

MONGOLIA ENVIRONMENTAL ANALYSIS:
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1 INTRODUCTION

Section 119 of the Foreign Assistance Act requires that all country plans include an “analysis of (1) the actions necessary in that country to conserve biodiversity, and (2) the extent to which the actions proposed for support by USAID meet the needs thus identified.” This paper does not seek to give a comprehensive assessment of Mongolia’s biodiversity, threats, and needs. Numerous environmental assessments have already been completed on this issue, including recent reports by the World Bank and WWF, among others. However, it does look at the most significant biodiversity and environmental issues and their linkages to USAID development objectives. The paper also includes an assessment of Mongolia’s most significant biodiversity resources, threats and needs as well as an analysis of the extent to which current and future strategic objectives and programming are or can be linked to biodiversity conservation.

Mongolia’s biodiversity is a globally significant natural resource, as well as a basis for the private sector growth that can provide better living standards and a deepened foundation for democratic governance. Mongolia’s relatively pristine environment and range of ecosystems, its small population scattered across a territory the size of Alaska, its relatively intact nomadic traditions and culture, its limited infrastructure and harsh climate pose a fundamental development challenge and opportunity. Can Mongolia, now open to the world after centuries of relative isolation, find a development path that builds on its most significant physical assets -- its territory, natural resources, and unique assemblage of ecosystems and species – to provide a better life for the people and civilization that have evolved from its harsh and unique environment? Or is Mongolia destined to follow the path of many other transition and developing countries, a path of rapid resource exploitation that damages the very qualities that provide a potential basis for long-term economic growth? How Mongolia’s environment is factored into the country’s development is central to Mongolia’s own future aspirations as well as to USAID strategic objectives.

Mongolia is highly reliant on its environment for its economy and semi-nomadic herding lifestyle. More than most countries, it has managed to keep a balance between using the land for sustenance and over-exploiting it. However, economic transition has increased pressure on the environment as people increasingly turned to the exploitation of natural resources – often in illegal and damaging ways – to sustain themselves.¹ Mongolia’s environment is relatively unspoiled, but it is also fragile, and vulnerable. The country’s relative poverty, its lack of value-added manufacturing and reliance on primary product for employment, labor, and exports, the natural resource demands of neighboring countries, and the country’s reliance on external sources of funding (and the need for those funders and investors to show quick and measurable economic results) create formidable pressure to overexploit natural resources.

2 BIODIVERSITY STATUS, TRENDS, AND THREATS

2.1 Status of biological resources

Mongolia's territory of 1.56 million square kilometers lies between the boreal forests of Siberia and the Gobi desert, spanning the southernmost border of the permafrost and the northernmost deserts of Central Asia.² The country is extremely cold and arid.

Mongolia lies within a transition zone of several ecosystems: the northern edge of the Gobi deserts, southern edge of the Siberian taiga, the Altai mountains and the Central Asian steppe converge in Mongolia. The country is "rich in transitional ecosystems that occur nowhere else and has its own unique assemblage of species."³ These ecosystems provide habitat for a variety of plants and animals, some of which are globally threatened. Enormous herds of the migratory Mongolian gazelle provide one of the last spectacles of mass migrations of ungulates on earth, rivaled in scale only by those taking place on the Serengeti plains of Tanzania.

Mongolia has six natural zones within its borders: high mountain, taiga forest, mountain forest steppe, steppe, desert steppe, and desert. In contrast to many of its neighbors, much of the biodiversity in these six ecosystems is still relatively intact. However, due to low precipitation, thin topsoils, and long, cold winters, natural productivity is low and the ecosystems are fragile and susceptible to irreversible damage.

Biodiversity conservation in Mongolia is regionally important as the country includes large, relatively intact examples of major ecosystems that in turn support a number of species that are often more threatened elsewhere in the world.

2.2 Major ecosystems and areas of global significance include⁴:

2.2.1 Gobi desert. The Gobi desert covers most of southern Mongolia, as well as considerable territory in northern and northwestern China. The Gobi is a rocky, high-altitude desert, much of it covered by vegetation. The Gobi area in Mongolia includes the Great Gobi Strictly Protected area, encompassing 5.3 million hectares, and one of the largest UNESCO biosphere reserve in the world. The Gobi is home to several globally rare, threatened, and endangered species representative of the ancient terrestrial fauna of Central Asia, including the Gobi bear, wild bactrian camel, argali bighorn sheep, snow leopard, wild ass (Hulan), gazelle, and mountain goat.

2.2.2 Steppe. Grasslands cover the center of Mongolia in a broad swath from east to west, with forests to the north and desert to the south. The steppe and forest steppe support the highest densities of livestock in Mongolia, and are the most heavily populated part of the country. The eastern steppe ecosystem, however, with very few people and livestock, is the largest relatively undisturbed steppe ecosystem in the world and is the home to hundreds of thousands of migratory Mongolian gazelles. The mass migration of gazelles rivals the spectacle of the Serengeti wildebeest migrations.

- 2.2.3 *High Mountains.* Several mountain ranges divide the country. The largest is the Altai Mountains, which extend eastward into Mongolia from Russia (Tuva) and western China. In far western Mongolia, the Altai are glaciated, with peaks over 14,000 feet. Other mountain ranges include the wild and remote Hentii Mountains, bordering Russia in northeastern Mongolia, the Hangai Mountains in the center of the country, and the Sayan range near Lake Hovsgol in the north.
- 2.2.4 *Taiga.* North central and eastern Mongolia is covered by taiga forest, the southern extension of the forests that cover much of Siberia. Taiga covers the area around the beautiful alpine Lake Hovsgol (the world's 14th largest lake by volume), in the north central part of the country, and the Hentii mountains to the northeast of Ulaanbaatar.
- 2.2.5 *Water resources.* Despite low levels of precipitation, Mongolia includes a great variety of water resources. Water flows to three different drainages, the Arctic Ocean, the Pacific Ocean, and to The Central Asian Inland Drainage Basin. Almost all of the water in the Arctic Ocean drainage flows to famous Lake Baikal, making Mongolia one of the most important watersheds for the world's largest lake. The largest rivers in eastern Mongolia, within the Pacific Ocean drainage, flow to the Amur River. More than 75 percent of the water in Mongolia is part of the Central Asian Inland Drainage Basin, which includes the large salt and freshwater Great Lakes of western Mongolia. In part because of Mongolia's geographical location, these water resources are important to the many migratory bird species that nest in Siberia (and Mongolia).

2.3 *Species diversity*

Though Mongolia is home to a low numbers of species compared to tropical countries, and relatively few endemic species, “the particular assemblages of species and the intact functioning ecosystems in which they live are found nowhere else.”⁵

Endemism (species that are native to a particular geographic area or continent) is low in Mongolia – 9.4 percent of plants and 7.6 percent of fish. However, Mongolia's combination of ecosystems provides an “important population base for many Central Asian desert, steppe, and taiga species with wider, but decreasing, distributions outside the country.” According to a recent World Bank Environment Monitor, Mongolia is home to more than 2,823 species of plants (compared to 2,400 in central Siberia and 2,176 in Inner Mongolia).⁶ Mongolia “provides habitat for wildlife now extinct or rare elsewhere.”⁷ Twenty-seven vertebrate species are listed as threatened (vulnerable or higher) according to IUCN's criteria, and around 65 species are listed in CITES appendix I or II. Of note, threatened and endangered vertebrate species in Mongolia include the snow leopard, Gobi bear (a relict population in the southern Great Gobi reserve numbering only around 30 animals), wild bactrian camel, argali (mountain sheep), ibex (mountain goat), and mountain saiga, and several species of fish and birds.

2.4 Major threats

2.4.1 *Pasture degradation and desertification.* Overgrazing and pasture degradation is a growing and potentially serious environmental and economic problem. This is a concern not only for Mongolia's herders (who make up around a third of the population) but also for biodiversity. Estimates of pasture degradation vary widely, from as low as 30 percent of the pastures to as much as 70 percent.⁸ However, it is very difficult to gauge the actual extent and severity of land degradation and "desertification," and to ascertain the difference between actual human or natural-caused damage and the effects on vegetation of climatic variability.⁹ Reports on specific sites by rangeland managers document serious overgrazing.¹⁰ Overgrazing is particularly evident around settlements, particularly in the steppe, desert steppe, and desert areas of the country.¹¹

The results of over-grazing and pasture degradation are potentially severe for the large numbers of Mongolians that rely on herding and herding products for their economic livelihoods. Livestock loss due to the winter disaster dzuds in 1999-2000 and 2000-2001, in which Mongolia reportedly lost over 20 percent of its herd, was reportedly exacerbated by human-caused pasture degradation. Economically, agriculture, primarily extensive livestock herding, accounts for nearly half of Mongolia's labor force and around 30 percent of GDP.

Over-grazing and pasture degradation also threaten biodiversity, as increased numbers of domestic livestock compete with wild herbivores for forage and water sources. The increased presence of herders and livestock in remote areas not only increases grazing of pastures used by wild animals but also increases their exposure to poaching and subsistence hunting.

A number of factors contribute to increased overgrazing and pasture degradation. These include increases in livestock numbers and numbers of herding households (and of inexperienced herders),¹² concentration of herds near settlements, transportation corridors and other market access points, accompanying reductions in livestock mobility, and changes in the composition of livestock herds.¹³ Following privatization, the number of herding families and livestock increased dramatically from 1990 to 1999,¹⁴ then fell following two consecutive bad winters (known as "dzud") that resulted in the reported loss of 20 percent of the herd.¹⁵ The composition of animals in the herds also changed, as high cashmere prices caused the percentage of goats in the herds to increase from 20 percent in 1989 to 34 percent in 2000. Most importantly, poor rural access to markets and social services and unfavorable domestic terms of trade with increasing distance from urban centers and transport corridors contributed to herders' tendencies to move toward settlements and stay there, reducing mobility and resulting in a concentration of animals near settlements and transportation corridors.

Root causes include the breakdown of land tenure management systems, high transport costs and unfavorable terms of trade with increasing distance from

transportation corridors and large cities, and the de-monetization of rural Mongolia following transition, which led many herders to rely on livestock for savings. Although Mongolia pastures are a common resource, pasture use has long been regulated. Other sources of pasture degradation include multiple vehicle tracks,¹⁶ cultivation,¹⁷ and mining. Loss of centralized markets for livestock products,¹⁸ de-monetization of the rural economy, lack of accessible markets and livestock product collection systems have all been factors that have encouraged herders to keep more animals on the hoof, despite the possibility of overstocking. Pasture degradation is also exacerbated by rodent infestations (especially Brandt's vole, *Microtus arvalis*) that have reportedly increased in range and intensity, mostly likely due to over-grazed pastures.¹⁹

- 2.4.2 *Climate change.* As a signatory to the UN framework on Climate Change, (1992) the Mongolia government prepared an initial communication that includes an impact assessment of climate change and possible adaptation measures. The assessment details Mongolia's concern over the possible relationship of the recently increased frequency and severity of drought and winter natural disasters called "*dzud*" to global climate change, and the direct impacts to large segments of Mongolia's population, especially herders.²⁰ "Mongolia has specific concerns related to the reduction of glaciers, permafrost area, and snow cover that would cause serious damages to the economy as a result of global warming."²¹

Meteorological records indicate that the mean annual air temperature for the country has increased by 1.56° C over the past sixty years, mostly due to increases in winter temperatures. There has been a slight trend of increased annual precipitation (due to increased summer precipitation), but of decreased spring precipitation, which is crucial to grassland productivity. Anecdotal evidence points to an increase in the frequency and intensity of blizzards, dust storms, wildfires both in forests and in grasslands, and insect infestations, although comprehensive research is lacking. For the coming 40-70 years, global climate change models predict a 3-10° C increase in monthly mean temperature, mostly in the winter months. General Circulation Models (GCM) scenarios produced very different estimations of future precipitation trends.

Superficially, it might appear that increased winter temperatures would have beneficial effects. However, the study concludes that global warming will have significant negative impacts on natural resources and human populations. For biodiversity, global warming may have significant effects as natural zones are predicted to shift northward, with a decrease in areas with typical high mountain and forest steppe conditions and an increase in areas covered by desert.²² Overall the changes are predicted to have negative impacts on animal husbandry, forests and forest regeneration, and a positive effect on cropland agriculture. Levels of soil carbon and nitrogen are expected to decrease. Negative potential impacts of global warming are forecast to be most severe in desert and desert steppe regions of the country.

Although there is little or nothing Mongolia can do to influence the causes of climate change (especially given the country's small total -- though very high per capita -- emissions of greenhouse gases), the government proposes a series of measures to mitigate the effects of climate change, including public awareness and education, improvement of rangeland management, and the establishment of early warning system for extreme climatic events.

- 2.4.3 *Deforestation.* Forests cover 7-11 percent of Mongolia's territory, depending on land classification techniques. This includes forested parts of Mongolia's taiga and forest steppe regions, as well as the 25 percent of total forest area²³ made up of the Gobi desert covered with so-called "saxaul forests," a desert shrub (*Haloxylon ammodendron*) that is important for desert soil conservation and water retention.²⁴

Forests provide important sources of fuel, construction materials, and commercial products. They also protect water sources and watersheds, and provide habitat for biodiversity. Forests in many parts of Mongolia are fragile and slow to regenerate. Mongolia's forests are increasingly depleted by unsustainable legal and illegal commercial logging, firewood gathering, fire, and insect infestations. Official estimates of log output are thought to seriously underestimate the loss of forests due to illegal logging, which is said to be "rampant," and gathering of firewood and other household wood. Most log production is concentrated in only a few, easily accessible areas²⁵ -- in these areas, even low levels of harvesting are unlikely to be sustainable.

Approximately half of the area of closed forests has been affected to varying degrees by forest fires. Over 300,000 hectares have been destroyed by insects -- primarily the Siberian silk moth -- during the 1990s.²⁶ Reportedly, the amount of wood gathered for fuel and other household uses exceeds the officially recorded commercial timber harvest. In the Gobi region, particularly in South Gobi and Gobi-Altai aimags, loss of saxaul forests, mostly due to firewood collection, is of particular concern due to the role of saxaul in protecting fragile desert soils. ADB's environment study writes: "Forests, just like wildlife, are clearly being 'mined,' the temporary economic hardship and institutional weaknesses conspiring to make this possible."²⁷

- 2.4.4 *Unsustainable use of wild flora and fauna.* Mongolia's wildlife and plant species are increasingly vulnerable to a growing number of threats. These threats include poaching and illegal collection for the Asian medicine market and global wildlife trade; illegal sport and subsistence hunting; habitat loss due to deforestation, pasture degradation and competition; mining; loss of access to water sources; and application of pesticides. Although comprehensive statistics are lacking, Mongolian and international environmental specialists generally agree that there has been a significant increase in illegal hunting and poaching of Mongolia's flora and fauna. The poaching and collection of species like musk deer, brown bear, and elk for the Asian traditional medicine market, and the collection of globally

rare saker falcons for falconers in the Arab world now both represent areas of increasing concern.

Illegal sport hunting, primarily of elk, argali, ibex, bear, gazelle, and wolf has grown significantly. This is fueled in part by the increased access of urban populations to high-powered rifles and high-speed four wheel drive vehicles. Globally threatened species like the taimen (*Hucho taimen*), the largest member of the salmonid family, growing to over 150 pounds in weight, and now almost extinct in Siberia and Europe, can be found lying in the dust, on sale for a few dollars, in remote settlements near rivers where they are still abundant, reminiscent of the overfishing of salmon that occurred in Alaska more than a century ago. Large scale application of rodenticide to control infestations of Brandt's vole (*Microtus arvalis*) in the summer of 2002²⁸ resulted in large scale die-offs of migratory bird species. Several human deaths were also reported due to rodenticide mishandling.

At the same time that pressures on wild flora and fauna are growing, the capacity of local authorities to systematically enforce environmental laws and regulations is weak. Financial and human resources are extremely scarce, especially in relation to the large territories and high costs involved in patrolling national parks and protected areas, let alone the rest of the country.

2.4.5 *Air and water pollution.* Urban air and water pollution have localized impacts on human populations as well as on biodiversity. Air pollution has grown significantly in Ulaanbaatar, along with population, over the past decade. This is especially the case in winter months when frequent temperature inversions and low wind speeds trap air pollution generated by local heating and electricity generation. Key sources of pollution include the growing *ger* districts (peri-urban areas) where families living in *gers* burn coal and wood, usually in inefficient stoves, for heating and cooking. Inefficient power plants and the growing number of automobiles also contribute to the problem. As a result, peak concentrations of SO₂ and NO₂ are increasing above their mean historic levels.

Urban water pollution due to domestic sewage and industrial effluents is increasing. Although basic wastewater treatment plants exist in Ulaanbaatar and most urban centers, these plants are outdated and usually in very poor condition. The water quality of several major rivers downstream of Ulaanbaatar and other major urban and industrial centers has degraded significantly. Major symptoms include increasing levels of biochemical oxygen demand, total coliform bacteria, and industrial effluents, including heavy metals. This threatens human health as well as flora and fauna both in and alongside affected water bodies. Downstream pollution due to sedimentation and release of toxic effluents is also a problem. In this case, the problems stem mainly from mining activities, particularly placer gold mining operations (see below).

2.4.6 *Rapid expansion of mining, including large number of illegal placer gold miners.* It is estimated that up to 50,000 people are engaged in gold mining, many of them in illegal placer operations. The mining sector is increasingly important as a percentage of GDP, as a source of foreign exchange, and as a source of employment. However, the largely unchecked proliferation of mines and miners, and the limited ability of government to enforce environmental and mining regulations has led to severe localized environmental degradation, as well as negative social consequences. In particular, rapid increases in illegal gold mining is bringing severe, localized environmental damage.

The rapid, and largely unchecked growth of the mining sector provides one of the most striking examples of the environmental challenges that Mongolia faces. On the one hand, an estimated 50,000 illegal miners (mostly gold miners) represent one of the fastest growing sources of new employment in rural areas. On the negative side, there are issues of environment, human health, infrastructure, law and order, gender, child labor, education, human rights, legislation, statistics and the erosion of livestock rearing. Although Mongolia has a new and relatively progressive Law on Minerals, implementation is weak. Although there were a few large state-run mines during Soviet times, mining has developed rapidly as an industry during Mongolia's 12 years of transition.

A large number of legal and illegal placer gold miners are operating in the Zaamar area, located about 180 km northwest of Ulaanbaatar, Mongolia's capital and largest city. The Zaamar area is Mongolia's largest goldfield with a production of 5500 kg in 2000, which is approximately half of Mongolia's total annual gold production. A large area 40-45 km in length and 0.6 km to 2.5 km in width has been severely damaged by mining activities. The goldfield adjoins and is in the watershed of the Tuul River, one of the main tributaries to the Selenge River, which is the major tributary to Russia's famous Lake Baikal. The river contains abundant fish stocks; three of the species migratory, one of which is the Mongolian Red Book listed Baikal Sturgeon. The associated wetlands are valuable wildlife habitats and the river valley is an important flyway and corridor for the migration of birds between the Pacific, Arctic and Indian Oceans. (Dallas, 1999).

Environmental assessments conducted of this area document severe local environmental damage. Severe environmental damages are resulting from the destruction of riparian and grassland habitat along the Tuul River, massive sedimentation and water pollution of the Tuul due to improper mining, settling, and rehabilitation, old inefficient mining technology and techniques, improper tailing and topsoil storage, lack of mine reclamation and rehabilitation, improper river diversions, and overgrazing and deforestation (near mining areas). Heavily sedimented wastewater from placer operations entering the Tuul River from inadequate (and sometimes non-existent) settling ponds is increasing the siltation of the river, threatening fish spawning habitat, and contributing to decrease in the quality of the water entering Lake Baikal. Destruction of vegetation and habitat

near the river is increasing channel and bank erosion, instability of the river channel, and exacerbates the above problems. The lack of reclamation also means that these problems will continue long after mining has ceased.

2.4.7 *Loss of and competition for water sources, especially in Gobi region.* Loss of access to water sources may be a serious problem for wild fauna, exacerbated by drought, unsustainable human use of groundwater aquifers,²⁹ and competition for existing water sources from humans and livestock.

2.5 *Policy framework*

The Government of Mongolia has developed a strong legal framework for environmental protection, much expanded beginning in the mid-1990s. There are now 23 laws directly relating to environmental management, most of them important for biodiversity conservation, and more than 100 other laws, regulations, orders, and standards that are related to the environment. These include laws on environmental protection and environmental impact assessment, laws on forests, natural plants, hunting, special protected areas, and laws on the use of water, forest, minerals, wildlife, and toxic chemicals.³⁰

Mongolia is a signatory to virtually every major environment-related international convention. Some of the most important including the Convention on Biodiversity (1993), Convention on Climate Change (1994), Convention on Trade in Endangered Species (CITES) (1994), and the Convention on Combating Desertification (1996).

At the 1992 Earth Summit (United Nations Conference on Environment and Development) in Rio de Janeiro in 1992, the Mongolian government stated its intention to place 30 percent of its territory in the protected area network. It also proposed that the entire territory of Mongolia should be accorded special status as a world biosphere reserve of special international significance.³¹ Although this proposal has not been repeated, to date the government has set up a network of 48 protected areas, national parks and reserves that cover over 20 million hectares. This represents 13.2 percent of Mongolia's territory, or an area larger than Nepal, Syria, Bangladesh, or Cambodia. In addition, buffer zones totaling over 10 million ha have been established around 12 of the protected areas. A nationwide "ecoregion biodiversity assessment" conducted by the WorldWide Fund for Nature (WWF) in 2002 identified a number of representative ecological areas to be considered for future inclusion in the protected area system.

Together with donors and NGOs, the Government of Mongolia has developed and implemented a large number of strategies and programs dealing with environmental and biodiversity issues, including the National Environmental Action Program (1994), the National Action Program to Combat Desertification (1994-5), the National Biodiversity Conservation Action Plan (1996).

2.6 International recognition of Mongolia's biodiversity

Four Mongolian protected areas – Bogd Khan Mountain (1996), Great Gobi (1990), Hustain Nuruu (2002), and the Uvs Lake Basin (1997) -- are UNESCO-designated Man and Biosphere Reserves. No Mongolian protected areas or national parks have yet received World Heritage designation, although the government nominated nine sites in 1996. Under the RAMSAR Convention on Wetlands, six sites in Mongolia are designated as Wetlands of International Importance. The Uvs Lake area is an IGBP (International Geosphere-Biosphere Programme) study area for global change research. Three ecoregions in Mongolia are listed among WWF's Global 200, a science-based global ranking of the Earth's most biologically outstanding terrestrial, freshwater and marine habitats: the Daurian steppe, the Altai-Sayan montane forests, and the Russian Far East Rivers and Wetlands.

3 ASSESSMENT OF ACTIONS NECESSARY TO CONSERVE BIODIVERSITY

3.1 *Generating income from biological resources in a way that provides an incentive to conserve them.*

A key challenge is to build linkages between biodiversity and environmental resources and economic values and income. Natural resource trade-offs are increasingly made that unduly damage biological resources for at least three reasons. First, the value of the resources are not reflected in prices/fees for their use (and fines for their mis-use). Second, there is a lack of alternative, less-damaging activities that bring income but do not overexploit the resources. Third, communities and local people have few economic incentives to conserve resources.

Many of Mongolia's natural resources are undervalued economically. In the case of pastures, grassland is generally used for no charge. Forests, wildlife, plants, and water are all used for a fraction of their market value. Mongolia's largely rural population, high rates of poverty and need for income exacerbate the unsustainable use of biological and other natural resources. When it comes down to individual economic decisions and actions to put food on the table or earn much needed income, biodiversity concerns do not figure prominently, especially when biodiversity generates little discernible economic return. For example, there are reliable reports of increasing illegal resource exploitation in national protected areas and parks, including illegal cutting of hay,³² illegal hunting, and illegal commercial and household tree felling.

A number of proposals are now under consideration to de-gazette parts of existing national protected areas and parks in order to allow mining, road construction, and other activities. In almost all cases, these conflicts arise because the exploitation activity is more economically beneficial, at least in the short term, to local decision-makers and to local people. Given the limited ability to enforce biodiversity and environmental laws, the commitment of local communities and governments to protect and sustainably use these resources will be at least partly based on perceptions of their economic value. Tourism

and increased user fees for the use of natural resources, including pastures, water sources, wild animals and plants are relevant examples.

3.1.1 Promoting tourism and eco-tourism. Eco-tourism is one of the most direct ways that biodiversity and environmental resources can contribute to economic growth and income. This also allows local communities to benefit from the values of these resources. Tourism is growing rapidly in Mongolia. The number of private tourism companies offering travel in Mongolia has grown to more than 300, foreign investment in the tourism sector reportedly measures over \$9 million, and the number of tourists is increasing. By some estimates, the number of tourists rose 21 percent between 2000 and 2001. Reportedly, tourism also forms an increasing part of GDP.³³ However, the economic benefits that accrue to local communities situated near national parks and other natural resources is limited.

Natural and cultural/historic features of the country are the main attractions for tourists. Several barriers limit the expansion of tourism as an economic enterprise, and the potential for it to bring benefits to local communities that provide residents with an economic incentive to conserve local resources. These include the relatively limited travel itineraries to areas of environmental interest, limited tourism infrastructure and human resources, lack of information about Mongolia's environment and biodiversity attractions, and the lack of tourism expenditures that reach local authorities and communities near natural attractions. Sport hunting by tourists generates significant revenues. However, because most permit fees go directly to the central budget, it brings limited revenues to local communities.

3.1.2 Fees for use of natural resources. Five Mongolian laws provide for the pricing of natural resources, including laws on Hunting Reserve payments and on Hunting and Trapping Authorization Fees, Water and Mineral Water Use Fees, Fees for the Harvest of Timber and Fuelwood, and Land Use Fees.³⁴ However, there are significant problems in the fees and their implementation. For example, fees often "represent a fraction of the true value of the resource." The fact that they are assessed in nominal terms, without inflation indexing, results in an erosion of the real price over the years. There are also many problems associated with collection and reporting. A number of proposals are under discussion for revising the current --but not implemented -- schedule of variable fees for pasture use.

3.2 Strengthening markets, value-added natural resource processors, and financial services that reduce pressure on pasturelands and associated biodiversity.

Mongolia's economy is largely dependent on the production of raw and minimally processed products for domestic use and for export. As well documented elsewhere, an economic emphasis on primary products increases impacts on the environment because economic returns are based more on quantity of natural resources exploited than on quality or added value of the products produced. Primary product natural resource based economies not only have greater direct negative impacts on the environment; they also

mean that a given amount of natural resource provides fewer jobs and less income to the population. In the case of Mongolia, a large percentage of the population directly depends on the use of natural resources – pastures, firewood, water, etc. – for subsistence and economic livelihood. The lack of agro-processing and alternative livelihood options means that individual households have an economic incentive, at least in the short term, to maximize exploitation of commonly held resources.

The problem of overgrazing and pasture degradation described above is a classic example of this phenomenon. The livestock sector is burdened by an excessive number of herders, a large number of livestock relative to the land's carrying capacity, poor access to markets and social services, increasing competition and conflict over pastures and water sources, localized problems of over-grazing and pasture degradation, and high vulnerability to natural disasters. The lack of markets for livestock products, of agro-processing that adds significant value, and of financial services are important contributors to the environmental and economic problems afflicting the sector.

Development of integrated markets for livestock products that increase the flow of livestock products and price signals that reward higher quality is essential for adding economic value, reducing the negative environmental impacts of over-grazing and pasture degradation, and improving the livelihoods of herders as well as others reliant on the agriculture sector. Development of demand-based agricultural processing enterprises that add significant value to livestock products means a greater emphasis on quality rather than quantity. It also underscores the importance of providing increased alternative opportunities for employment and income for herders and others. In addition, improving access to savings and credit services are important to reducing environmental pressures from herders. Increased herd sizes and reduced fall off-takes of livestock partly result because livestock serve as the de facto bank account for many herders, in an environment in which there are no reliable savings and credit services.

3.3 Improving land tenure and regulation of pastureland use

Improving systems of land tenure and pasture regulation are also important to reducing over-grazing and pasture degradation. At the same time that the number of herders and livestock have increased, and herders have become more concentrated near market access points, the systems that regulate pasture use have weakened. The deterioration of traditional and formal systems of pasture management contributes to high grazing pressure on and increasing conflict over prime pastures, water sources, and campsites.

With the dismantling of herding collectives in Mongolia in 1992, formal regulatory institutions for allocating pasture vanished, and weakened customary institutions were unable effectively to fill the void. Increasing poverty and wealth differentiation in the herding sector combined with the lack of formal or strong informal regulation led to declining nomadic mobility and increasing trespassing and out of season grazing—a downward spiral of unsustainable grazing practices.³⁵

Privatization of pasture land is not desirable (and is forbidden by Mongolia's Constitution) because of the importance of mobility given highly variable precipitation and pasture conditions in localized areas of Mongolia's steppe. Though the 1994 Land

Law (and the newly passed Law on Land) provide for the provision of leases, implementation and enforcement of provisions is variable and often weak. A wide range of studies have been conducted, and several pilots implemented testing different combinations of land use rights and user fees with support of a several donor-funded projects, including the USAID-funded Gobi Initiative.

3.4 Improving energy policy and energy efficiency

Energy policy improvement is especially important to reducing air pollution problems in urban Mongolia. Encouraging the use of more efficient energy technology, and developing incentives to conserve energy and use energy efficient technology can bring substantial environmental and economic benefits, especially considering Mongolia's long, cold winters and high heating costs. The lack of accountability, weak fee collection mechanisms and other structural and financial problems in the energy sector contribute to a lack of incentives to reduce energy use and increase energy efficiency.

3.5 Improving enforcement of environmental laws and regulations

Despite Mongolia's relatively strong legal and policy framework for environmental and biodiversity conservation, implementation and enforcement of environmental regulations is relatively weak. Low budgets and staffing for environmental enforcement, the high cost of enforcement given Mongolia's large territory and high transportation costs, and problems of transparency, accountability, and public participation all hinder effective enforcement. There is a lack of human resources and funds for the management and protection of protected areas, for example. In addition, environmental implementation responsibilities, which fall primarily on local governments, are not matched by adequate budget resources.³⁶ According to the World Bank, revenues from natural resources (apparently, excluding revenues from mining and tourism) account for an average of 2 percent of GDP, but environmental expenditures make up only 0.3 percent of GDP.³⁷

3.5.1 Improve transparency of and public participation in environmental decision-making and procedures. Although Mongolia has a strong tradition of environmental conservation and respect for nature, public involvement in development decisions related to natural resources and biodiversity is relatively weak. Despite environmental laws, an environmental impact assessment system, and regulations that require public involvement, many natural resource decisions are made with little or no public consultation, and often without any public notification at all. Little if any information on natural resources decisions is regularly made available to the public. Corruption is perceived to be a growing problem, and there are frequent reports of illegal logging, illegal hunting, illegal use of wild lands, and illegal collection of wild flora and fauna without permits. Improving implementation and enforcement of environmental laws and regulations requires improved awareness and incentives for environmental officials, as well as improved legal mechanisms to resolve environmental disputes, to access information on environmental decisions, and to challenge actions and decisions.

3.5.2 Strengthening civil society organizations supporting environmental awareness and greater public participation and transparency in environmental policy and implementation, and monitoring of environmental enforcement. A growing number of local and international environmental NGOs are active in Mongolia. Though they are often run by individuals highly committed to environmental protection, their strength is limited by weak links to constituencies, and lack of funds and experience in conducting public awareness campaigns and organizing public advocacy on key environmental issues. Their voice in the policy arena is also limited by the relatively few opportunities for formal public participation in the formulation of new environmental policies and laws. However, these problems stem largely from the relative newness of civil society organizations and the evolving public and government understanding of the role of civil society organizations in Mongolia's democracy. Environmental organizations are increasingly active in galvanizing public awareness of environmental issues, highlighting key problems, and encouraging better monitoring and enforcement of existing laws.

4 PROTECTING BIODIVERSITY IN MONGOLIA .

4.1 National and Donor efforts

The Mongolian Ministry of Nature and Environment has been the major government locus for environmental protection and programs. A growing number of national and international NGOs are also active in Mongolian environmental issues.

There are a large number of donor programs focused on various aspects of environmental protection. A comprehensive account of recent and existing donor-supported environmental initiatives is provided in the Asian Development Bank's 2001 environmental assessment. Major donors involved in environmental protection include UNDP, GTZ, World Bank, ADB, the Dutch government, and the European Union. Several have undertaken initiatives jointly with the Global Environmental Facility (GEF). Together with the Ministry of Nature and Environment and local NGOs, donors have supported the implementation of numerous programs and projects in the fields of environmental policy formulation, environmental impact assessment, biodiversity conservation and protected areas, land use planning, forest resource, pollution control, climate change, water supply, renewable energy, tourism, and environmental awareness. Funding of these programs and projects, some of it still pending, totals more than \$40 million.³⁸ Environment and natural resource planning has been one of the most significant areas of UNDP activity, which has focused on biodiversity conservation, environmental public awareness, and energy efficiency. The Asian Development Bank supported the development of Mongolia's environmental impact assessment system, the World Bank supported creation of the national environmental action plan, and a number of donors have supported projects related to national parks and protected areas (including USAID), conservation and reintroduction of endangered species.

4.2 USAID efforts

Except for a USAID-funded project to improve the management of Khuvsgul Lake National Park (now completed) and the preparation of a wind atlas to help promote wind power in Mongolia (also completed), USAID's strategy and programming do not include direct environment projects and programs. However, much of the programming under USAID's economic growth strategic objective directly addresses some of the economic causes of growing threats to Mongolia's environment and biodiversity. The work of the Competitiveness Initiative to strengthen the tourism sector recognizes Mongolia's comparative economic advantage in terms of the environment and promotes practical actions to help the growing tourism industry convert this to a competitive advantage. Programming under the democratic governance SO, though only tangentially related to the environment, has a positive effect in terms of promoting accountability, transparency of the judiciary and Parliament in particular, and greater public awareness and participation in public policy and decision-making in general. Finally, Mission receptivity to possible global funding such as the "Living Landscape" proposal for the Eastern Steppes being prepared by the Wildlife Conservation Society (WCS) will provide opportunities for possible future involvement in ways that also support USAID's broader strategic objectives in Mongolia.

Strategic Objective 1: consolidation of Mongolia's democratic transition

USAID-supported programs to strengthen the judiciary and rural civil society indirectly touch on environmental concerns, especially issues of public participation in environmental decision-making and policy, and with transparency and accountability in the enforcement of environmental laws and resolution of conflicts over the use of natural resources. The judicial reform program, although it does not directly focus on environmental law, has contributed to new laws and systems designed to make the judiciary more efficient, accountable and transparent. A new draft administrative law is expected to be approved shortly that will allow citizens to sue the government over decisions that they believe are illegal. This will promote more accountability in decision-making related to natural resources and the environment, because citizens will be better able to challenge government decisions in these areas.

The Gobi Initiative includes programs to develop information resources that serve herders and other rural residents and new forms of association and participation in economic life. Such programs can also become vehicles to help promote public awareness of and participation in environmental policies, resource use decisions and environmental monitoring and enforcement. In addition, work with herders groups, associations, and cooperatives supports grassroots cooperation and action that is an important basis for greater public participation in addressing environmental issues. The IRI Democracy Strengthening project's work with parliament and with political parties is environment-neutral, although it does promote public information, accountability and transparency that are important for biodiversity and environmental issues. For example,

its recent work to promote open committee hearings on economic and political issues could be extended to cover environmental issues as well.

Strategic Objective 2: accelerate and broaden environmentally sound private sector growth.

IR 2.1: transfer productive assets to private ownership

IR 2.2: increase the efficiency of financial markets

IR 2.3: improve the business environment

IR 2.4: improve management of natural resource base for long-term sustainable use.

The economic growth work of the Gobi Initiative (GI) is directly related to the economic causes of pasture degradation and, more indirectly, deforestation. GI supports improved rangeland management practices, improved livestock management, and development and strengthening of local businesses in the Gobi region. The rangeland and water management component seeks to strengthen environmentally sustainable pasture management practices to “improve the use and care of Mongolia’s productive land and water resources.” The herder management and livestock improvement component seeks to increase the market value of livestock products and emphasizes quality rather than quantity. The business development component also is potentially beneficial to the environment and pastures by strengthening productive and profitable businesses that add value to livestock and other products, and increasing the market for livestock products, thereby potentially reducing the numbers of animals and grazing pressure.

The Competitiveness Initiative’s focus on improving the competitiveness, productivity, quality, and markets in specific export sectors also has generally positive implications for the environment. Most significantly, the initiative’s emphasis on tourism recognizes Mongolia’s potential to develop tourism based on Mongolia’s “exceptional and wilderness areas, rare wildlife, fascinating nomadic culture, and rich history.” At a practical level, this includes the introduction of the “leave no trace” ethic to Mongolia’s guide training program and curriculum. Perhaps more than any other industry, tourism offers an opportunity for local communities and Mongolia as a country to economically benefit from its special environmental and biodiversity attributes, and to increase national and local commitment to conserving these resources. The Competitiveness Initiative’s former (now cancelled) focus on meat exports similarly had a potentially positive effect on overgrazing by seeking to improve markets for meat products, emphasize quality rather than quantity, and look for value-added niches for specific products. Improving the markets for meat is important for reducing herd size by increasing fall off-take of livestock herds.

While it might be assumed that the emphasis of both the Gobi Initiative and Competitiveness Initiative on cashmere production might have negative environmental negative consequences, a closer look at these activities suggests the opposite. As noted above, the increased percentage of goats in the total livestock herd has potentially damaging environmental consequences. However, it is important to note that the percentage of goats has increased because of high market prices for cashmere, most of which is sold in raw or minimally processed form, not because of the existence of the

projects. If anything, these initiatives are likely to reduce the negative environmental effects of larger numbers of goats because of both initiatives emphasize improving the quality of cashmere and developing value-added cashmere products for niche markets. If realized, these goals will result in fewer, more carefully bred animals, and more value added through processing, meaning greater income and employment for a given amount of cashmere.

USAID-supported initiatives to improve the efficiency of financial markets, including the dramatic turnaround of the state-owned Agriculture Bank and the creation of the Xas Bank, and changes in financial sector laws and policy, also have potentially beneficial environmental effects. Over the past two years, the Agriculture Bank extended credit and financial services such as personal savings accounts to many rural residents. Ninety seven percent of the Agriculture Bank's business is in rural Mongolia. In addition, by the end of 2002, XasBank had expanded to include 27 branches covering 19 of Mongolia's 21 provinces, and competitors were following suite. The overall improved access to savings accounts provides herders with an alternative to keeping their savings in their livestock, which are vulnerable to natural disasters and reliant on seasonal changes in the markets. Furthermore, improved provision of credit services in rural areas means more opportunity for developing businesses that provide markets for livestock products (decreasing herd sizes) and create opportunities for alternative employment and income for marginal and other herders.

Although they have faced difficulties, USAID-funded initiatives in energy policy also are positive with regard to the environment. Among other things, these programs promote the development of pricing and collection systems in which energy consumers must bear the full cost of the energy they consume. Because many residents, particularly in large cities, do not pay the full cost of energy they consume for heat and electricity, there are limited incentives to conserve energy resources. This in turn contributes to increased pollution, especially in urban areas.

The privatization program, now focusing mainly on privatizing the largest remaining state companies in banking and insurance, probably has a neutral effect on the environment.

The economic growth side of USAID's portfolio could explore ways to make greater use of Mongolia's comparative advantage in environmental and biodiversity values in ways that maintain these values to the fullest extent possible. As described above, Mongolia is unique in the combination of ecosystems that lie within its borders and the relatively undisturbed status of large representative parts of those ecosystems. Compared to its neighbors, the relatively pristine nature of these ecosystems, and the rare and endangered life that they support, are an increasingly scarce resource in the region and internationally. From a global perspective, the value of these attributes is high, perhaps higher than most of the commodities that Mongolia could produce from them. More needs to be done to investigate how to convert these attributes to competitive advantage.

5 REFERENCES

ADB, “Supplementary Appendix H: Initial Environmental Examination Report,” as part of TA 3685-MON Integrated Development of Basic Urban Services in Secondary Towns project (158).

Asian Development Bank, *Mongolia’s Environment and its Implications for ADB’s Operations*, October 2001.

Chuluun, Togtohyn and Dennis Ojima, eds, *Fundamental Issues Affecting Sustainability of the Mongolian Steppe*, International Institute for Study of Nomadic Civilizations (IISNC), Ulaanbaatar, Mongolia, 2002.

DAI, *Environmental Profile of Mongolia*, 1998 (160).

Finch, Christopher, ed., *Mongolia’s Wild Heritage*, Ministry for Nature and Environment, UNDP-GEF, World Wide Fund for Nature, 1996.

Government of Mongolia, World Bank, National Environmental Action Plan: Towards Mongolia’s Environmentally Sound Sustainable Development,” 1995.

GTZ, “Development of ecotourism in the protected areas of Gobi Gurvansaikhan, Gorkhi-Terelj, and Khan Khentii,” 1997.

Fernandez-Gimenez, Maria E., and B. Batbuyan, “Law and Disorder in Mongolia: Local Implementation of Mongolia’s Land Law,” 1999.

Humphrey, Caroline, and David Sneath, eds, Cambridge University, *Culture and Environment in Inner Asia*, Vol. 1., Overview and comparative essays,

Mann, Roy S., “Report Relative to Range Management Considerations for Demonstration Projects for the Gobi Regional Economic Growth Initiative, April 20, 2002.

Ministry for Nature and the Environment, *Biodiversity Conservation Action Plan for Mongolia*, 1996a.

Ministry for Nature and the Environment, UNEP, ESCAP, *Nature and Environment in Mongolia*, Ulaanbaatar, 1996b.

Ministry for Nature and the Environment, *National Plan of Action to Combat Desertification in Mongolia*, 1997b.

Ministry for Nature and the Environment, UNDP-GEF, *Biological Diversity in Mongolia*. First national report of the Mongolia Biodiversity Project, Ulaanbaatar, 1998.

National Agency for Meteorology, Hydrology and Environment Monitoring, Ministry for Nature and the Environment, *Initial National Communication of Mongolia to UN Framework Convention on Climate Change*, Ulaanbaatar, 2001.

National Statistical Office, World Bank, *Mongolia Participatory Living Standards Assessment 2000*, [PLSA] 2001.

USAID, "Conservation of Biodiversity in Mongolia," Annex H to Country Strategic Plan for Mongolia FY 1999-2003, October 1998.

Wingard, J.R. Mongolia's environmental laws.

World Bank, *Mongolia Environment Monitor*, 2002.

¹ USAID (1998), p. 6.

² MBCAP, p. 5.

³ MBCAP, p. 15.

⁴ *Ibid.*, p. 16

⁵ *Ibid.*, p. 12.

⁶ World Bank (2001), p. 11.

⁷ World Bank (2001), p. 11.

⁸ According to the studies by Janchivdorj (1999), 78.3 percent of total land of Mongolia is susceptible to desertification, of which 59.4 percent, or 929.6 thousand square kilometers, is very sensitive. In the last 40 years of intensive development, grass yield has decreased by 5 times and flora species by 6 times in overgrazed pastures. Particularly intensive desertification caused by overgrazing has taken place in the desert, desert-steppe, and steppe zones. These zones constitute more than half of total pastures in Mongolia. Between 1970-1990, flora species reduced from 33 to 18 and grass yield from 0.32 tonnes to 0.23 tonnes in desert and desert-steppe zones." National Agency for Meteorology, p. 97.

⁹ "In general, land degradation refers to 'a change in land quality, most often as a result of human activities, undermining its capacity to sustain current uses'" "Desertification refers to 'land degradation in arid, semi-arid, and dry sub-humid areas resulting from various factors, including climatic variations and human activities.'" In addition to considerable variability in estimates of the extent and severity of pasture degradation, there is also variability in what constitutes "degradation" and its causes. "In dryland grazing ecosystems that are in relative 'equilibrium' there is a close coupling of livestock population density with range vegetation condition. However, most of the world's dryland grazing ecosystems, including Mongolia, are not at 'equilibrium.' Range vegetation condition in these areas is influenced more strongly by highly variable precipitation than by livestock grazing density. World Bank, 2001, p. 14.

¹⁰ Mann, p. 1 and p. 5, "All areas visited exhibited strong indicators of severe overgrazing. It appeared that virtually every plant of the palatable forage species had been reduced in vigor (health) with a corresponding unnatural reduction in size, resulting in lowered productivity of forage, reduced root system development, and no remaining plant residues," is the main observation of a consultant's report, commissioned by the Gobi Initiative, based on a visit to three sites in Overhangai and South Gobi aimags. The report goes on to state: "The most dominant and persistent observation relates to the tremendous grazing pressure being applied in all areas visited, and those observed while traveling. Close examination of vegetation, soil surface conditions, and general health and condition of livestock all indicate a severe imbalance between livestock numbers and available forage. This is equally true for those areas of project proposals that are described as being "unused." In addition to the question of too many animals, it should be noted that the continuous grazing throughout the growing season can have as serious effect as an excess of number of animals. Recognizing both of these factors as having an adverse effect on the rangelands will help understand needed changes regarding livestock grazing."

¹¹ MNE (1998), pp. 18-19.

¹² “With the economic transition, and in the absence of alternative livelihood opportunities, many people turned to livestock production to support their families. The total number of herding households more than doubled, from 75,000 households in 1990 (17 percent of total population) to 192,000 in 2000 (35 percent of total population). Differences between new and existing herders – in terms of their livelihood orientation, levels of wealth, and skill and experience in herding – have had profound implications for grassland management since they influence the mobility of the herders and their animals as well as their choice of where to graze them.” World Bank, 2001, p. 17.

¹³ ADB (2001), p. 20.

¹⁴ In 1990, there were less than 75,000 herding households and a third of the population was employed in agriculture, which accounted for around 15 percent of GDP. Today more than 185,000 households, or a third of all households, rely on herding as their primary source of employment and income. Nearly half of the labor force is employed in agriculture, which accounts for approximately 30 percent of GDP (of agricultural production, livestock makes up over 83 percent). (NSO (2001), pp. 68, 84, 144-5.) The number of livestock increased from 25.8 million in 1990 to 33.5 million in 1999, before decreasing to 30.2 million in 2000 and 26.1 million in 2001. NSO, 2001, p. 131.

¹⁵ However, “Stocking rates alone are a poor guide to the levels of perceived pasture degradation. It is not the growth in the number of animals but the pattern of incentives and disincentives to be mobile that is a better predictor of degradation.” (ADB, p. 21.) “...in a country that continues to depend on pastureland, itself rather evenly distributed in space, centralisation of services encourages a concentrated use of pasturelands, as herders have a strong incentive to move closer to the urban centers. More than anything else, recent pasture degradation in the vicinity of Mongolia’s urban centers – widely agreed to be among the country’s key environmental problems today – can be attributed to the collapse of decentralized provision of services supported by transport subsidies.” (ADB, p. 15.)

¹⁶ “For 1 km of 5-m-wide road (equivalent of 0.5 ha), there are therefore 1.5 ha of land “lost” to “multi-tracking” at time *t*. New alternative tracks tend to emerge every two or three years...With total length of 50,000 km, some 300,000 ha of productive land may have been lost to “multi-tracking” in the last decade alone, and perhaps close to 0.7 million ha since 1960s.” ADB, p. 22.

¹⁷ “Of the 1.2 million ha [of Mongolia] cultivated at its peak, 59 percent is said to be slightly degraded, 28 percent moderately degraded and 13 percent severely degraded... Wind erosion affects almost all cultivated lands in Mongolia and steadily reduces their organic content... Deep plowing and chemical fertilization have proven disruptive and planting of wind breaks not very successful.” ADB, p. 22.

¹⁸ “The main reason for this substantial increase was the breakdown of the centralized marketing system that had prevailed under collectivized agriculture. For several decades, centralized markets for meat and other livestock products that met domestic and export demand had limited national herd growth. Because the Government was a guaranteed buyer of livestock, fewer animals needed to be carried and fed over the harsh winter/spring period. The breakdown of this centralized system in the early 1990s and the parallel collapse of the state-subsidized distribution of consumer goods through wholesale agents, resulted in sharply deteriorating terms of trade for herding households. Herders preferred to keep animals ‘on the hoof’ rather than sell them for low prices relative to the cost of consumer goods. In the inflationary economic environment of the mid-1990s, increasing the size of household herds became herders’ chief objective.” World Bank, pp. 17-18.

¹⁹ “Some rodents, especially the Brandt’s Vole *Microtus brandtii*, and some species of grasshoppers have caused serious problems in certain pastures. On a large scale, the Brandt’s Vole has occupied over 40 million hectares of the steppe zone. The core area of the rodent’s distribution is currently approximately 2.9 million hectares, and it has shown a tendency towards further extension. By 1997, the Brandt’s Vole spread to 8 million hectares of a new area and there, it started to cause deterioration of 90 per cent of the vegetation cover ... In the 1950s, Mongolia still had a healthy environment with normal and balanced relations with rodents and insects. Studies conducted during the last few years show that the environmental deterioration in and around urban areas caused by the centralization of humans and livestock will continue also in the future... On the other hand, the use of chemicals to control rodents from the 1960s until present has had negative effects on the environment, as well. Many carnivores including wolves, foxes, corsac foxes, and some birds of prey have been poisoned during these years, and their numbers have declined. Consequently, this has affected the ecological balance of Mongolia. During the last 320 years, some 40 thousand tonnes of zinc-phosphate worth one billion tugriks were used on a grand scale to control the

Brandt's vole. The peak densities of Brandt's Vole in Mongolia have been measured in 1956-1957, 1963-1965, 1970-1973, 1980-1985, and in 1990-91." MNE (1998), pp. 16-17.

²⁰ "Variation in fodder yield are closely related to rainfall are closely related to rainfall fluctuations. Fodder production can decline to 30-80 percent of the long term average during dry years, and go up to 125-200 percent of the average during wet years." ADB, p. 20.

²¹ National Agency for Meteorology, p. 9.

²² "the desert region may expand into the lakes Basin and current desert steppe zones. The desert area is projected to increase by 6.9-23.3 percent of the actual area by 2040." National Agency for Meteorology, pp. 17-18

²³ MNE (1998), p. 41-43.

²⁴ MNE (1998), p. 45.

²⁵ such as the pine forest that covers around 300,000 ha in Selenge.

²⁶ "Almost half of all closed forest (amounting to 5.4 million ha) has been affected by forest fires during the 1990s, the extent of damage varying from area to area but increasing." "Growing threat to the forest posed by insects (mainly the Siberian silk moth). Some 300,000 ha of closed forest were destroyed in the 1990s, and the rate of infestation is said to be accelerating." ADB, p. 23.

²⁷ ADB, p. 23.

²⁸ The efficacy of such rodenticide applications has been strongly questioned by the international scientific establishment. Research has shown that population surges of Brandt's vole is the result of over-grazing, and that application of rodenticide will not reduce numbers of voles but may actually exacerbate pasture degradation, along with unintended consequences of poisoning birds and vole predators.

²⁹ USAID, p. 23. "The four aimags that have the least water per area, in ascending order, are Umnugobi, Dornogobi, Dundgobi, and Sukhbaatar. Not surprisingly, in these four aimags which comprise the southeastern part of the country, groundwater comprises between half and three quarters of the scarce water resources...Nonetheless, nationwide in 1993, 283 million m³ (between 2.25 and 4.5 percent of the total groundwater resource) (Whitten, 1998) were withdrawn for livestock, irrigation, and other human consumption. Given the high evapotranspiration rates, it is unlikely much of this withdrawal was recharged."

³⁰ ADB, p. 39.

³¹ MNE (1998), p. 79.

³² For example, it was reliably reported that local government officials in eastern Mongolia allowed Chinese companies to conduct large scale hay cutting in the middle of a national park with important pastures for Mongolian gazelle.

³³ World Bank, pp. 5-6. The tourism sector overview states that there are over 300 private tourism companies in Mongolia, 59 of them with some amount of foreign investment, and foreign investment in tourism since 1990 totals \$9,588,000. It estimates that 165,899 leisure tourists visited Mongolia in 2001, an increase of 20.7 percent from the previous year, and that the income from tourism in 2001, according to the Mongolia Tourism Board, totalled \$102.9 million. However, it states, "... these figures are subject of debate due to differences of definitions and statistical sources used."

³⁴ ADB, p. 42.

³⁵ Fernandez-Gimenez/Batbuyan, p. 1.

³⁶ "The key institutional problem in Mongolia's environmental management today is the imbalance between the assignment of implementation responsibilities and the allocation of budget responsibilities. Most of the former, and all work done at the (vast) field level with the exception of protected area management, has largely been put at the door of local governments. Yet the local government budgets and existing assignment of revenue sources mean that the implementation task is seriously handicapped unless local budget resources are supplemented by donor funding." ADB, p. 44.

³⁷ World Bank, p. 34.

³⁸ ADB, p. 70.