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Mongolia
Country Report
(updated in January 2003)

Ministry of Nature and Environment

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Ⅰ Geographical Considerations

Mongolia is situated in Central Asia, 1600 km from the Pacific, and 3000 km from the Arctic ocean and 5000 km from the Mediterranean. It experiences a continental climate, with hot summers (temperatures up to 41℃) and cold winters (temperatures down to −53℃). Diurnal temperature changes too can be very large. Rainfall is relatively low,

varying from 5cm in the southern desert region, to 40 cm in mountain areas. 80 to 96 % of precipitation falls in the warm period from April to October. In the south, significant rainfall begins in July.

About 40 % of the country is mountainous, 40 % hills (1000–1500m) and the remainder denotation plain. The landscape includes alpine, mountain taiga, forest steppe, steppe, Gobi, and desert regions. Rivers draining to the south and west terminate in inland lakes/salt lakes.

Crop growing season is short, 70 to 130 days, depending on location and altitude Unseasonal frosts can destroy up to 30% of crops. Crops are mainly root crops, wheat, garden vegetables, (including greenhouse vegetables near Ulaanbaatar) and hay fodder. The main agricultural production is animal husbandry, with herds of cattle, sheep, horses, camels, and goats.

Wind speeds are often high, with dust and sand storms 40 days per year over a large part of the country, and in some regions over 100 days per year.

The population of Mongolia was estimated to be 2.3 million in 1994, with about 27% of the population in the capital. The most densely populated rural areas are the river valleys in the forest steppe zone. The least populated are the semi desert, desert and mountain taiga zones. Rural population is 34% of the total, urban population 57%.

Disaster losses must be seen in relation to the gross national product. Per capita income is at present 100 to 110 US$. Although there is undoubtedly a significant natural economy which is non monetary (animal production and growth of vegetables for own consumption etc.). 510 000 persons or 23% of the total population are recorded as living below the government established poverty line.

Agriculture is a dominant part of the economy, and livestock breeding is a dominant part of agriculture. The total head of livestock is 23.6 million at the end of 2002, mostly sheep and goats, horses, cattle and camels. Livestock density is close to the carrying capacity of available pasture, and in some seasons exceeds carrying capacity Livestock losses per year have varied between 500 000 and 1 million head since 1986, with the average loss between 1986 and 1992 being 800 000, between 50 and 93% of the losses are due to disasters.
In agricultural field, there was loss of 65.2 billion MNT in 2000, 70.2 billion MNT in 2001, and 81.8 billion MNT by the first 9 months of 2002, and in animal husbandry sector it was loss of 95.0 billion MNT in 2000, 97.0 billion MNT in 2001, and 79.3 billion MNT by the first 9 months of 2002 or the three years' loss amount totally equals to Mongolia's one year's state budget. In other words, it is evident that one main factor that reducing Mongolia's economic development is the natural disasters as droughts and hard winters. If we calculate the amount of natural disaster damage to GDP, the share is as follows:n15.7% of GDP in 2000n14.8% of GDP in 2001.

Ⅱ Potentially Natural Disaster in Mongolia

Mongolia is a country where the following natural disasters occur frequently: meteorological such as blizzard; heavy snow; dust storm zud; rain water flood; dibaish flow; snow melt flow; and others such as earthquake; wildfire; drought; and desertification.
Natural disasters which have occurred in Mongolia are presented in Table 1.

Table 1. Types of natural hazards in Mongolia

Major hazards	Minor hazards
Blizzard	Lightning
Heavy snow	Locust infestations.
Dust storm	Plague
Zud	Epidemic disease
Flood (three types)	Ecological hazards
Cold rain	Industrial hazards
Hail	Toxic Chemical
Earthquake	Radiation
Wildfire	Accident (road/air)
Drought	
Desertification	

Ⅲ Disaster Monitoring and Prevention System

Measures to create a combined system on natural disaster information transmitting and processing, observing, forecasting and warning have been in operation since 1940. Today this system is based on the telecommunication systems of the hydrometeorological service of Mongolia. This system consists of the following subsystems:

- Sub-system for observation and information collection
- Sub-system for data transmission and processing
- Forecasting and warning sub-system
- Geological and wildfire sub-system

1. Sub-system for observation and information collection

The National Hydrometeorological Service (NHS) is responsible for observing, forecasting, and warning of hydrometeorological disasters such as drought, zud*, heavy snow, and dust storms, strong wind, blizzard, cold rain, flood, dibaish flow, and weather conditions for wildfire occurrence.. NHS has more than 400 gauging points, including meteorological, hydrometeorological and agrometeorological stations, BAPMON and greenhouse gas stations. Meteorological stations measure 8-11 elements _ a day agrometeorological stations measure 4-7 elements 3 times a day, hydrometeorological station measures three elements per day.
In addition, there are a number of stations for air, water and soil pollution monitoring.

2. Sub-system for data transmission and processing

Hydrometeorological observation data are collected from 18 provinces and three cities by telephone Channel and transmitted to the information and Computer Center (ICC) of the Ministry of Nature and Environment where they are processed. Data on earthquakes and wildfire occurrence are also collected by the same telephone channels. ICC also receives AVHRR digital data from NOAA satellites of the USA. ICC contains Mongolian national center for hydrometeorological communication. This center is connected to Beijing and Novosibirsk and V/MO regional centers, and it receives meteorological maps from Habarovsk, Tokyo and Beijing.
All incoming data are processed by VAX computing equipment. Although data are processed, no natural disaster data-base system was created until now.

3. Forecasting and warning sub-system

The Hydrometeorological Research Institute of the Ministry of Nature and Environment has responsibility for forecasting and warning of imminent hydrometeorological disaster: blizzard, dust storm, heavy snow, flood, zud, and drought.
The forecasting and warning criteria have been adopted under Government Resolution No.68 of 1993.

4. Geological and wildfire sub-system

The Academy of Sciences of Mongolia conducts research studies on earthquake phenomenon. It has 10 study locations within the territory of Mongolia. The first earthquake observation station was opened at Ulaanbaatar, the capital city in 1957.
There are no special locations for wildfire observation. Information on wildfire occurrence is obtained by from local government offices and people.

5. Telecommunications.

Since the 1920s, Mongolia has established a national postal and telecommunications network as well as a limited international communications network. The development of telecommunications reflects the spatial distribution of Mongolian population and the vastness of the country. The urban areas have the basic infrastructure.
In spite of the difficulties posed by geography and a small population thinly scattered over 18 provinces, a large proportion of the population has access to telephone services. There were 4 lines per 100 people in 1990 for the country as a whole. The density is higher in cities: for instance, 6 lines per 100 persons in Ulaanbaatar (33 500 lines) which accounts for one fourth of the population.
Mongolia has a motorized inter-city mail delivery service and a reasonably well-developed postal system.
There are 16 radio transmitters operating in VHF, short, medium and long wave ranges. Almost every famil2y has a radio, an estimated 16 radios per 100 persons, and 450,000 in all. There are 4 TV programs.

*Zud-is severe winter with heavy snow, very low air temperatures and strong wind.

Ⅳ Institutional Background

The Government of Mongolia is responsible for all activities (planning and implementation) related to prevention and mitigation of all types of natural disaster. In 1990, the Government of Mongolia established the State Permanent Emergency Commission (SPEC) in order to coordinate activities among the government agencies against any type of natural disaster.

SPEC has the following functions:
● Preparation of a National Disaster and Calamities Preparedness Plan
● Organization of disaster coordinating down to the ministerial and local government level
● Coordination of relief activities and measures to reduce consequences
● Organization of reconstruction or rehabilitation measures (SPEC has a branch in each aimag and in the large cities).

1. State Civil Defense board

The State Civil Defense Board operates under SPEC in emergency and has the following flections:

● duties of civil defense in peace-time
● quick dissemination of information on natural disaster warning and alarm operations
●. civil defense education and Training:

The Civil Defense Board has a central organization u˜ Ulaanbaatar, with units at the aimag (province) and sum (district) levels.

2. Ministries

Ministries have duties and responsibilities in accordance with their functions to prevent, mitigate and relieve natural hazards, and to educate and build national capacity to combat them. Ministry of Nature and Environment: natural disaster-related data collection and processing, forecasting and warning; dissemination of other operational information to public community, investigation of pollution levels after nuclear and chemical accident.

Ministry of Defense: disaster-resistance measures; reconstruction or rehabilitation of transport supply.
Ministry of Finance and Economic Development: financing reconstruction and relief measures.
Ministry of Infrastructure: fuel and energy supply in emergency.
Ministry of Food and Agriculture: food reserve to meet natural hazards.
Ministry of Health: medical equipment supply; organization of medical service and aid.

3. Focal Point for International Decade for Natural Disaster Reduction.

The International Cooperation Department of the Ministry of Nature and Environment is the National Focal Point for the International Decade for Natural Disaster Reduction.

The Focal Point has the following functions:
● comprehensive national assessment of risks from natural hazards;
● mitigation plans at national level, involving long term prevention and preparedness, and community awareness;
● ready access to global, regional, national, and local warning systems.
● international cooperation;
● policy and strategy for natural disaster reduction.

Ⅴ Legislative Background

In 1990 the Government established the State Permanent Emergency Commission and approved its regulations. In 1993 the Government adopted a resolution on natural disaster prevention measures, coordinating the duties and activities of Central and local government agencies, and approving the system of transmission for meteorological warnings.

The legislative basis for environmental protection in Mongolia including, emergency and disaster actions, is the MONGOLIAN LAW ON ENVIRONMENTAL PROTECTION, approved on March 30 1995. The following paragraphs are most directly related to emergencies and disasters:

1. Article 22 Areas of Natural Disasters and Emergencies.

1. The term areas of natural disasters and emergencies means an area which is affected by adverse impacts or hazardous changes of the environment resulting from human activities or natural evolution, which may have detrimental impacts on the environment, human, animals, wildlife, plants, and their genefunds.
2. The Government shall establish boundaries for areas of natural disaster and emergencies upon consultation with the Central State Administrative Organization in charge of nature and environment.
3. The Central State Administrative Organization in charge of nature and environment, Civil Defense Board, Governors of all levels and other concerned organizations shall jointly take measures on prevention and mitigation of natural disasters and emergency, elimination of adverse impacts, rehabilitation of nature and environment, and restoration of natural resources.

4. All costs for mitigating natural disasters and emergencies shall be allocated from the State budget. After the investigation of real cause the guilty party or citizens shall be assessed for the full compensation of any damages and losses.

2. Article 23. Environmental Protection in State of Emergency

Any measures with respect to mitigation of natural disaster, elimination of adverse impacts, and preservation of the environment and its natural resources undertaken within an area affected by State emergency shall be carried out pursuant to the rationale for, and procedures stipulated by the State Emergency Laws as provided by the Constitution of Mongolia.

The Civil Defense Law, approved in May 1995, officially included set of measures aimed at preventing, and safeguarding the people from natural disaster, eradicating the damage hitherto incurred by the population, and training in these aspects.

Ⅵ Disaster Mitigation Measures

1. Disaster reduction plan

The international Decade for Natural Disaster Reduction (IDNDR, 1990–2000) was launched by United Nations General Assembly Resolution 44/236, adopted in December 1989, with the objective of reducing, through concerted international action especially in developing countries, the loss of life, property damage, and economic and social disruption caused by natural disasters. Natural disasters, such as earthquakes windstorms, floods, wildfires, heavy snow fall, drought and desertification continue to strike and increase. Therefore a Program of actions was launched in order to implement the target activities of the Decade at the national level and to prevent as well as to reduce the effects of natural disasters.

The National Program on Natural Disaster Reduction was considered an integral aspect of the social and economic development policy of country, and activities for the implementation of this program started in 2002.

The objective of the Program is to provide follow-up activities in Mongolia in order to achieve agreed targets of the Decade, namely, the development and strengthening national capacities and capabilities for natural disaster prevention, mitigation and preparedness.

In order to fulfill objectives the following measures will be undertaken:

1. Disaster assessment, analysis and evaluation

a/ Disaster assessment
b/ Vulnerability analysis
II. Short and long-term prevention measures
III. Collection and dissemination of documentation and information to improve public awareness of natural disasters and how best to deal with them

2. Construction

Mongolia still does not have reliable earthquake-resistant construction technology. In Mongolia, there are very few buildings equipped with earthquake-resistant facilities and means. However, gers (national houses) are more resistant to earthquake they can be damaged, but to a lesser extent than conventional buildings.

Since 1990, a decentralization policy for people and industry has been effected in urban development planning and regional development.

a) Flood protection, River flood protection dams have been constructed in Ulaanbaatar, Darhan and other cities. Dibaish flow protection dams also were constructed in mountainous area of Ulaanbaatar city.
b) Housing: Due to accelerated urbanization in the last three decades, the demand for house building has increased greatly. In this connection, a large number of 5–9 storey apartments have been built in the cities. Schools and kindergartens are also in these apartments which can be more vulnerable to earthquake than other ones. Since the 1990s, government housing policy has basically changed. Citizens are now encouraged to construct their own individual small houses. In Mongolia roofs of small houses are easily damaged by strong wind and dust storm. There is no project on wind-resistant roof design so far.

3. Public awareness

There are insufficient activities organized for public awareness of natural hazards. Warnings and alarms for all types of natural disaster are transmitted through radio and television over the entire territory of the country. But, there is no activity for increasing public, awareness among the peop1e in non-disaster times. Unfortunately, radio, television and newspapers provide special programs only after a natural disaster has already occurred. No propaganda is provided on natural disaster-related problems. No books and brochures for public awareness have

been produced. Warning and alarm systems can effectively work in big cities and settlement areas, but due to scarce population density and inadequate communication systems, people in the countryside sometimes cannot be informed in time.

4. Research and development of Disaster-reduction technology

Since the 1970s, there have been attempts to study, evaluate and forecast some hydrometeorological disasters. Today research studies on frequency and regime of snow and dust storms, and their forecasting are being conducted successfully. Meteorological conditions for heavy snow fall have been identified. Methodological guidelines for flood forecasting are being prepared.
A part of the future work of the ministry involves refining the analyses, adding more detail, and evaluating them at the province level. An attempt has been made to make the values given here as accurate as possible, but further data collection in the field is required before values can be used for decision making.

The effectiveness of prediction and warning depends both on the quality and lead time of prediction, and on communications channels. Prediction of blizzards, dust storms, and heavy snow can now be made in Mongolia with a lead time of 2 to 3 days, and a reliability of about 90%.

High reliability is a necessity. Unreliable warnings are unlikely to be believed, reducing their effectiveness. Dissemination of information to herders is the least reliable aspect of the warning chain, because of the lack of telephones, radios, and TV in herder communities. It is estimated that only about 35 % have working radio. Note that a supply of batteries or access to electrical power is also needed.

5. Emergency Scenarios and En sting Responses

The following examples show some technological approaches for mitigation measures for blizzards, heavy snow and earthquake.

1) Blizzards
Blizzards occur in Mongolia generally between September and May. Duration may be short, just a few hours, or up to 10 days. Number of blizzard days varies between less than two days in the west of the country (except for mountains) to between 2 and 8 days in the eastern part of the country and 8-10 days in some mountainous areas. Blizzards can be extremely dangerous with heavy snow and up to 35 m/s wind. Table 2 gives a listing of recent blizzard disasters.

Table 2.Recent Blizzard disaster in Mongolia

Year Consequences	Place	Fatalities	Livestock lost	Other
Sept. 1995	Eastern Mongolia	8	48,000	
May 1993	Central Mongolia	17	100,000	
Sept. 1993	Central and East	11	5,000	20% potato crop lost
Oct. 1992	Central and West	4	500,000	
1988	Dornod, Hentii, Sukhbaatar, Domogobi	8	10,000	Property damage

Heavy snowfall can often prevent by preventing livestock from reaching pasture. It is hard to distinguish the consequences of blizzard (due to chilling) and heavy snow (due to exhaustion and starvation of livestock).

The following safety barrier diagram (Figure 1) shows the structure of emergencies involving blizzards, and the emergency measures which may be used to reduce risk. The sequence of events in a blizzard disaster begins with the weather turning bad and terminates with harmful events to persons, livestock and crops. The first barrier to disastrous consequences is prediction and warning. This can allow persons to seek shelter and, given sufficient time can also allow herdsmen to gather stock and take them to shelter.

2) Heavy Snow Fall
Heavy snow fall disasters differ from blizzards in that persons are not so much at risk. Damage is primarily caused by livestock being immobilized on the range or in shelters (pens, cow shed, etc.) and unable to reach grazing. Figure 2 shows a safety barrier diagram for this situation.

The problems of warning and stock collection in the case of heavy snow fall are similar to those described above for blizzards. The consequences are less direct however. There are two major aspects of the problem, that of people obtaining supplies if snow lasts a long time, and that of providing fodder for animals which cannot reach pasture due to snow.

On farms there is unlikely to be a large shortage of food. The primary problem is in villages, where direct access to food may not be available if transport is halted for a long time. This is a question of the amount of snow falling, and the length of time it remains. The mean depth for heavy snow falls is typically 10–15 cm, in mountain areas 20–25 cm. Extreme snow falls are up to 1.5 m in mountain areas. Transport becomes difficult with snow falls greater than 40 cm.

A problem is communication. Communication of snow warning to farmers can be made by radio, to the limit of access to radio receivers. Communications from farmers, requesting aid, generally have to be made on foot or horseback.

When snow is heavy and the snow remains for longer periods, animals begin to weaken and die. Delays in feeding of one day are unlikely to cause significant damage. But following two days without fodder, mortality begins to increase. Heavy snow falls covered most territory of the country in winter of 1999–2000, 2000–2001 and 2001–2002. In this year for the estimation in January, 2003, almost 90 per cent total land of Mongolia covered by snow falls and from them in about 50 per cent of territory covered by heavy snow falls.

3) Earthquake
Earthquakes are quite frequent in some parts of Mongolia. The consequences in villages are generally destruction of housing, roads and bridges. On farms the traditional gers houses are very resistant to earthquake damage. A safety barrier diagram for earthquake disasters is shown in Figure 3.

Earthquake prediction is difficult, but can be made in a percentage of incidents, particularly with a 1 to 2 day warning. But here again, there are the same difficulties in communication out to rural areas as described above for floods and blizzard warnings. Prediction can be used for increased awareness and possibly for evacuation of collapse–prone buildings, at least in summer. Earthquake preparedness training is an important aspect of this kind of disaster mitigation (Table 3).

Rescue, rehousing and rebuilding are important aspects of disaster mitigation for earthquakes, particularly in winter. There are two major problems in Mongolia which limit the speed of response at present. One is the difficulty of communicating from rural areas. The other is the difficulty of access, particularly during winter.

Table 3. Effectiveness of disaster mitigation measures for earthquake

Safety measures effectiveness	Response time	Reliability of prediction	Effectiveness of warning	Effectiveness of rescue	Rehousiug effectiveness	Overall
Earthquake prediction+ evacuation	days, hours	30%	<30%			<10%
Rescue humans	days			Depends on location		Depends on location
Rehousing	days			Depends on location		Depends on location

Ⅶ International Cooperation

Mongolia has joined the International Conventions on Climate Change, Biodiversity, Desertification and Ozone–layer protection. Its representatives have actively participated in conferences, regular meetings and other undertakings of the parties to the International Conventions concerned. It has explained its position and policy in relation to those aspects, and has taken measures to carry out its commitment in respect of the international community.

Mongolia actively participates in the International Decade Natural of Disaster Reduction, and collaborates with some countries in the held of information exchange, studies of new technology and personnel training. Its representative has prepared Mongolian National Report, and took part in the Yokohama Conference at 1993.
Over the last two to three years, joint venture projects have been implemented with some developed countries. For example, together with the US Environment Protection Agency work has been done on a Country Study Program on climate change, inventory of greenhouse gas, vulnerability assessment and mitigation policies. We have successfully completed an initial stage of this work, and have now started a second stage.
The Ministry of Nature and Environment of Mongolia in collaboration with some Japanese organizations have developed project proposals for natural disaster reduction and have presented them to potential donors.

Currently, we are cooperating with the Tsukuba University of Japan to implement a project on Global warning and climate change, and studies of the changing mechanisms of the Central Asian climate.

With the help of the Asian Development Bank, we have started realization of a Project on Environment Management Capacity. Within the framework of this project, we have organized workshops on disaster 2anagement and early warning systems, prim it system for tens of Mongolian specialists. These are the first steps designed to build national capacity. On the basis of the output of the workshops, we are now preparing an action plan for development and training for disaster analysis, prediction and emergency planning support.

With the assistance of UNEP and UNDP, a National Action Plan to combat desertification has been elaborated and a National Workshop on the combating of desertification has been held in Mongolia.

Mongolia is concluding agreements with its neighbors on natural disaster reduction. Recently, Mongolia and the Russian Federation signed an agreement on cooperation in case of industrial accidents, natural disasters and the eradication of their consequences.

Because of the economic situation, we are now experiencing some difficulties sending our representatives to international scientific conferences and workshops, and for training abroad.

In future, Mongolia is interested in cooperation with its neighbors in the Subregion and International Organizations on the subjects of measures for natural disaster reduction, prevention and management.

Ⅷ Conclusions

1. Natural disasters are very sensitive issues for Mongolia, especially from the economic point of view. Losses to herds, flocks and crops annually affect a very significant part of the country.

2. The high frequency of natural disasters and their extent presents a serious constraint which delays development of the country.

3. Natural disasters cause significant loss of life, and of property.

4. The sheep flocks, cattle and horse herds of Mongolia represent a large portion of the wealth of the nation, and are an essential part of the livelihood of most Mongolians. In the most extreme disasters in the past, over half of the national herd has been lost. Even larger disasters are possible.

5 .The disasters contributing to losses of herds and flocks are heavy snow, blizzards, dust storms, drought, and floods.

6. Disaster response outside Ulaanbaatar is hampered by difficulties of communication, very long distances, and limited resources.

7. There is a weather monitoring and weather forecasting service which has a well functioning network of weather observation stations, and a well functioning forecasting capability. Effective use of this service will help to an establishment well functioning disaster prevention system.

8. There is a weak link in transmitting natural disaster information to herders in remote parts of the country who especially need it. That is the final link in communications. Only a fraction of herder families have radios. The supply of batteries is also a problem. Those herder families who do have radios tend to use them sparingly and they reserve battery power for weather forecasts and other disaster warning information.

9. Civil Defense activities could benefit from the use of modern risk assessment and emergency response .effectiveness assessment methods, in order to optimize the use of limited resources.

10. The action plan should involve a program of training in risk assessment, computer programming for risk analysis and emergency response communications, and disaster mitigation planning assessment.

11 The action plan also should involve development of pilot projects in risk assessment, disaster communications, and emergency planning.