policy on Herder and the Mongol Livestock Program approved by the Parliament in 2010 may be necessary.

In general, the NDIP Law should consider following aspects of the social insurance scheme against catastrophe *dzud* risks: (i) form and coverage of the insurance, in particular define as compulsory insurance covering all five types of livestock species; (ii) basic eligibility criteria, in particular availability for households whose primary income source is herding animals; (iii) accumulation of reserve funds, including government contingency funds, donor assistance, domestic and international reinsurance and participation fee; (iv) ensure full payment of indemnities in case of the eligible event; (iv) control of data

reliability and moral hazard issues, (v) transparency and verification in the calculation of the livestock mortality index.

5.3 NDIP Sustainability

While establishing such social protection insurance scheme such as NDIP, following conditions need to be considered:

- Be sustainable over a long period
- Be politically acceptable
- Be free of moral hazard
- Be linked with mitigation activities
- Be affordable for most of the herders
- Have high penetration
- Have an efficient administrative system including response to claims

Long-term Stability

In order to assure sustainability of the proposed NDIP it should be set up as a part of the comprehensive livestock risk management framework and promoted along with other basic services provided to herder households. Therefore, as mentioned earlier close collaboration of the NDIP with other programs related to the risk preparedness and mitigation activities is very important.

Maintenance of long-term stability should depend not only on the financial viability of the insurance scheme, cost-effective delivery services but also on administrative burden and ability to have permanent risk monitoring, and particularly the management of the overall actuarial risk. Careful consideration need to be given to finding a balance between premiums, policy conditions, pre-disaster protection level, the accumulation of funds, and the level of post-disaster protection.

Another significant aspect of sustainability is a distraction of the current macro-insurance market that is gradually developing in Mongolian countryside. In particular, introduction of the state insurance scheme may distract the operation of existing LRI offered by IBLIP and participating private insurance companies in rural communities of Mongolia causing high attrition. In the long-run this will create political pressure and a financial burden to the functionality and operation of the NDIP itself. Therefore, the inception of NDIP should be performed in combination with LRI supplementing each other. For instance, those herders who purchased LRI may be registered to NDIP free of charge. This social *dzud* insurance product should not be named or implied as "insurance" which may increase community and other stakeholders misunderstanding and confusion about the two products.

Political Acceptability

For century's livestock herding was the main source of income generation for the majority of Mongolians. The situation has not changed much today with more than 80 percent of the rural households dependent on their income generated out of the sales of livestock and its products. Mongolia is the only country in the world with clause about livestock protection in its Constitutional Law. For instance, article 5.5 of the

Constitution of Mongolia states that “The livestock of the country is the national wealth and subject to state protection”.

Hence, for the most politicians at both central and local government issues pertaining sustainability of herder households, livestock management and conservation of environment are of high importance and deliberation. In particular, 50 out of 76 members of the State Great Hural or Parliament of Mongolia elected from rural constituencies questions of sustainable rural livelihood and subsidization of herders experienced extreme livestock losses due to *dzud* disasters is of great significance.

Politically acceptable policy measures that attempt to strike a balance between the highly subsidized participation fee charges aimed to create an indemnity pool for moderate nationwide level of losses while creating incentives to develop risk preparedness and risk mitigation behavior among herders and allocation of contingency financing from the scarce fiscal budget for ex-ante risk mitigation activities based on the actuarially fair estimations have a reasonable possibility for support. Furthermore, as we have experimented under IBLIP, retail approach to the distribution of the DRP policies proven to be difficult to implement and perhaps some sort of risk socialization through a special mandatory levy or surcharge may be justified.

At the local administration levels, policy framework needs to fit in and supplement the major activities such as delivery of livestock management and social services to rural households. Major capacity building and public awareness activities are required in order to promote advantages of ex-ante risk mitigation and risk transfer practices versus post-disaster aid.

Adverse Selection and Moral Hazard Issues

It is already evident from the past experiences of the state’s *dzud* related emergency and post-disaster risk management activities that every herder in the affected area receives equal amount of assistance. However, implementation of such disaster related assistance activities without clear registration or management information system created some doubts whether the funds were appropriately used and whether those in the more need for support received it. In addition most of the government supported insurance programs create some moral hazard and adverse selection issues, since policyholders are not solely reliable for the incurred losses.

One of the feasible approaches to avoid moral hazard and adverse selection issues as well as create more comprehensive information management resources is to set the NDIP as a compulsory insurance. By establishing NDIP as a mandatory program regulated by law we obligate every herder to be a policyholder and pay premiums, while ensuring that everyone becomes a claimant when exposed to severe livestock losses due to *dzud*. Such system will also ensure cost effective ways to deliver product in remote locations.

Furthermore, many international multilateral and bilateral agencies are not willing to continue post disaster funding *ad hoc* without a more structured risk management system implemented by the affected country’s government. The international community needs to be aware of the moral hazard created by their activities. Hence, the evidence that the government allocates some of its scarce resources to a

government supported insurance scheme would receive larger support from the donor community for disaster preparedness as well as post disaster aid.

For instance, current mechanism of the mortality based index insurance that pays off based on the average *soum* level threshold is a good attempt to avoid moral hazard. For NDIP that provides infrequent indemnity payments for heavily affected *soums*, thorough monitoring and control on data analysis as well as distribution within the affected *soum* would also decrease moral hazard and adverse selection issues. Significant contributions towards improving existing livestock census structure, in particular, ways of collecting surveys and information from herder households need to be progressed by the Government of Mongolia

Linkages with other Risk Mitigation Activities

Another important factor to eliminate the moral hazard is to create a mechanism that encourages responsibilities of herders and/or herder groups towards implementing better risk management techniques and continuing to act carefully while preparing for long winters and preventing losses due to *dzud* disasters.

For instance, the NDIP should attempt to deliver its services jointly with other publicly supported programs on rangeland management, vaccination services and ex-ante risk management activities such as those provided by IBLIP, SLP, and Mongol livestock Program. If herders pay to participate/receive such services, participation fee for NDIP may be incorporated into that service cost. To make this structure effective a reasonable degree of compulsion may be considered as well.

Affordability

For majority of households living in the rural Mongolia proceeds generated from agricultural activities, more specifically from herding five species of livestock, is often the only source of income. NDIP policy conditions should have some limitations to make sure that the insured risk fit the affordable participation fee or premium. Generally herders who own less than 200 livestock (about 70 percent of the total herder households) may not be generating enough income to pay for the livestock insurance premium. However, they may be able and interested to pay a small amount for NDIP participation fee and be covered against catastrophe *dzud* events. Hence, this social insurance scheme has to be subsidized enough in order to be affordable by the majority of herder households.

On the other hand, past experience in herders' behavior demonstrates that they tend to view as "affordable" costs that they feel are justified for the product and/or service that is important to improve their living. For instance, herders are willing to pay descent amount of cash for the tertiary education fee of their children, purchase of a satellite television antenna, purchase of a power generator, cell phone services, expenses for medical examination, acquisition of the vehicle/motorcycle etc.

Another aspect of affordability is the periodicity of payment. Herders generate cash income from informal seasonal activities that usually includes proceeds from sales of cashmere in spring, earnings made out of sales of dairy products during summer, and profit from sales of meat or stock. Therefore, since herders do not have regular periodic income flow, they cannot be expected to pay a regular

monthly fee. Thus, NDIP participation fee needs to be flexible enough to enable its pay when herders can. With purpose of aligning it with the LRI, product offered by IBLIP through participating insurance companies, payment of the NDIP participation fee may occur by the end of the year (October or November) for the next winter's risk coverage.

High Penetration

There are several reasons for low participation rate in livestock insurance in rural Mongolia. Herders tend to be aware of the *dzud* related risks, but generally they are likely to underestimate the likelihood or severity of such catastrophe events. This tendency of underestimation makes herders reluctant towards purchase of insurance products. Moreover, although IBLIP is spreading excellent public awareness and insurance culture in rural Mongolia, there is still a limited understanding about the benefits of insurance often confusing it with taxes.

Since lessons learned from the pilot of the Index-Based Livestock Insurance scheme point out that mixing commercial insurance product with social protection insurance and attempting to deliver them through the same channel of participating companies' insurance agents is not viable. Providing two different insurance products through two different channels would create even more confusion among herder community and even destroy immature market.

In this case the Government of Mongolia may consider introduction of the NDIP as a compulsory "social insurance" scheme the distribution of which occurs through local public services. Although it may create some adverse selection issues, compulsory insurance may eliminate or at least substantially reduce the need for recurrent post-disaster government intervention. Moreover, it would allow low cost of service delivery which in turn would aid in decreasing the NDIP participation fee amount.

Efficient Administrative System

Delivery of financial services to rural community of Mongolia is the biggest challenge due to the distant location of herder households from *soum* centers. Insurance companies participating in the IBLIP reported administrative costs associated with service distribution of LRI as high as 40 percent of the risk loaded premium.

Administration of NDIP under existing government structure is a very challenging issue. Some feasible options for consideration included: (i) NDIP is to be managed by independent not for profit organization established under the line ministry or (ii) responsibilities for NDIP is to be further carried out by the IBLIP or its successor.

Under the first option identification of the line ministry that is best suited and has a technical expertise in managing such social insurance program is the biggest challenge. While each agency or line ministry has some knowledge and/or experience in handling certain aspect of the *dzud* disaster or insurance related issue, there is not an institution that is perfectly suited to run such services. However, NDIP could be established as an independent entity under one of the three institutions that were historically engaged into the similar activities: MoFALI, NEMA or Ministry of Social Welfare and Labor. In many incidents its operation and management will be similar to the State Social Insurance General Office, the implementing agency of the Government of Mongolia (SSIGO), but on much compact scale.

Its efficient administration at the *aimag* and *soum* levels can be ensured through the use of existing public service delivery structure that existed from the socialist time and is evaluated as the most efficient and reasonable structure under Mongolian condition for distributing services to herders.

In any of such cases, sufficient capacity building and appropriate human resources allocation (recruitment of adequately trained professional staff) would be crucial to the success of the program. Extensive training and capacity building activities among public servants and social workers would be required.

5.4 Principles of the NDIP

NDIP shall act as the social assistance program that offers catastrophe insurance coverage against extreme *dzud* events which covers and compensates for only the direct losses of livestock. Herders are mandated to participate into NDIP on annual basis by paying a small amount of participation fee. The enrollment to the NDIP may start in August of the previous year with a deadline for enrollment set until November 15 for the coverage of possible livestock losses beginning on January 1st of the forthcoming year. The features of the NDIP product and the coverage it provides should be solely for the purpose of indemnification of agreed percentage of insured livestock market value that meets eligible conditions.

Assuming that the NDIP would be a compulsory social insurance scheme, the amount of the participation fee is to be based on the total number of livestock they own and the geographic area their *soum* is located. Individual herders or herder groups that own livestock would be obligated to register to the NDIP at least 30 percent of the total livestock they own by paying the participation fee.

Generally, NDIP social insurance scheme may be based on the principles of the existing Index-Based Livestock Insurance and use livestock mortality index or any other indexes adopted under it. For instance the NDIP may offer indemnification for livestock losses that are above 30 percent of the *soum* average. While introducing NDIP, any activities that may create distortion of the existing LRI market need to be assessed and avoided.

One of the possible options to introduce NDIP without distracting existing LRI operations would be setting the NDIP as a part of the GOM's social protection program and deliver its services based on the existing public services structure. NDIP may be introduced as a stand-alone product, set up as part of the tax levy surcharge, or launched as a fraction to the Rangeland Management Fee that is proposed under the draft law on Pastureland Management. This structure would not contradict with existing LRI sales decreasing herders' incentives towards voluntary insurance but still would allow implementation of the social insurance in the form of NDIP that offer benefits in case of low probability but extreme *dzud* events only.

National Disaster Indemnification Program should provide social protection to the vulnerable rural households against *dzud* disasters and assist them in maintaining sustainable livelihoods. Therefore, such insurance should be consistent with the following criteria: (i) benefits, eligibility requirements, and other aspects of the program need to be defined by related laws and/or regulations; (ii) have definite funding structure that may consist of premiums paid by or on behalf of participants and allocation from the state budget (or taxes), contingent budgeting and/or funding provided by international donor agencies; and

(iii) serve a defined population with participation fee either compulsory or heavily subsidized that most eligible individuals choose to participate.

NDIP Eligibility

Since the main objective of the NDIP is to create agricultural and social safety net in rural Mongolia again the biggest natural disaster event such as *dzud*, the eligibility criteria should allow better access for vulnerable households and also may include a range of alternatives to influence better risk management practice.

The minimum eligibility criteria for the participation in the NDIP are as follows:

- Be an individual herder and/or herder household whose primary income is generated out of the livestock herding activity and/or;
- Possesses at least one species of herd such as sheep, goat, cattle, horse or camel for the household consumption purpose;
- Be registered with the *soum* administration under which the livestock is to be insured (mainly for the purpose of determining appropriate participation fee amount);
- Willingness to provide information for livestock statistics and/or census survey and questionnaire;
- Willingness and ability to pay participation fee amount on annual basis.

Additional participation fee discounts may be available for those herders who are engaged in certain type of risk mitigation activities such as hay and fodder preparation, winter shelter development, vaccination of livestock, etc. Since herders tend to prepare at least a limited amount of hay and/or fodder, it may be difficult to determine the level of eligibility for the discount and some further research may be required.

Another option would be to incorporate participation in NDIP as part of eligibility criteria for herders who are interested in participating into other government programs that assist herders in developing infrastructure, conducting risk mitigation activities etc.

Furthermore, as was evidenced from the past *dzud* disaster post aids herders receive support from the local governments without any contractual relationship often receiving assistance at the local officials' discretion. Development of NDIP may assist in strengthening such relationship through formal registration system (Management Information System with detailed information on the household, income level, livestock property registration, etc.) which will allow targeting more vulnerable households as eligible for payment of cash, food or vouchers, should insurance and/or the *dzud* case be triggered.

NDIP Funding Structure

According to the Government of Mongolia's experience in managing *dzud* related disaster events during last two decades, its activities mainly has concentrated on the funding the recovery from disasters. Such post-disaster financings of catastrophe financial losses were mainly provided through government's fiscal budget and donor aids provided by multilateral and bilateral international agencies. For instance the GOM received 23.7million USD aid for 2000-2002 *dzud* disasters and 38.1 million USD for 2009-2010 *dzud* disasters respectfully for the coping and recovery activities.

Introduction of NDIP or state insurance structure, on the other hand, would not only allow easy recovery after disasters, but also increase economic efficiency in relation to disaster management by reducing individual exposure to catastrophes. Financial reserves required to indemnify huge livestock losses from *dzud* disaster events would consist of the following reserves: (i) built up from participation fee payable by herders; (ii) governments' contingency fund for extreme losses; and (iii) international donor aids.

Depending on the affordability of herders as well as GOM policy on *dzud* related livestock subsidy amount, participation fees could differ. Nevertheless, sustainability of the NDIP would directly depend on its long-term viability which could be assured by accumulation of required financial capital reserves. Charging small participation fee based on the risk exposure zone to every herding family would create reasonable amount of the capital reserves (for details please see next paragraph). Any proceeds (participation fees paid annually) must be held in a separate account and not commingled with other intermediary funds.

The accumulated capital resources, would allow creation of some level of funding required in case of the catastrophe risks. Though, because catastrophe risks are highly covariant, in case of extreme disaster events such accumulated reserves may not become sufficient enough to cover all indemnity payments. Hence, the Government of Mongolia would still be required to provide additional funding from its fiscal budget and/or request international donor assistance. However, amount of funding that would be required for the NDIP is going to be substantially lower than what was spent during 2000-2002 and 2009-2010 year disaster events, considering the same level of disaster.

Although few attempts were prompted, Government of Mongolia still not able to create domestic budgetary funds that is to be efficiently used for risk mitigation, transfer and preparedness activities. Nevertheless, GOM's endeavor to introduce more sophisticated risk management approach such as the proposed Mongol Livestock Program's "Mongol Livestock" Development Investment Fund is a natural progression to move towards developing ex-ante risk management discipline and creating a reserve fund. This Fund is to be composed from domestic budgetary funds plus assistance provided from the international community. There may be some arrangements to provide NDIP participation fee subsidies from this Fund to the most vulnerable herder households.

Type of NDIP	Total Insured Value USD	Financial Exposure USD	Participation Fee USD
Mandatory 100% of herd	1,205,786,160.00	17,917,143.74	2,286,366.65
Mandatory 50% of herd Voluntary with 10% intake	723,471,696.00	10,750,286.25	1,371,819.99
Voluntary with 30% intake	361,735,848.00	5,375,143.12	685,909.99

Source: Author's Calculations

Another viable option for catastrophe *dzud* disaster financing is the Catastrophe Risk Deferred Drawdown Option, CAT DDO that the World Bank Group provides to eligible countries to secure immediate liquidity and budget support following a major natural disaster. This contingent loan can provide immediate liquidity up to USD 500 million or 0.25 percent of GDP (whichever is less) following a natural disaster. It

offers bridge financing while other sources of funding are being mobilized. Funds are disbursed when a country suffers a natural disaster and declares a state of emergency. Mongolia is one of the eligible borrowers and can apply for up to USD 11.25 million based on the USD 4.2 billion GDP reported in 2009. However, in order to receive such contingent loan the country must have an adequate macroeconomic framework in place at inception or renewal, and a disaster risk management program that is monitored by the World Bank Group.

NDIP Participation Fee

Again since NDIP is the social safety product it should not be a financial burden for herders. In general a state insurer would not be subject to insolvency risk and the limitations that insolvency risk places on a private insurer's access to capital. As a result, it would be able to offer the risk premiums that are much more affordable for extreme risks.

For those livestock that are covered by LRI, any premium for participating into NDIP could be waived. For all livestock that is not covered by LRI herders will be required to participate into the NDIP by paying heavily subsidized fee. The state may impose a minimum mandatory coverage for the livestock. For instance, it may state that at least 50 percent of the total livestock value owned by herder has to be insured for DRP. Herder may also choose to insure remaining value of the livestock with DRP on voluntary basis. This will ensure community interest towards voluntarily purchasing LRI from insurance agents.

NDIP participation fee could be calculated based on the geographical area and its exposure zone to *dzud* related risks. Since all *soums* of Mongolia are divided into 3 categories depending on the probability of risk exposure to 30 or more percent of livestock losses (please see paragraph 3.3), participation fees need to be set up according to this classification (Table 9).

Table 9: Participation Fee by Risk Exposure Zone

Risk Exposure Zone	NDIP Participation Fee	
	USD	<i>Tugrugs</i>
Low	0.020	25 <i>tugrugs</i> per herd
Moderate	0.035	45 <i>tugrugs</i> per herd
High	0.055	70 <i>tugrugs</i> per herd

According to the NSO report (2010), about 43 percent of total herder families own less than 100 livestock, 48 percent own 101 to 500 livestock, 6 percent own 501 to 999 livestock and only 1.8 percent of herder families own 1000 to 2000 livestock. Therefore, above participation fee amount would be affordable for herders and would not be a burden on the families' financial situation. Furthermore, this amount is approximately identical to livestock taxes charged to herder families under personal income tax law prior to 2009.

For instance, herder family that owns 500 livestock in Bulgan *soum* of Arkhangai *aimag* is categorized under low risk exposure zone and, thus, would pay total of USD 10.0 per annum as the NDIP participation fee (or 12500 *tugrugs* based on 15 *tugrugs* fee per herd). Controversially, herder family owning 500 livestock in Erdene *soum* of Gobi-Altai *aimag*, the high risk exposure zone area, would pay total of USD 27.5 annually as the NDIP participation fee (or 35000 *tugrugs*). Please see Table 10 for details.

Table 10: Participation Fee Payable Depending on Herd Size Owned

Size of herd owned by herder families (in sheep proxy)	Fee Payable USD		
	Low 0.012	Moderate 0.035	High 0.055
100	2.00	3.50	5.50
300	6.00	10.50	16.50
500	10.00	17.50	27.50
700	14.00	24.50	38.50
1000	20.00	35.00	55.00
1300	26.00	45.50	71.50
1500	30.00	52.50	82.50
1800	36.00	63.00	99.00
2000	40.00	70.00	110.00

This study assumes that the GOM would be direct liability for extreme losses (above 30 percent based on the *soum* average composite index) without private insurance sector bearing some portion of loss. Since the GOM may not have sufficient funds to provide full reimbursements in case of extreme *dzud* disaster events, NDIP may have some flexibility in participation requirements and indemnification procedure. For instance, NDIP may be set as (i) mandatory: all livestock is required to participate into NDIP that protects them from *soum* level livestock losses above 30 percent by paying the established fee amount, (ii) voluntary: herders may voluntarily participate into the NDIP, or (iii) as a mix of the two depending on the financial exposure level and capability to develop necessary reserve funds. In case of voluntary NDIP herders would be required to insure their entire herd. Also for the purpose of financial risk calculation participation rate of 30 percent has been assumed.

Table 11: Financial Exposure to Risk under Different NDIP Options

Type of NDIP	Total Insured Value USD	Financial Exposure USD	Participation Fee USD
Mandatory 100% of herd	1,205,786,160.00	17,917,143.74	2,286,366.65
Mandatory 50% of herd Voluntary with 10% intake	723,471,696.00	10,750,286.25	1,371,819.99
Voluntary with 30% intake	361,735,848.00	5,375,143.12	685,909.99

Under the third scenario with the mix of mandatory and voluntary NDIP options, herder family would be required to insure 50 percent of the entire stock they own and also may choose to insure the rest of the stock. That voluntary intake is assumed to be 10 percent for the purpose of the study. The calculation of reserve funds required under each of the above scenarios and accumulation of related annual participation fee is shown in the Table 11.

Based on the above calculations, in case of mandatory NDIP, total insured value reaches 1.2 billion USD causing financial exposure to the risk of approximately 18 million USD while accumulating 2.3 million USD in participation fees every year. According to this analysis, NDIP participation fees accumulated over 6 years would be somewhat satisfactory to cover indemnity payments due to *dzud* disaster cases. However, if consequent *dzud* events would be repeated as happened in 2000 - 2002 with the current animal populations, the losses would be in excess and require additional funding from the government budget. Such mandatory approach may possibly allow development of sustainable risk transfer practice in rural communities in short time period. Majority of such mandatory fee would be accumulated into the saving account and applied for the reimbursement of claims, while small portion used towards covering operational expenses of NDIP, hence making it self-sustaining.

Controversially, under the voluntary approach total insured value would be only 362 million USD with financial risk exposure of 5.4 million USD. However, such voluntary approach would accumulate just about 686 thousand USD while would require substantial funding for the administrative costs as well as for public awareness activities. GOM contributions towards such operational costs may be substantial.

Since the prime purpose of catastrophe insurance in a development context is to create sustainability of herder communities in the event of disasters, NDIP has to have a relatively high level of compulsion, so that it follows some reimbursement for livestock losses, therefore, providing sufficient funds to enable the affected herder household to get back on its feet as quickly as possible.

Options for Service Delivery

The administration of catastrophe insurance requires a different approach than normal insurance. It needs a system which, most of the time, is only concerned with the collection of premiums and managing the reinsurance and investment of accumulated funds but when a major event occurs is equipped to handle a huge demand for claims handling services with a high level of probity to minimize the moral hazard risk which can arise in such situations. Getting the administrative system right is just as important as getting the technical-based aspects right if a system is to cope when the big event for which it is primarily intended occurs.

In order to develop sustainable operations of the NDIP, the GOM needs to have a viable domestic administrative platform. *Soum* governor's administration office could act as an intermediary institution and as a local representative for the central NDIP. It would be required to collect the participation fee from all herder households and transfer it to the designated fund account managed by central office of NDIP through its *aimag* representative. Distribution of the indemnity payment in case of disaster event

would be directly to the herder's designated bank account. In this case the local public administration operates as the intermediary institution.

Below are the discussions why delivery of the NDIP through the existing public service structure to ensure low cost and effective administration is the preferred option.

Challenges with Channeling through Private Insurance of Financial Sector

Although using private sector channel as a delivery mechanism for micro-insurance products is considered as one of the suitable approaches, this may not be a case for current Mongolian conditions. Recent pilot of IBLIP that attempted selling DRP through insurance agents of participating private companies demonstrated that same insurance agents should not be selling similar insurance products together. For instance, when commission based insurance agents approach herders and introduce livestock insurance products they tend to hide full information about the available opportunities such as choices between LRI and/or DRP. Practically, they provide detailed information about LRI eager to receive their commission if sales are successful. Some evidences have been registered when insurance agents were agitating not to insure for DRP, but to consider LRI option explaining that DRP is not a good product with almost any chances for payout because of "high mortality thresholds".

Furthermore, corporate office of these insurance companies do not have adequate capacity and both technical and resource to conduct comprehensive monitoring and control in sales activities in rural Mongolia. Most of the capacity building as well as monitoring and quality assurance activities are performed by the IBLIP and its local offices which is again one form of the public institution. Attempting to overload engagement of such immature private insurance sector in delivering NDIP may create some burden for its successful implementation. That is why some other forms for distributing services besides channeling through private insurance companies is needed.

Use of the other financial institutions such as banks, non-bank financial institutions or herder cooperatives may be an alternative option to consider. Such financial institutions are able to provide more professional services and its financial specialists would be well suited to provide detailed information about NDIP eligibility criteria, options for insuring livestock and indemnity payment conditions. However, there is a restriction in sales of insurance products through banks and non-bank financial institutions unless the insurance is combined with other financial products offered by these institutions.

Past experience observed that herders often reluctant to visit financial institutions to obtain information on insurance protection and purchase a policy. The only viable option for sales of LRI was to pay a personal visit to the herder household, explain a product and propose the sales. Financial specialists of bank and non-bank financial institutions are often immovable. Furthermore, they are requiring clients to visit their offices for any services. In case of Mongolia herder households reside far away from *soums* center where financial offices are located and often are not willing to have a long trip ile most of the insurance Therefore, it may rely on the existing social insurance system and provide insurance through the existing public service channel.

Channeling NDIP under existing public structure

Administration of NDIP under existing government structure may be the most cost efficient and straight forward option. Historically herders used to deal with their *soum's* agricultural officers and/or social workers pertaining issues related to *dzud* related risk management as well as assistance during and after the *dzud* disasters. In addition, access to and participation into other activities that promote better herding practices including winter preparedness and other risk mitigation are also available through this network. Therefore, considering the fact that NDIP is to be more efficient when offered along with other ex-ante risk mitigation activities, it has to be delivered by the local administration office.

Table 12: Delivering NDIP through Existing Public Structure

Opportunity	Constraints
<ul style="list-style-type: none"> • Low administration cost • Timely collection of participation fees • Public sector support, including public servants • Seen as an advanced alternative option for the livestock taxes, seized in 2009 	<ul style="list-style-type: none"> • May require intensive training and capacity building efforts • Public service system may not be able to easily adjust to the new activities introduced by NDIP • Lack of policy and product development knowledge at corporate level • Inefficient under voluntary NDIP • May contradict with existing LRI and IBLIP activity

Alternatively, the GOM may consider expanding operations of the existing IBLIP. For instance, as currently proposed, upon finalization of the phase II Mongolian Agricultural Reinsurance Corporation (MARC) may be established as the successor of the project. MARC operations could consist of two separate departments. One of the departments will act as a reinsurer by providing financial support to the private insurance market that has already been put into operation under the project and continue to provide stop loss reinsurance for participating insurance companies. The other department may act as a main implementation body responsible for the management of the NDIP. The pros would be that NDIP will be managed by highly qualified professional team with relevant expertise. It would even have experienced field offices in at least every *aimag* with some possibility of expanding their services to the *soum* level. In case if DRP is set as part of the pastureland utilization fee, collection of premiums could be easily managed by *aimag* level offices.

Table 13: Utilization of the Existing IBLIP Structure in Delivery of NDIP

Opportunity	Constraints
<ul style="list-style-type: none"> • Deep knowledge about the policy and product development • Previous experience and knowledge in marketing similar products and services • Ability to manage LRI and NDIP allowing supplementation of the two 	<ul style="list-style-type: none"> • May require large initial investment and some administrative costs • Efficient work would be assured only with highly qualified management staff and key professional personnel •

Regardless of who will be responsible for the management of NDIP, challenges towards keeping the integrity of the system, enhancing data management, sharing technical expertise, and ability to rapidly exchange information required to be addressed with priority.

6. Conclusion

The Government of Mongolia should shift its disaster management paradigm from one that is reactive toward one that is proactive in nature. Such a proactive stance could reflect itself in a number of elements: (1) readiness in anticipating the possibility and impacts of the upcoming disaster by creating structured risk management system; (2) the shift from emergency response to risk reduction, which means that disaster reduction measures are being conducted through mitigation and early warning system; ; and (3) a paradigm shift from centralized to local autonomy, thereby assuring that the new approach provides more roles and responsibility to local governments.

In this case the Government of Mongolia can establish National Disaster Indemnification Program that is managed as government business enterprise and expected to be sustainable with the assistance of GOM guarantees for very extreme events. It should be noted that neither MOFALI nor NEMA is technically and professionally capable of running a program similar to NDIP. However, such a program can be established as an independent government entity regulated by the supervisory board which could consist of the MOFALI, NEMA, MoF as well as other related agencies. Alternatively, NDIP may be established as additional line of business under the existing IBLIP or its successor. The later already has experience, knowledge and technical capacity to implement similar activity on behalf of the GOM.

Creation of the NDIP should provide incentives for both the GOM and as well as individual herder households to better manage *dzud* related risks through introduction of structured ex-ante risk mitigation and transfer approaches. To eliminate high administrative costs and moral hazard issues, such NDIP need to be set with some degree of compulsion. Furthermore, it should not contradict with the existing LRI and provide confusion among rural communities. Therefore, it may be appropriate to manage the program under the existing IBLIP or its successor organization or create a similar not for profit public institution with adequate technical and professional resources.

In order to establish an appropriate and efficient risk management system, close collaboration with the Mongol Livestock Program of MOFALI and with other risk mitigation activities organized by NEMA is required in the area of risk preparedness and mitigation. While these two activities concentrate on risk preparedness and risk mitigation activities, they also should promote risk transfer approach among herders through encouraging them to participate into the LRI and NDIP.

By introducing NDIP, the GOM would have an opportunity to introduce the social safety net product, publicly provided and financed, to respond quickly to herders most affected by extremely high levels of livestock losses following major *dzud* event. If appropriately established and adequately managed, the NDIP would assist the Government of Mongolia and international donors to structure and distribute *dzud* related disaster financing in a systematic, timely and transparent manner, while keeping high covariate risks manageable.

Appendix A. List of Meetings

Names	Appointments and Responsibilities
Mr. T. Badral	Deputy Chief, National Emergency Management Agency
Mr. B. Batjargal	Head of the Fiscal Policy Department, Ministry of Finance
Mr. D. Batsaikhan	Head of State Reserve Department, National Emergency Management Agency
Mr. Sh. Boldbaatar	National Project Manager, Strengthening the Disaster Mitigation and Management System in Mongolia Project
Mr. I.Byambabaatar	Recovery Policy and Planning Expert, Early Recovery Support Team to Assist NEMA, UNDP Mongolia
Mr. Bayanmunkh	Head of Strategic Planning and Policy Department, Ministry of Food, Agriculture and Light Industry
Mr. M. Enkh-Amar	Secretary for the State Emergency Commission
Mrs. Enkhbayar	Deputy Governor of Bayangol <i>soum</i> , Uvurkhangai
Mr. Javkhlan	Manager, Mongol Daatgal
Mr. A. Ganbaatar	Head of Finance Department, National Emergency Management Agency
Mr. H. Ganbaatar	Deputy Director, MIG Insurance
Mr. T. Ochirkhuu	Deputy Minister of Finance
Ms. Oktyabri	Underwriting Manager, Practical Insurance
Mrs. P. Ongonsar	Programme Officer for Disaster Management, UNDP Mongolia
Mr. Otgon	Deputy Governor of Khujirt <i>soum</i> , Uvurkhangai
Mrs. G. Suvdaa	Livestock Specialist, Strategic Planning and Policy Department, Ministry of Food, Agriculture and Light Industry
Mr. D. Togtokhsuren	Governor of Uvurkhangai <i>aimag</i>
Mr. Tsendenbaljir	Governor of Bayangol <i>soum</i> , Uvurkhangai
Mr. S. Tsogtbaatar	Commissioner, Director of Disaster Management Department, National Emergency Management Agency
Mr. Tumurbat	Agricultural Officer of Bayangol <i>soum</i> , Uvurkhangai

Appendix B. Analysis of *Dzud* Disaster Losses

Table 1. Livestock Mortality Rate and Losses during *Dzud* Occurred Years

Years	Type of Disaster	Number of <i>soums/ aimags</i> affected	Percentage of Livestock Mortality (%)	Livestock Loss in Heads (adult)	Direct Loss (millions ₮)
1944- 1945	Red drought, <i>Dzud</i> (air temp 5-10 C below average)	65% of 9 <i>aimags</i>	32.2	8.1	
1954-1955	<i>Dzud</i>	9 <i>aimags</i>	8.2	1.9	
1956-1957	<i>Dzud</i>	11 <i>aimags</i>	6.2	1.5	
1967-1968	<i>Dzud</i> , foot and mouth disease	80% of 13 <i>aimags</i>	11.9	7.8	60 (at that time USD1=₮4)
1976-1977	<i>Dzud</i> (heavy snow fall 40-60 cm, low temp, blizzard)	90% of 15 <i>aimags</i>	8.6	2.0	330 (at that time USD1=₮3)
1986-1987	<i>Dzud</i>	80% of 11 <i>aimags</i>	3.6	0.8	
1993	<i>Dzud</i>	30 <i>soums</i> of 3 <i>aimags</i>	6.4	1.6	
1996-1997	<i>Dzud</i>	69 <i>soums</i> of 11 <i>aimags</i>	2.1	0.6	
1999-2000	<i>Dzud</i>	157 <i>soums</i> of 12 <i>aimags</i>	8.9	3.49	91,700
2000-2001	Drought, <i>Dzud</i>	147 <i>soums</i> of 13 <i>aimags</i>	13.1	4.75	133,400
2001-2002	<i>Dzud</i>	114 <i>soums</i>	10.5	2.91	108,000
2009-2010	Drought, <i>Dzud</i>	175 <i>soums</i> of 17 <i>aimags</i>	18.8	7.5	500,000?

Source: NSO Yearbooks, (NEMA, 2010)

Appendix C. Soum Classification by Risk Exposure Level

Risk Exposure Zone 1 (Lowest)					
Code	Aimags	Soum	Code	Aimags	Soum
102	Arkhangai	Bulgan	1613	Khovd	Tsetserleg
104	Arkhangai	Ikhtamir	1610	Khovd	Myangad
103	Arkhangai	Jargalant	1720	Khovsgol	Chandmana Ondor
110	Arkhangai	Khairhan	1722	Khovsgol	Erdenebulgan
111	Arkhangai	Khangai	1715	Khovsgol	Hankh
116	Arkhangai	Olziit	1707	Khovsgol	Ikh-Uul
107	Arkhangai	Ondor-Ulaan	1700	Khovsgol	Moron
114	Arkhangai	Tsenher	1708	Khovsgol	Rashaant
202	Bayan-Olgii	Altantsoets	1709	Khovsgol	Renchinkhumbe
207	Bayan-Olgii	Deluun	1710	Khovsgol	Tarialan
208	Bayan-Olgii	Nogoonnuur	1711	Khovsgol	Tosontsengel
200	Bayan-Olgii	Olgii	1718	Khovsgol	Tsagaan Uur
210	Bayan-Olgii	Tolbo	1716	Khovsgol	Tsagaan nuur
211	Bayan-Olgii	Ulaankhus	1714	Khovsgol	Ulaan uul
403	Bulgan	Bugat	1002	Ovorkhangai	Bat-Olzii
400	Bulgan	Bulgan	1016	Ovorkhangai	Hairkhandulaan
404	Bulgan	Bureghangai	1301	Selenge	Altanbulag
413	Bulgan	Khangal	1302	Selenge	Baruunburen
414	Bulgan	Khishig Ondor	1303	Selenge	Bayangol
415	Bulgan	Khutag	1313	Selenge	Huder
408	Bulgan	Orkhon	1314	Selenge	Hushaat
703	Dornod	Bayan Uul	1305	Selenge	Javkhalant
701	Dornod	Bayandun	1307	Selenge	Mandal
702	Dornod	Bayantumen	1310	Selenge	Saikhan
700	Dornod	Choibalsan	1311	Selenge	Sant
715	Dornod	Chuluunkhoroot	1316	Selenge	Shaamar
706	Dornod	Dashbalbar	1300	Selenge	Sukhbaatar
705	Dornod	Guvanzagal	1315	Selenge	Tsagaannuur
712	Dornod	Holonbuir	1312	Selenge	Tushig
707	Dornod	Matad	1304	Selenge	Yoroo
606	Dornogovi	Mandakh	1306	Selenge	Zuunburen
600	Dornogovi	Sainshand	1206	Sukhbaatar	Ongon
610	Dornogovi	Ulaanbadrakh	1203	Sukhbaatar	Darijana
802	Dundgovi	Bayanjargalan	1401	Tov	Altanbulag
508	Govi-Altai	Tonkhil	1411	Tov	Bayanchandamana
1802	Khentii	Batchireet	1405	Tov	Bayandelger
1805	Khentii	Bayanmonkh	1408	Tov	Bayanhangai
1804	Khentii	Bayanovoo	1412	Tov	Bomuur
1810	Khentii	Dadal	1424	Tov	Erdene
1812	Khentii	Delgerkhaan	1418	Tov	Mongonmorit
1813	Khentii	Jargalthan	1507	Uvs	Malchin
1818	Khentii	Omnodelger	1512	Uvs	Sagil
1819	Khentii	Tsenkhermandal	1515	Uvs	Tes
1603	Khovd	Buyant	1519	Uvs	Tsagaankhairkhan
1605	Khovd	Duut	905	Zavkhan	Bulnai
1612	Khovd	Khovd	906	Zavkhan	Dorvoljin
1609	Khovd	Most	919	Zavkhan	Tsagaanchuluun

Risk Exposure Zone 2 (Moderate)

Code	Aimags	Soum	Code	Aimags	Soum	Code	Aimags	Soum
101	Arkhangai	Battsengel	1803	Khentii	Bayanadrags	1201	Sukhbaatar	Asgat
106	Arkhangai	Ohuluut	1806	Khentii	Bayankhutag	1202	Sukhbaatar	Bayandelger
117	Arkhangai	Erdenebulgan	1807	Khentii	Binder	1204	Sukhbaatar	Monkhhaan
117	Arkhangai	Erdeneemandal	1811	Khentii	Darkhan	1205	Sukhbaatar	Naran
112	Arkhangai	Hashaat	1808	Khentii	Galshir	1207	Sukhbaatar	Sukhbaatar
113	Arkhangai	Hotont	1817	Khentii	Kherlen	1208	Sukhbaatar	Tuvshinshire
105	Arkhangai	Olgiinuur	1814	Khentii	Moron	1210	Sukhbaatar	Uulbayan
108	Arkhangai	Tariat	1815	Khentii	Norovlin	1211	Sukhbaatar	Khalzan
109	Arkhangai	Tovshruulah	1601	Khovd	Altai	1426	Tov	Arkhus
115	Arkhangai	Tsetserleg	1602	Khovd	Bulgan	1403	Tov	Batsumber
302	Bayankhongo	Bayanbulag	1614	Khovd	Chandmana	1407	Tov	BayanOnjuul
300	Bayankhongo	Bayanhongor	1604	Khovd	Darvi	1410	Tov	Bayantsogt
309	Bayankhongo	Bombogor	1616	Khovd	Dorgon	1413	Tov	Buren
319	Bayankhongo	Erdenetsogt	1615	Khovd	Erdeneburen	1414	Tov	Delgerhaan
311	Bayankhongo	Galuut	1600	Khovd	Jargalant	1425	Tov	Erdenesant
313	Bayankhongo	Jargalant	1607	Khovd	Mankhan	1415	Tov	Jargalant
201	Bayan-Olgii	Altai	1608	Khovd	Monkhairhan	1417	Tov	Lun
203	Bayan-Olgii	Bayannuur	1611	Khovd	Uyench	1419	Tov	Ondorshireet
204	Bayan-Olgii	Bugat	1606	Khovd	Zeree	1421	Tov	Sergelen
205	Bayan-Olgii	Bulgan	1701	Khovsgol	Alag-Erdene	1420	Tov	Sumber
206	Bayan-Olgii	Buyant	1702	Khovsgol	Arbulag	1423	Tov	Tseel
209	Bayan-Olgii	Sagsai	1703	Khovsgol	Bayanzurkh	1422	Tov	Ujetaal
401	Bulgan	Bayan-Agt	1704	Khovsgol	Burentogtoh	1416	Tov	Zaamar
406	Bulgan	Dashinchilen	1705	Khovsgol	Galt	1400	Tov	Zuunmod
405	Bulgan	Gurvanbulag	1721	Khovsgol	Shine ider	1402	Tov	Aregalant
407	Bulgan	Mogod	1712	Khovsgol	Tomorbulag	1406	Tov	Bayanjargalan
410	Bulgan	Saikhan	1713	Khovsgol	Tunel	1409	Tov	Bayantsagaan
412	Bulgan	Teshig	1101	Omnogovi	Bayandalai	1501	Uvs	Baruunturuun
704	Dornod	Bulgan	1102	Omnogovi	Bayanovoo	1502	Uvs	Bokhmoron
711	Dornod	Halngol	1103	Omnogovi	Bulgan	1503	Uvs	Davst
709	Dornod	Sergelen	1100	Omnogovi	Dalanzadgad	1518	Uvs	Hyargas
713	Dornod	Tsagaanovoo	1104	Omnogovi	Gurvantes	1517	Uvs	Khovd
601	Dornogovi	Airag	1110	Omnogovi	Khanbogd	1508	Uvs	Naranbulag
602	Dornogovi	Altanshiree	1111	Omnogovi	Khanhongor	1509	Uvs	Olgii
613	Dornogovi	Erdene	1105	Omnogovi	Mandal Ovoo	1510	Uvs	Omnogovi
612	Dornogovi	Hovsgol	1106	Omnogovi	Manlai	1511	Uvs	Ondorkhangai
605	Dornogovi	Ikhket	1108	Omnogovi	Nomgon	1513	Uvs	Tarialan
611	Dornogovi	Khatanbulag	1107	Omnogovi	Noyon	1514	Uvs	Turgen
607	Dornogovi	Orgon	1109	Omnogovi	Sevrei	1505	Uvs	Zuungovi
608	Dornogovi	Saikhandulaan	1113	Omnogovi	Tsogtovoo	1506	Uvs	Zuunkhangai
806	Dundgovi	Delgertsogt	1114	Omnogovi	Tsogettsetii	901	Zavkhan	Aldarkhaan
807	Dundgovi	Deren	1000	Ovorkhangai	Arvaiheer	902	Zavkhan	Asgat
813	Dundgovi	Huld	1019	Ovorkhangai	Bayangol	904	Zavkhan	Baynkhairhan
808	Dundgovi	Luus	1005	Ovorkhangai	Bogd	909	Zavkhan	Ider
809	Dundgovi	Olziit	1007	Ovorkhangai	Guchin us	910	Zavkhan	Nomrog
810	Dundgovi	Ondorshil	1018	Ovorkhangai	Hujirt	911	Zavkhan	Otegon
811	Dundgovi	Saintsagaan	1017	Ovorkhangai	Kharhorin	921	Zavkhan	Shiluustei
500	Govi-Altai	Altai	1010	Ovorkhangai	Nariin teel	916	Zavkhan	Tes
501	Govi-Altai	Bayan-Uul	1011	Ovorkhangai	Olziit	918	Zavkhan	Tsagaankhairkhan
503	Govi-Altai	Bugat	1013	Ovorkhangai	Taragt	920	Zavkhan	Tsetsen Uul
506	Govi-Altai	Jargalant	1014	Ovorkhangai	Togrog	917	Zavkhan	Urgamal
515	Govi-Altai	Sharga	1015	Ovorkhangai	Uyanga	903	Zavkhan	Bayantes
505	Govi-Altai	Delger	1012	Ovorkhangai	Sant	900	Zavkhan	Uliastai
1801	Khentii	Batnorov	1308	Selenge	Orkhon	604	Dornogovi	Delgereh
			1309	Selenge	Orkhontuul	409	Bulgan	Rashaant

Risk Exposure Zone 3 (Highest)

Code	Aimags	Soums	Code	Aimags	Soums
301	Bayankhongor	Baatsagaan	513	Govi-Altai	Tseel
306	Bayankhongor	Bayan Ondor	512	Govi-Altai	Tsogt
305	Bayankhongor	Bayan Ovoo	1706	Khovsgol	Jargalant
304	Bayankhongor	Bayanlig	1717	Khovsgol	Tsagaan Uul
307	Bayankhongor	Bayantsagaan	1719	Khovsgol	Tsetserleg
308	Bayankhongor	Bogd	1112	Omnogovi	Humen
310	Bayankhongor	Buutsagaan	1001	Ovorkhangai	Baruun-Bayan Ulaan
312	Bayankhongor	Gurvanbulag	1004	Ovorkhangai	Bayan-Ondor
314	Bayankhongor	Jinst	1006	Ovorkhangai	Burd
317	Bayankhongor	Khureemaral	1012	Ovorkhangai	Sant
316	Bayankhongor	Olziit	1008	Ovorkhangai	Zuil
318	Bayankhongor	Shinejinst	1009	Ovorkhangai	Zuun-Bayan Ulaan
315	Bayankhongor	Zag	1200	Sukhbaatar	Baruun Urt
303	Bayankhongor	Bayangovi	1212	Sukhbaatar	Erdenetsagaan
603	Domogovi	Dalanjargalan	1209	Sukhbaatar	Tumentsogt
801	Dundgovi	Adaatsag	1404	Tov	Bayan
805	Dundgovi	Delgerkhangai	1406	Tov	Bayanjargalan
815	Dundgovi	Erdenedalai	1504	Uvs	Zavkhan
803	Dundgovi	Govi Ugtaal	1717	Khovsgol	Tsagaan Uul
804	Dundgovi	Gurvansaikhan	505	Govi-Altai	Delger
812	Dundgovi	Saikhan Ovoo	1816	Khentii	Olziit
814	Dundgovi	Tsagaandelger	1409	Tov	Bayantsagaan
502	Govi-Altai	Biger	907	Zavkhan	Zavkhanmandal
514	Govi-Altai	Chandmana	908	Zavkhan	Ikh Uul
504	Govi-Altai	Darvi	912	Zavkhan	Santmargats
516	Govi-Altai	Erdene	913	Zavkhan	Songino
510	Govi-Altai	Khaliun	915	Zavkhan	Telmen
511	Govi-Altai	Khohmorit	914	Zavkhan	Tudevtei
507	Govi-Altai	Taishir	922	Zavkhan	Erdenekhairkhan
509	Govi-Altai	Togrog	923	Zavkhan	Yaruu

Appendix D. Total Value of Animals and Participation Fee Options

unit value USD 18 (50% of sheep value)
 premium USD 0.02 (10 tug per livestock)
 0.035 (40 tug per livestock)
 0.055 (60 tug per livestock)

code	aimag	soum	cattle	sheep	goat	camel	horse	total livestock converted to sheep units	risk level	loss probability to exceed 30%	mandatory 100%			voluntary with 30% intake			mandatory 50%+ voluntary 10%		
											insured value USD	fin exposure USD	premium USD	insured value	fin exposure	premium	insured value	fin exposure	premium
102	Arkhangai	Bulgan	14820	20461	29937	0	8267	182,917	1	0.0001	3,292,506.00	329.25	3,658.34	987,751.80	98.78	1,097.50	1,975,503.60	197.55	2,195.00
104	Arkhangai	Ikhtamir	34430	107105	85891	3	18377	528,230	1	0.0001	9,508,140.00	950.81	10,564.60	2,852,442.00	285.24	3,169.38	5,704,884.00	570.49	6,338.76
103	Arkhangai	Jargalant	18120	80927	56999	2	7575	299,381	1	0.0001	5,388,858.00	538.89	5,987.62	1,616,657.40	161.67	1,796.29	3,233,314.80	323.33	3,592.57
110	Arkhangai	Khairhan	13869	105988	83774	2	16651	369,541	1	0.0001	6,651,738.00	665.17	7,390.82	1,995,521.40	199.55	2,217.25	3,991,042.80	399.10	4,434.49
111	Arkhangai	Khangai	23507	25289	23414	0	5014	224,843	1	0.0001	4,047,174.00	404.72	4,496.86	1,214,152.20	121.42	1,349.06	2,428,304.40	242.83	2,698.12
116	Arkhangai	Oizit	8519	96956	81176	10	11952	312,060	1	0.0001	5,633,280.00	563.33	6,259.20	1,689,984.00	169.00	1,877.76	3,379,968.00	338.00	3,755.52
107	Arkhangai	Ondor-Ulaan	39134	107079	70134	0	17231	532,834	1	0.0001	9,587,412.00	958.74	10,652.68	2,876,223.60	287.62	3,195.80	5,752,447.20	575.24	6,391.61
114	Arkhangai	Tsenher	19115	64454	55107	29	13895	331,241	1	0.0001	5,962,338.00	596.23	6,624.82	1,788,701.40	178.87	1,987.45	3,577,402.80	357.74	3,974.89
202	Bayan-Olgii	Altantsogts	3433	30756	48424	391	3792	128,127	1	0.0001	2,306,286.00	230.63	2,562.54	691,885.80	69.19	768.76	1,383,771.60	138.38	1,537.52
207	Bayan-Olgii	Deluun	9064	57754	77768	262	6079	233,769	1	0.0001	4,207,842.00	420.78	4,675.38	1,262,352.60	126.24	1,402.61	2,524,705.20	252.47	2,805.23
208	Bayan-Olgii	Nogoonuur	5894	53510	85768	307	5346	213,599	1	0.0001	3,844,782.00	384.48	4,271.98	1,153,434.60	115.34	1,281.59	2,306,869.20	230.69	2,562.19
200	Bayan-Olgii	Olgii	2119	4636	11809	28	371	31,896	1	0.0001	574,128.00	57.41	637.92	172,238.40	17.22	191.38	344,476.80	34.45	382.75
210	Bayan-Olgii	Tolbo	4022	42296	34027	90	2539	118,678	1	0.0001	2,136,204.00	213.62	2,373.56	640,861.20	64.09	712.07	1,281,722.40	128.17	1,424.14
211	Bayan-Olgii	Ulaankhus	10978	82402	78713	671	6662	276,972	1	0.0001	4,985,496.00	498.55	5,539.44	1,495,648.80	149.56	1,661.83	2,991,297.60	299.13	3,323.66
403	Bulgan	Bugat	9526	36954	27932	0	6483	167,283	1	0.0001	3,011,094.00	301.11	3,345.66	903,328.20	90.33	1,003.70	1,806,656.40	180.67	2,007.40
400	Bulgan	Bulgan	6940	34903	27306	3	3999	131,647	1	0.0001	2,369,646.00	236.96	2,632.94	710,893.80	71.09	789.88	1,421,787.60	142.18	1,579.76
404	Bulgan	Bureghangai	9582	90458	77524	74	8485	285,239	1	0.0001	5,134,302.00	513.43	5,704.78	1,540,290.60	154.03	1,711.43	3,080,581.20	308.06	3,422.87
413	Bulgan	Khangal	11083	33288	37009	0	4373	167,400	1	0.0001	3,013,308.00	301.33	3,348.12	903,992.40	90.40	1,004.44	1,807,984.80	180.80	2,008.87
414	Bulgan	Khishig Ondor	8824	75204	82443	2	11907	273,950	1	0.0001	4,931,100.00	493.11	5,479.00	1,479,330.00	147.93	1,643.70	2,958,660.00	295.87	3,287.40
415	Bulgan	Khutag	18386	97562	73237	20	11059	358,628	1	0.0001	6,455,304.00	645.53	7,172.56	1,936,591.20	193.66	2,151.77	3,873,182.40	387.32	4,303.54
409	Bulgan	Orkhon	13991	83444	80754	18	18931	380,051	1	0.0001	6,840,918.00	684.09	7,601.02	2,052,275.40	205.23	2,280.31	4,104,550.80	410.46	4,560.61
703	Dornod	Bayan Uul	9531	31750	28554	385	7940	170,895	1	0.0001	3,076,110.00	307.61	3,417.90	922,833.00	92.28	1,025.37	1,845,666.00	184.57	2,050.74
701	Dornod	Bayandun	10896	75932	39403	250	7752	236,045	1	0.0001	4,248,810.00	424.88	4,720.90	1,274,643.00	127.46	1,416.27	2,549,286.00	254.93	2,832.54
702	Dornod	Bayantumen	8343	57412	37481	559	11454	227,624	1	0.0001	4,102,632.00	410.26	4,558.48	1,230,789.60	123.08	1,367.54	2,461,579.20	246.16	2,735.09
700	Dornod	Choibalsan	8219	43978	36925	599	10674	213,928	1	0.0001	1,781,280.00	178.13	1,979.20	534,384.00	53.44	593.76	1,068,768.00	106.88	1,187.52
715	Dornod	Chuluunkhoroot	4459	21801	18767	97	4479	98,060	1	0.0001	3,850,704.00	385.07	4,278.56	1,155,211.20	115.52	1,283.57	2,310,422.40	231.04	2,567.14
706	Dornod	Dashbalbar	10441	80854	49605	600	14151	295,062	1	0.0001	1,781,280.00	178.13	1,979.20	534,384.00	53.44	593.76	1,068,768.00	106.88	1,187.52
											5,311,116.00	531.11	5,901.24	1,593,334.80	159.33	1,770.37	3,186,669.60	318.67	3,540.74
907	Zavkhan	Zavkhanmandal	2940	55708	49861	207	4497	155,721	3	0.033									
908	Zavkhan	lkh Uul	15913	54527	41250	78	6421	236,562	3	0.033	2,802,978.00	92,498.27	8,564.66	840,893.40	27,749.48	2,569.40	1,681,786.80	55,498.96	5,138.79
912	Zavkhan	Santmargats	3728	84285	55503	504	6070	207,146	3	0.033	4,258,656.00	140,535.65	13,012.56	1,277,596.80	42,160.69	3,903.77	2,555,193.60	84,321.39	7,807.54
913	Zavkhan	Songjino	3356	69280	38270	65	4089	156,814	3	0.033	3,728,628.00	123,044.72	11,393.03	1,118,588.40	36,913.42	3,417.91	2,237,176.80	73,826.83	6,835.82
915	Zavkhan	Telmen	6198	60203	37743	319	7124	186,597	3	0.033	2,819,052.00	93,028.72	8,613.77	845,715.60	27,908.61	2,584.13	1,691,431.20	55,817.23	5,168.26
914	Zavkhan	Tudevtei	3400	47601	32356	17	4315	130,647	3	0.033	3,358,746.00	110,838.62	10,262.84	1,007,623.80	33,251.59	3,078.85	2,015,247.60	66,503.17	6,157.70
922	Zavkhan	Erdenekhairkhan	3191	71131	40240	287	3862	157,588	3	0.033	2,351,646.00	77,604.32	7,185.59	705,493.80	23,281.30	2,155.68	1,410,987.60	46,562.59	4,311.35
923	Zavkhan	Yaruu	4018	52108	32617	147	4580	141,628	3	0.033	2,836,548.00	93,606.08	8,667.23	850,964.40	28,081.83	2,600.17	1,701,928.80	56,163.65	5,200.34
TOTAL								66,615,589			2,549,304.00	84,127.03	7,789.54	764,791.20	25,238.11	2,336.86	1,529,582.40	50,476.22	4,673.72
											1,205,786,160.00	17,917,143.74	2,286,366.65	361,735,848.00	5,375,143.12	685,909.99	723,471,696.00	10,750,286.25	1,371,819.99

For the full details of the over calculations and its results please see attached excel file: *composite index 3.exe*

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