

Mongolia
ENVIRONMENT
Monitor 2004

30053



Environmental Challenges of Urban Development

FILE COPY

THE WORLD BANK





Environmental Challenges of Urban Development



PREFACE	iii
ABBREVIATIONS AND ACRONYMS	iv
SECTION I: OVERVIEW OF THE URBAN TRANSFORMATION IN MONGOLIA	2
SECTION II: PRESSURES OF URBANIZATION	10
SECTION III: TOWARD ENVIRONMENTALLY SUSTAINABLE URBAN AND ECONOMIC DEVELOPMENT	24
SECTION IV: FUTURE CHALLENGES	30
MONGOLIA AT A GLANCE	31
NOTES	32

The International Bank for Reconstruction and Development / THE WORLD BANK
1818 H Street, NW
Washington, DC 20433

The World Bank Mongolia Office
11 A Peace Avenue
Ulaanbaatar 210648, Mongolia

All rights reserved.
First printing June 2004

This document was prepared by a World Bank team comprising Messrs./Mmes. Anna Corsi (ESDVP), Giovanna Dore, Tanvi Nagpal, and Tony Whitten (EASES); Raja Iyer (EASUR) and the team of the Second Ulaanbaatar Urban Service Improvement Project; Salvador Rivera (EASEG) and the team of the Mongolia Improved Urban Stoves Project; Jim Cantrell designed the cover and layout of this document, and Jeffrey Lecksell was responsible for the map design.

Input and comments from Messrs./Mmes. Zafar Ahmad and Christopher Finch (EACIF); Tseveen Badam (Office of the Mayor, City of Ulaanbaatar); Rachel Kaufmann (SASES); Dr. Shiene Enkhtsetseg (Mongolia Ministry of Health); H. Ykhanbai, and Naavaan-Yunden Oyundar (Mongolia Ministry of Nature and Environment); Jitendra Shah (EASES); Dr. Jeffrey Spickett (Western Australia, Curtin University -- World Health Organization); Darius Teter (Asia Development Bank, Ulaanbaatar Office); Caterina Laderchi-Ruggeri and Vera Songwe (EASPR); and Heinz Unger (EACIQ) are gratefully acknowledged.

The facilitation of the Office of the Mayor of Ulaanbaatar is also acknowledged.

All photographs by Tony Whitten, except where otherwise indicated.

The views expressed in the Mongolia Environment Monitor are entirely those of the authors and should not be cited without prior permission. They do not necessarily reflect the views of the World Bank Group, its Executive Directors, or the countries they represent. The material contained herein has been obtained from sources believed to be reliable but is not necessarily complete and cannot be guaranteed.



In the last decade, Mongolia has undergone an economic and political transition, as well as a demographic transformation. A confluence of market reforms, harsh climatic events and greater urban opportunities attracted growing numbers of nomadic herding families to urban areas. Thirty percent of Mongolia's 2.3 million people already live in Ulaanbaatar, the capital city. Tens of thousands more move to Ulaanbaatar every year, straining social and environmental services, and placing unprecedented stresses on the already-fragile environment.

Mongolia's urbanization has been both rapid and ad-hoc. Much of the urban growth has been absorbed by the rapidly expanding suburban "ger" areas. Residents of ger areas are often unregistered, poorer than their counterparts in formal housing and spend disproportionately high percentages of their incomes for water, heating, healthcare and education. City cores and ger areas face growing pollution from industrial, vehicular and household heating sources, and rising quantities of solid waste. Scarce open spaces are quickly disappearing as they are developed for urban uses.

As long as urban areas offer individuals opportunities that they may not have in rural areas, Mongolia will continue to face the challenges of a fast paced urbanization process. The Government recognizes that while fostering economic growth, urban environments also need to be protected. Toward this end, a City Development Strategy has recently been completed to better manage Ulaanbaatar's growth, and a Regional

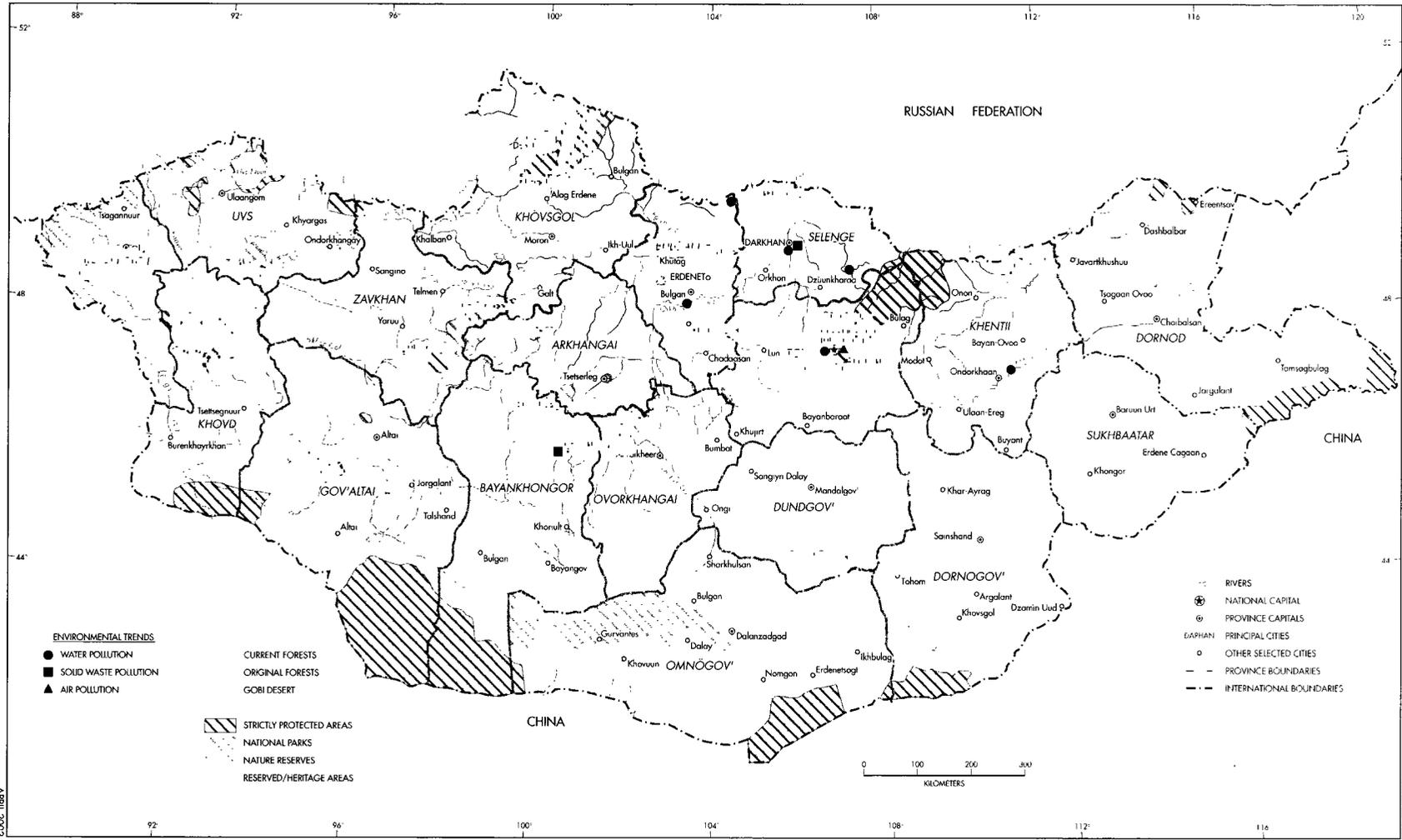
Development Strategy has been approved by the Parliament. The latter strategy aims to create alternative urban nodes of development throughout Mongolia, based on regional economic and natural resource advantages. The effective and environmentally sustainable implementation of these strategies will depend on a complex understanding of the environmental impacts of large-scale urban investments in diverse landscapes and ecologies, and on comprehensive environmental monitoring and management.

The Environment Monitor 2004 aims at raising awareness about the environmental challenges of urbanization in Mongolia. The report is divided into four sections; the first presents an overview of the urban transformation in Mongolia based on changes in the structure and distribution of the population; the second focuses on the environmental pressures created by urbanization, providing data on air pollution, water availability and quality, solid waste management, and land degradation. The third section summarizes government responses to urban environmental challenges. The final section outlines the main challenges for improving and strengthening environmental management in urban areas.

This issue of the Monitor was prepared by the World Bank East Asia Environment and Social Development Unit, in collaboration with the Energy and the Urban Development Units, the Mongolian Ministry of Nature and Environment and the Municipality of Ulaanbaatar.



ADB	Asian Development Bank	NEAP	National Environmental Action Plan
BOD	biochemical oxygen demand	NGO	non-governmental organization
CDS	Ulaanbaatar City Development Strategy	NO ₂	nitrogen dioxide
CHP	combined heat-and-power plant	PSMFL	Public Sector Management and Finance Law
CRC	City Reconstruction Company	RDS	Regional Development Strategy
DO	dissolved oxygen	SO ₂	sulphur dioxide
DSRC	District Construction Service Companies	UBSIP2	Second Ulaanbaatar Services Improvement Project
GoM	Government of Mongolia	USAG	Ulaanbaatar Water Supply and Sanitation Company
GDP	Gross Domestic Product	USEPA	United States Environmental Protection Agency
HOB	heat-only boiler	WHO	World Health Organization
km ²	square kilometer	WWTP	wastewater treatment plant
m ³	cubic meter		
mg/m ³	microgram per cubic meter		
MNE	Ministry of Nature and Environment		
MNT	Mongolia Tugrug		



APRIL 2002

BRD 31267

2004





GEOGRAPHY, POPULATION, AND ADMINISTRATIVE STRUCTURE

With a territory of 1,564 square kilometers (km²) and a total population of 2.3 million people, Mongolia is one of the most sparsely populated countries in the world.¹ Some 30 percent of the total population lives in the capital city of Ulaanbaatar alone, another 30 percent resides in the Central region,² and about 18 percent of the population lives in the West region.³ The South⁴ and East⁵ regions are very sparsely populated and account for the remaining 32 percent of the total population. According to the 2000 census, 57 percent of the total population lived in urban areas, defined as Ulaanbaatar, the 21 provincial capitals⁶ and 22 village capital centers.⁷ Some 39 percent of the urban population is concentrated in Ulaanbaatar, Erdenet, Darkhan, and Choibalsan. Ulaanbaatar is by far the largest, most populous, and most densely populated city in Mongolia (see Map III).

Urbanization Trends

In 1999, 47 percent of the world's population lived in urban areas. By 2030, it is expected that this proportion will reach 60 percent, totaling 4.9 billion people. More than 60 percent of the increase in the world's urban population will occur in Asia; both primary and secondary cities are likely to experience high rates of growth and face all the problems that accompany rapid urbanization.

Mongolia is no exception to this commonly experienced urbanization pattern. There are, however, two notable differences. First, urbanization is a relatively new trend in Mongolia, having been introduced in the middle of the last century. Second, while Ulaanbaatar is a small city compared to many Asian capitals, in a very sparsely populated country it stands out as an increasingly congested capital, dwarfing other urbanizing areas by its size, services, and importance in the national economy. Thus, while policymakers may not be able to stem urbanization, they have the opportunity to better plan and manage growth in both the capital and in the rest of the

Table 1
Relative Population Densities in the World

Ranking	Country	Persons per km ²
1st	Macau	20,824.38
2nd	Monaco	16,486.67
3rd	Hong Kong	6,571.14
4th	Singapore	5,539.77
5th	Gibraltar	4,486.92
10th	Bahrain	1,014.66
20th	Puerto Rico	433.94
50th	Vietnam	237.62
100th	Cuba	100.09
150th	Ecuador	45.38
200th	Argentina	13.34
233rd	Mongolia	1.67

Source: WWW.Geography.com.

Table 2
Rates of Urbanization, and Population in Largest City in Selected Asian Countries

Country	Urban pop. as % of total population (2001)	% population in urban centers < 1M (2000)	Population in largest city as % of urban pop. (2000)
Cambodia	17		53
China	37	14	3
Indonesia	42	10	13
Lao PDR	20	--	62
Mongolia	57	--	56
Philippines	59	16	22
Thailand	21	12	56
Vietnam	25	13	24

Source: World Development Indicators 2003, Table 3.10, pp.156-158.



country, and to learn from the mistakes that have been made in other Asian mega-cities.

Mongolia's urbanization has been both rapid and ad hoc. The country had a largely nomadic population well into the 20th century, when unplanned settlement was set into motion. Beginning in the 1930s, a number of small towns and cities had been created by default, along railway routes and roads, and around major power plants. Road connections were established, and social services provided in these towns. Ulaanbaatar, Darkhan, and Erdenet were among the first urbanized areas in Mongolia. The socialist government strictly controlled migration in an attempt to equalize the status of rural and urban areas. However, since the Law on Freedom of Personal Movement (Article 16) went into effect in 1992, the Government has been unable to control the flow of migrants into Ulaanbaatar and other urban areas.

The definition of what constitutes an urban area has changed four times since 1961. In 1992 the new Constitution of Mongolia was ratified, and the Law on Cities and Villages was issued by the Parliament. According to this supplemental law, passed in December 1993, the capital city, and aimag centers—both soums and villages, are included in urban areas. The law defined "towns" as those urban settlements having a minimum population of 15,000 with a large proportion of the population working in industries and the tertiary sector; with developed

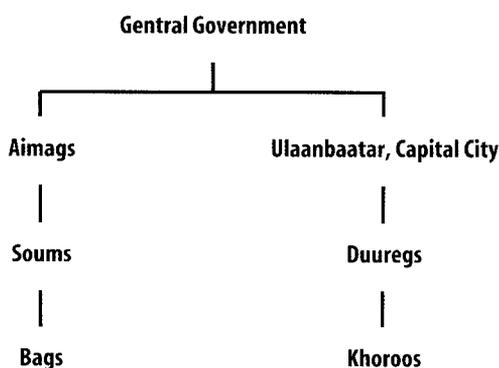
urban infrastructure and self-governing administrative structures.⁸ Towns with 50,000 or more residents can receive a special status in accordance with their role in national economic and social development, their level of urbanization and infrastructure development.⁹

Ulaanbaatar

Ulaanbaatar is the chief contributor to the economic growth of the country since more than 50 percent of Mongolia's gross domestic product (GDP) is produced in the capital. The city now accounts for 30 percent of total industrial output, more than 50 percent of the construction and assembly work, 85 percent of power generation, and half the total investment in the country. In addition, Ulaanbaatar is home to the central government and its bureaucratic structure, and the most prominent public and private institutions of higher learning and best medical services.

The 2000 census estimated Ulaanbaatar's population at 760,000. However, recent reports estimate that 824,700 people permanently reside in Ulaanbaatar, and almost one million people, including interim residents and incoming and outgoing guests, live, work, and study in the city.¹⁰ From 1989 to 2002, the population grew by 41 percent, and is expected to reach 1.1 million in 2010 and almost 1.6 million in 2020.¹¹ Immigration to Ulaanbaatar is the chief source of population growth. In 2002 alone, Ulaanbaatar's population grew by 22 percent, most of which were migrants from rural areas. The steady stream of migrants who enter Ulaanbaatar for employment, medical services, education, or to be close to other family members, is increasingly absorbed into the expanding ger areas.¹² The influx of population presents a financial and management challenge to the municipal government, which is already pressed to provide and expand urban services.

Figure 1
Administrative Structure of Mongolia



Source: Mongolia Statistical Book 2002.

Secondary Cities and Provincial Capitals

While Ulaanbaatar is by far the most important urban center in the country, several Mongolian secondary cities also have important regional and provincial roles. Urban centers in the Central region grew as people moved in to take advantage of the road and rail corridors that link Ulaanbaatar to other



Box 1 DEMOGRAPHIC SHIFTS IN MONGOLIA

Inter-censal growth in Mongolia has varied over the years both due to natural changes in fertility rates, loss of life due to internal conflicts, and out migration. Between the censuses of 1918 and 1935, and 1935 and 1944, the population growth rate remained below one percent. From 1956 and 1989, the inter-censal growth varied between 2.5 to 3.0 percent per annum. However, from 1989 to 2000 the growth had fallen by approximately a whole percentage point to 1.4 percent. Fertility has been declining since 1989. In 1999, the crude birth rate was 20.4 percent as compared to 36.5 percent in 1989. Economic hardships and greater availability of contraception are seen as the main causes of the decline. In addition, since 1989 more than 50,000 citizens of the former Soviet Union left for their countries, and more than 60,000 Kazakhs have returned to Kazakhstan since 1992. Average annual growth rates in Ulaanbaatar city, Orkhon, Bulgan and Khovsgol aimags were above the national average because of migration into these areas.

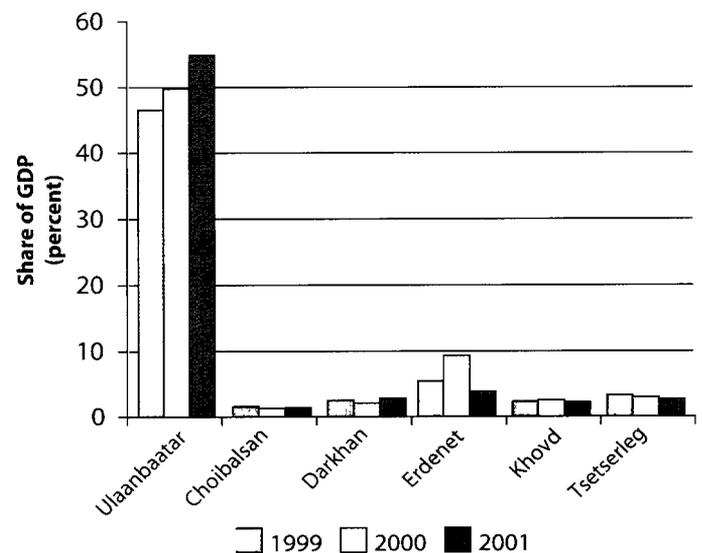
The early 1990s saw a steady net flow of urban-to-rural migrants, swelling the population of rural districts, particularly in the Central and Western Regions. This trend has been attributed to the outflow of many newly unemployed state workers who had acquired a few animals under the privatization of state and collective assets, and taken up life as herders. By the second half of the 1990s, this pattern had been reversed. Herders and other rural inhabitants began to move closer to markets so as to reduce transaction costs and improve household terms of trade. This process of population concentration began taking place at virtually all scales levels; within districts, from outlying areas closer to the district centers; within provinces, closer to provincial centers and major transport axes, and on a national scale from more remote provinces, particularly in Western Mongolia, toward those in Central Mongolia and closer to Ulaanbaatar.

Source: 2000 Population and Housing Census of Mongolia, National Statistical Office of Mongolia, United Nations Population Fund (UNFP), and United Nations Statistics Division (UNSD), 2001.

regions and countries (see Map V). However, even in the rapidly growing Central region there was a net outflow of people to Ulaanbaatar. The 2000 Census describes the Central region towns, many of which are aimag centers, as temporary destinations in a step-wise internal migration process whose end point is Ulaanbaatar. With a population of 75,000, Erdenet is the second largest city in Mongolia and an important center for the copper mining industry; Darkhan is the third largest urban center, and one of key agricultural areas in the country. Sainshand and Choibalsan remain important centers for meatpacking, serving livestock owners across a wide region. Finally, Dalanzadgad is the center of cashmere production in the Southern Gobi area (see Map II).

Urban and economic development of secondary cities and provincial capitals is undermined by old and decaying infrastructure, in serious need of repair and replacement. At the end of 2000, only 32 percent of the total urban population had access to potable water, 27 percent to district heating, and 37 percent to solid waste disposal services. Like in Ulaanbaatar, there is vast disparity in the provision of services between

Figure 2
Share of GDP in Main Urban Centers



Source: Mongolia—Development Strategy for Secondary Cities; Urban Development Unit, East Asia and the Pacific Region, 2003.



formal urban and ger areas. Formal urban areas may have access to centrally provided heating and hot water, water supply and sanitation, solid waste collection, and social services such as schools and hospitals. On the other hand, ger areas, which house at least half the population in provincial capitals, generally lack most of these services.

Very limited information is available on the environmental impacts of economic growth and urbanization in secondary towns. Local environmental authorities lack the administrative and financial capacity to monitor and analyze even basic water and air quality indicators. Although there is anecdotal information that these areas are experiencing a growth in pollution and degradation problems similar to Ulaanbaatar, it remains difficult to support this claim with sufficient reliable data.

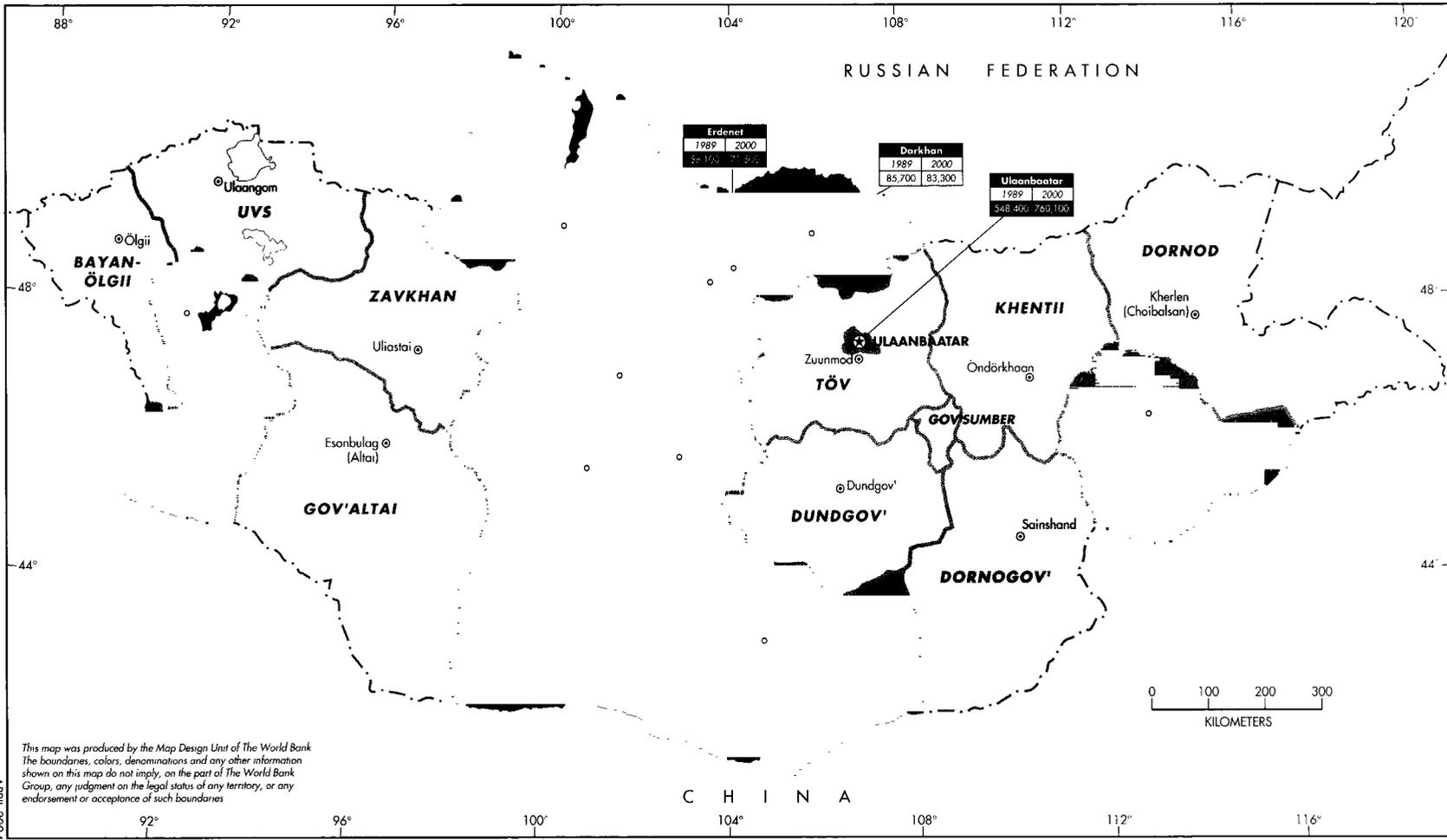
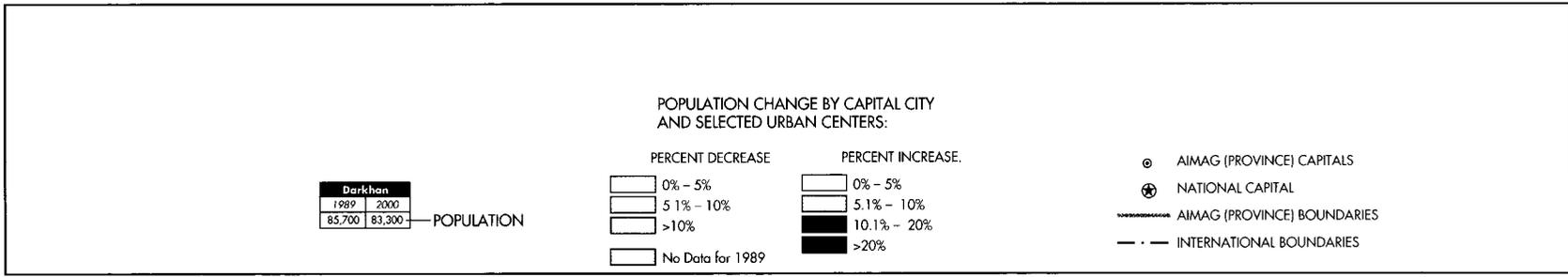
Disparities Within and Across Rural and Urban Areas

As Mongolia's urban areas have grown, disparities between them and rural areas have become even starker. Rural residents have less access to education, health care, information, employment and other opportunities than their urban counterparts. For example, while health services are generally poor in urban and rural areas, they are particularly problematic in the countryside, where there is an acute shortage of qualified doctors. Some rural clinics lack electricity and running water. Soum hospitals suffer from inadequate budgets, and unreliable funding from the center. Rural women face higher mortality rates due to complications from pregnancy and childbirth. Similarly, two-thirds of the rural population uses water from unprotected wells, rivers, rain or snow, as compared with less than a tenth of the urban population.¹³

Growing rural to urban migration is one of the most visible consequences of these disparities. In addition to the migration of herding families to be closer to markets, the search for employment is the main cause of migration.¹⁴ People also migrate to be close to extended family or to study. Approximately 42 percent and 25 percent of migrants to Ulaanbaatar and Darkhan reported that they have better employment opportunities in their new home place. Migrants to Ulaanbaatar also felt that they have improved access to education and professional skill-building.

A large percentage of those who migrate to towns, including Ulaanbaatar, settle in ger areas. These, quickly-growing areas have access to few municipal services, and migrants living here spend a huge portion of their incomes to obtain heating, healthcare and education for their families. Yet, ger areas continue to grow as herders seek more reliable income sources, proximity to markets and the promise of a different life for their children.

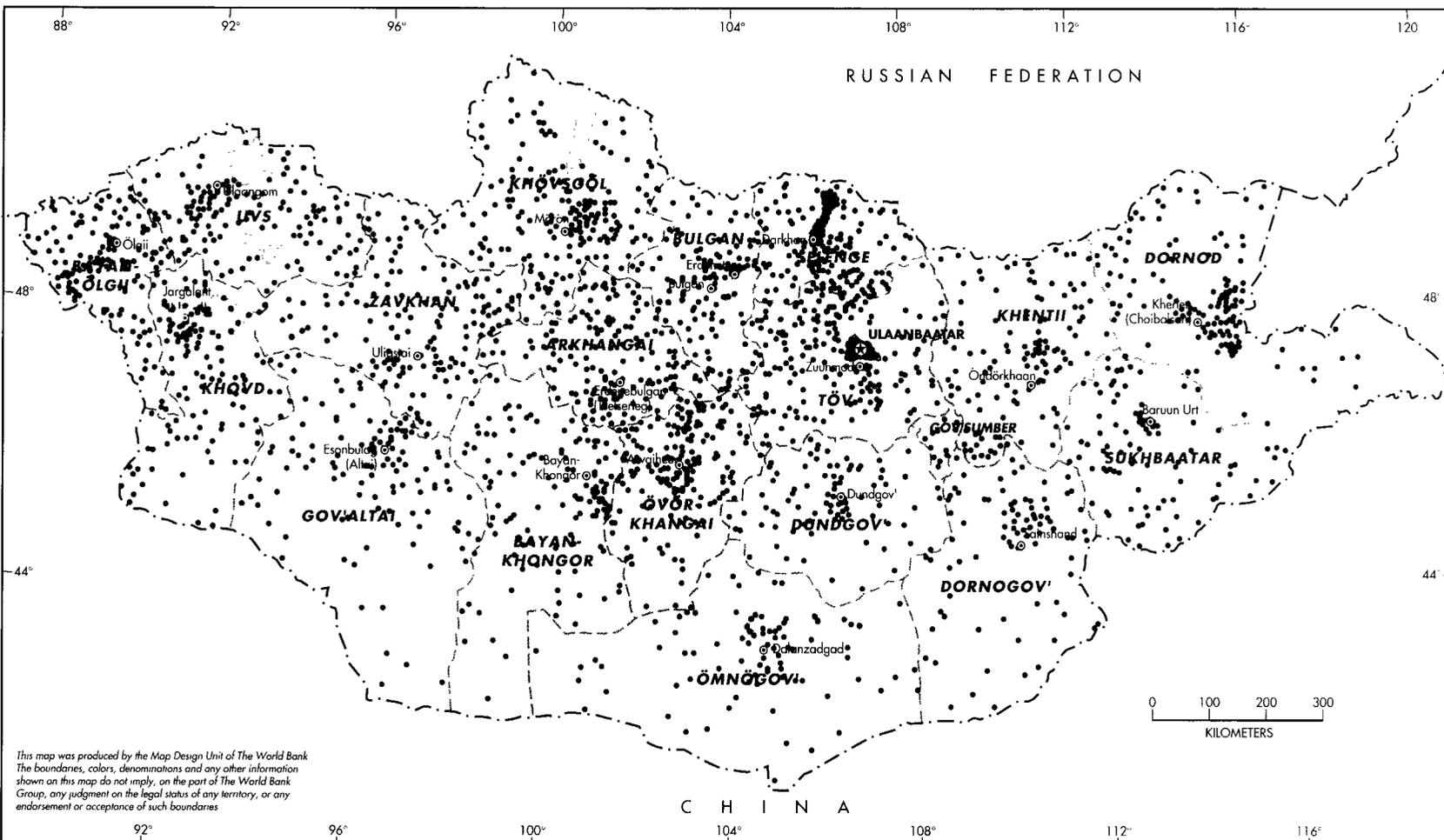
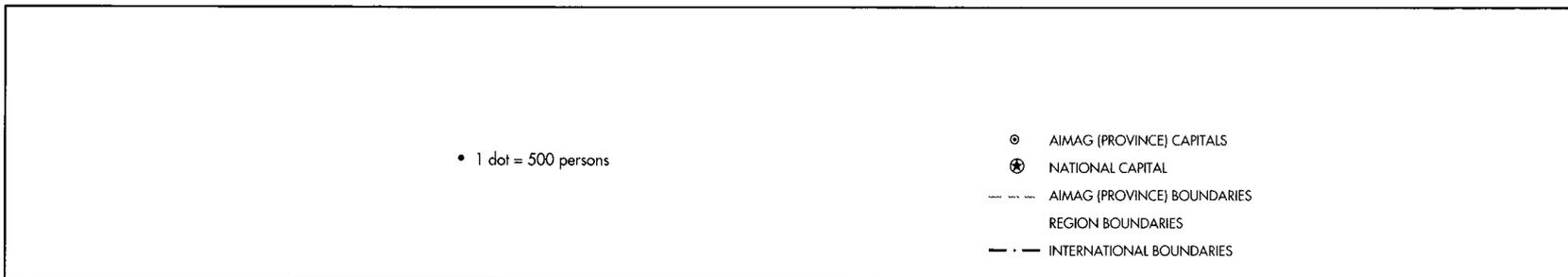
Over the past five years, GoM has been working to ensure that, while fostering economic growth, urban environments are also protected. Toward this end, it had undertaken the development of a *Masterplan for Ulaanbaatar*, and a *City Development Strategy* to ensure the city's financially viable and environmentally sustainable growth; a *Development Strategy for Secondary Cities* to help selected secondary cities to formulate their development strategies, and a *Regional Development Strategy* to develop alternative urban nodes of economic growth in areas other than Ulaanbaatar.



This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

IBRD 33076

APRIL 2004

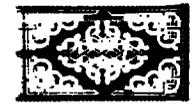


This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

APRIL 2004

IBRD 33077

2004 7





Box 2

GER AREAS — ADAPTING TRADITIONAL NOMADIC DWELLINGS TO AN URBAN ENVIRONMENT

In Mongolian, *ger* simply means home. Gers are traditional dwellings, well adapted to the nomadic life of Mongolia's herders, and consist of a wooden framework and a felt cover. The wooden framework includes the walls, long poles, a round smoke escape and its supports. Inside the ger, felt is laid either on a wooden floor or straight on the ground. The number of walls and poles determines the size of the ger. Most herders' gers have five walls, which make a living area of 16–18 m². Larger gers can have up to 12 walls. Each ger has a hearth, which is of great symbolic and functional importance. In the winter the hearth heats the ger and also serves as a stove for cooking. Gers weigh approximately 224 kg. It takes about half an hour to collapse an average ger and slightly longer to rebuild it. Some ger residents in urban areas are beginning to build wooden houses to avoid expenditure on the upkeep of gers, and the cost of covering them with plastic sheets to protect them from the rain and snow.

Currently, 22 percent of the total Mongolian population live in houses and apartment buildings, while 78 percent live in gers. In urban areas, about 60 percent of the population still live in gers. A large percentage of those who migrate to towns settle in 'ger areas.' These are long strips of fenced-in, unserviced housing plots that surround the city. The center of the plot contains a ger, increasingly in addition to a simple wooden home. Animals are kept in close proximity to the ger, within the fenced-in area. Approximately 4.8 percent or 225 square kilometers of the total land area of Ulaanbaatar Municipality is considered urbanized, and residents of the urbanized core live in apartment homes. Ger areas are growing informally on three sides of Ulaanbaatar, bounded on the south by the Tuul River and topography. Over 30 percent of Darkhan residents also live in ger areas.

There are wide disparities between these two types of dwellings with respect to access to electricity, heat, water and sanitation, and communication. Residents of gers in all urban areas are often unregistered, receive little to no services, are poorer than their counterparts in apartment dwellings, and use disproportionately high percentages of their household incomes for water, heating, healthcare and education. Although the majority of households have access to electricity (92.2 percent), all ger households use individual stoves for heating. Roughly 80 percent of the households get their water from boreholes and the rest from open springs. The available water supply per resident in these areas is 4.6 liters/day, far less than the World Health Organization's recommended standard. Over 70 percent of the households lack access to waste removal points, and the vast majority are not linked to any drainage system.

Ger areas have become a permanent part of the urban landscape of Mongolia, representing a fusion of traditional and modern lifestyles. Even in ger areas, younger Mongolians prefer modern, well-built, wooden or brick houses to traditional gers. Herding families who spend most of the year in ger areas use their traditional homes in the summer months when they move their herds into nearby pastures.

Source: Author.

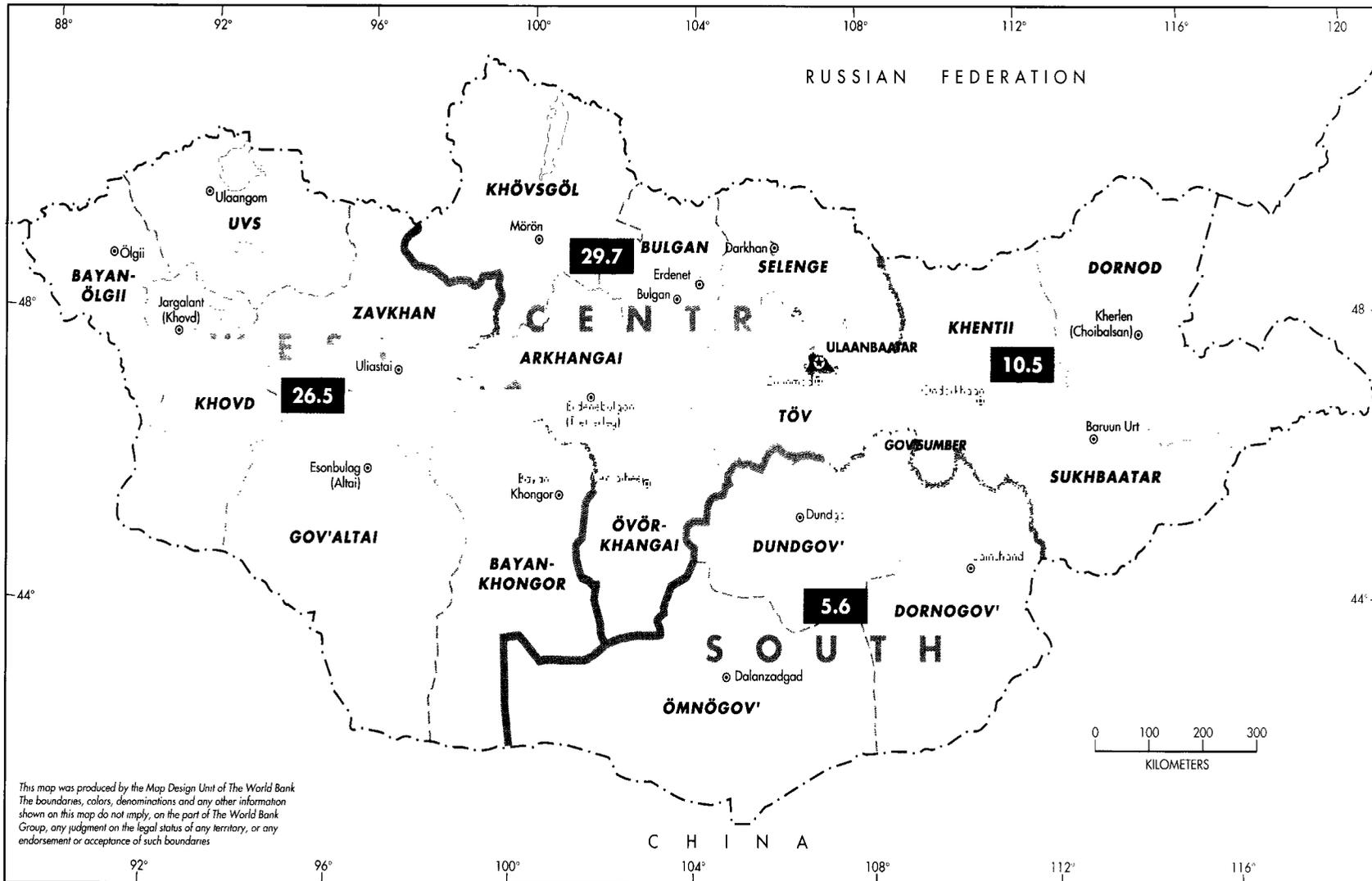


Photo: CHF International

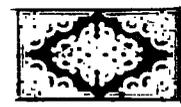
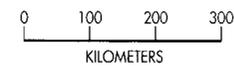
Ger area outside Ulaanbaatar.

10.5 NET IN-MIGRANTS ('000)

- ⊙ AIMAG (PROVINCE) CAPITALS
- ⊗ NATIONAL CAPITAL
- - - AIMAG (PROVINCE) BOUNDARIES
- ▬ REGION BOUNDARIES
- - - INTERNATIONAL BOUNDARIES



This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.

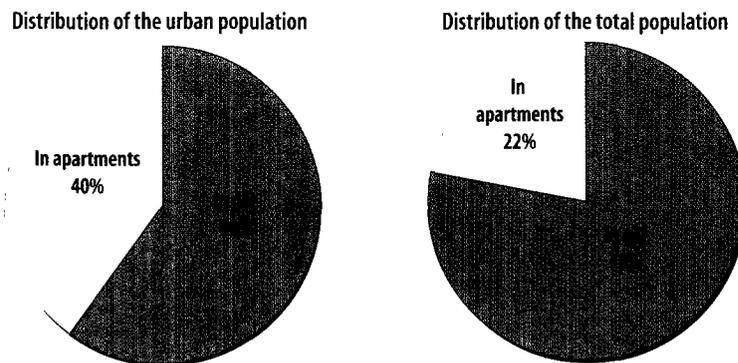




Urbanization often creates environmental hazards, which affect the health and safety of the population, especially the poorest residents. It also causes environmental degradation, with longer-term, wider-area and intergenerational consequences.¹⁵ In Mongolia, rapid growth in Ulaanbaatar and its periphery has led to a deterioration of air and water quality, and land degradation.

In addition, in-migration into the ger areas surrounding both Ulaanbaatar and secondary cities has aggravated the solid waste management problem. This section outlines the extent of these urban environmental issues and the legislative and institutional capacity hurdles that Mongolia faces in their management.

Figure 3
Distribution of the Population in Formal Urban Settings and Ger Areas



Source: National Wastewater Draft Strategy for Mongolia. Ministry of Infrastructure, National Water Committee and Ministry of Nature and Environment, 2003.



Ulaanbaatar — Degraded forest in the Ikh Tengger Presidential complex.



AIR POLLUTION

Sources

Air pollution has become a serious problem in Mongolia's urban areas in the past decade. Sources of air pollution include emissions from mobile sources or vehicles; stationary sources—combined heat-and-power plants (CHP), heat-only boilers (HOB) and industry; and area sources—household stoves, refuse burning, road dust, sandstorms.

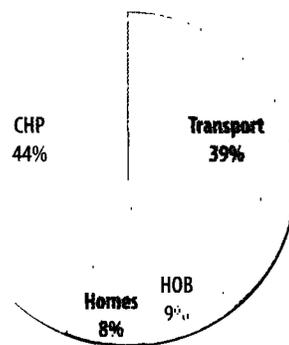
Approximately 5.7 million tons of coal and 160 cubic meters (m³) of wood are used for energy generation, heating and cooking in Mongolia annually. Ulaanbaatar is the world's coldest capital and heating is required for almost nine months in the year. Three CHP consume approximately 5 million tons of coal per year. An additional 250 HOB burn an annual average of 400,000 tons of coal and release 10,000 tons of poisonous substances, including sulfur dioxide (SO₂), particulate matter, and nitrogen dioxide into the air. Over 70,000 households use between 200,000 to 350,000 tons of coal. In winter, each household consumes approximately 5 tons of coal and 4.7m³ of wood, contributing approximately half the air pollution in the city. Reductions in emissions from the power sector have been partially offset by the higher emissions from household heating and cooking in the growing ger areas. Air pollution has a strong seasonal pattern, being much worse in the winter months when SO₂ and dust concentrations are many times higher than in the summer.

Between 1995 and 2002, the number of vehicles (such as cars, buses and trucks) in Ulaanbaatar has grown from 28,119 to 52,000 units, and the transport fleet continues to expand rapidly. Some 80 percent of the vehicles do not meet fuel consumption or emissions standards, further adding 70 tons of pollutants to air pollution each year.

Air Quality Monitoring

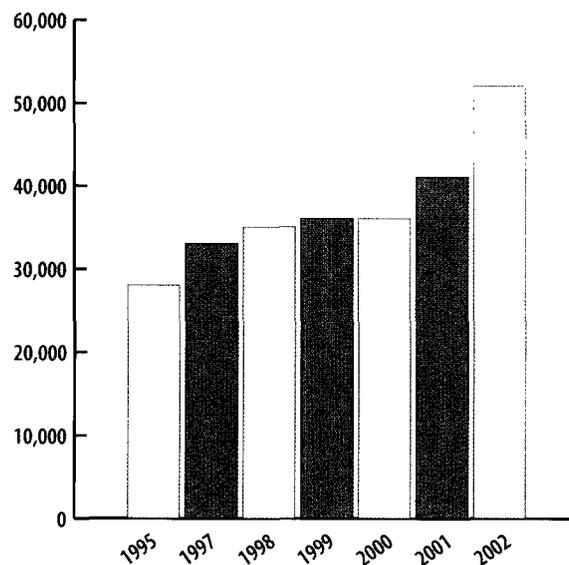
There are four air quality-monitoring stations in Ulaanbaatar. However they have not been measuring ambient concentrations very regularly, and various studies of air pollution have yielded different results. Most studies agree that concentrations of SO₂ are higher between October and March

Figure 4
Sources of Air Pollution in Ulaanbaatar



Source: Ministry of Nature and the Environment, 2003.

Figure 5
Number of Vehicles in Mongolia



Source: WHO, Ministry of Health and Public Health Institute (2002). Preliminary Health Risk Assessment of Environmental Pollution in Ulaanbaatar City, WHO, Ulaanbaatar.



due to increased emissions from local heating sources and electricity generation. In these months, peak SO₂ concentrations of 45 µg/m³ have been recorded in the evenings between 4 pm and 8 pm. There is concern that at the current rate of growth, these peak concentrations will soon be above stipulated standards.

Vehicle emissions have been growing in Ulaanbaatar since 1990. As a result higher concentrations of nitrogen dioxide (NO₂) have been observed along the main roads and traffic intersections. Readings at all the monitoring sites show that NO₂ concentrations are on the rise. From 1997 to 2002, daily mean NO₂ rose from 18 µg/m³ to 28 µg/m³. However, these concentrations are still below the national standard. According to one study, between 1994 and 2000, mean annual concentrations of SO₂ and NO₂ have risen; SO₂ concentrations have risen from 4 µg/m³ to 9 µg/m³ and NO₂ concentrations have risen from 14 µg/m³ to 25 µg/m³. A recent World Health Organization (WHO) study observed that the daily mean of both SO₂ and NO₂ in the winter months are already higher than the ambient air quality standards.¹⁶

Particulates

Perhaps the single largest problem pollutant in Ulaanbaatar is particulate matter. The daily mean particulate concentration in Ulaanbaatar now ranges between 131–162 µg/m³ and is two-to-three times higher than internationally accepted standards. Suspended particulate matter measurements show that this form of pollution peaks in the winter months. Dust storms, caused by strong winds picking up the soil, are especially common in April. There are now four times as many dust storms in Ulaanbaatar as were recorded in 1960.

In recent years, health studies have established a direct relationship between daily concentrations of particulate matter and premature deaths and excess morbidity. A significant correlation also exists between increased air pollution and acute respiratory infection among children. A 2002 WHO study reports that there is a strong statistical link between air pollution and respiratory disease requiring hospitalization among children in Ulaanbaatar and Tungkhel areas.¹⁷ Two studies, conducted in 1996 and 2001, have noted that the

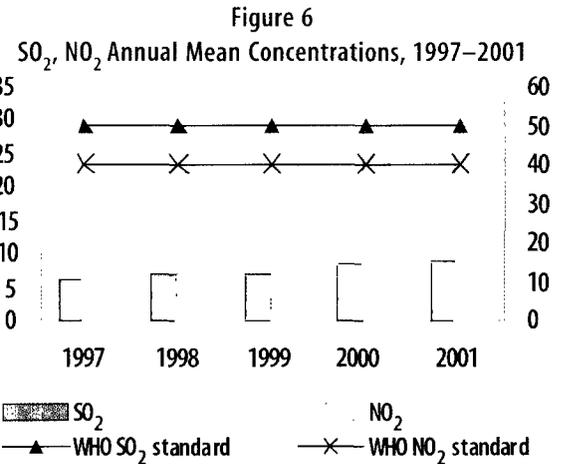


Table 3
WHO, US-EPA¹ and Mongolia² Ambient
Air Quality Guidelines for Common Pollutants

Pollutant	Time (averaging)	WHO (µg/m ³)	US-EPA (µg/m ³)	Mongolia Standard (µg/m ³) ^a
Total Suspended Particulate (TSP)	daily annual	** **	--	150-200
Particulate matter less than 10 microns (PM ₁₀)	Daily Annual	**	150 50	--
Sulfur dioxide (SO ₂)	Daily Annual	125 50	365 80	150
Nitrogen dioxide (NO ₂)	Daily Annual	40	- 100	40-60
Ozone (O ₃)	1 hour 8 hours	120	235 15	120
Carbon monoxide (CO)	1 hour 8 hours	30 mg/m ³ 10 mg/m ³	40 mg/m ³ 10 mg/m ³	3 mg/m ³ (24 hrs)

Notes: 1. US Clean Air Act of 1999 and WHO/SDE/OEH/00.02, Geneva 2000.

2. Mongolian standards are from MNS4585-98. The range is related to the analytical method used for measuring the pollutant.

** WHO no longer recommends an air quality guideline for PM because there is no safe limit.

Values of US-EPA are for primary standards.

Annual average is an average of daily measurements taken during a period of one year.

µg/m³ refers to one millionth of a gram of a pollutant in a cubic meter of air.

Guideline refers to the safe level of a pollutant, for the given averaging time, to protect the public from acute health effects.

Source: US Clean Air Act of 1999; WHO/SDE/OEH/00.02, Geneva 2000; MNS4585-98, Ulaanbaatar, 1998.



physical growth of children has been negatively impacted by air pollution.¹⁸

Policy Responses

As more automobiles enter the roadways in and around Ulaanbaatar, and industries diversify and expand, air pollution will continue to worsen if appropriate steps are not taken. In this regard, the government has recently begun limited testing of tailpipe emissions in the city. New, less polluting coal stoves are being introduced through a government program supported by the Global Environment Facility. The private sector is also becoming active in marketing energy efficient and less polluting alternatives to coal and wood, for use in household stoves. These developments will have a direct impact on indoor air quality. The Government recognizes that there is a need to replace or refurbish old boilers and furnaces to make them more efficient and less polluting. New industries should have tax and other incentives to adopt cleaner technologies and other energy-conserving measures.

The National Agency for Meteorology, Hydrology and Environmental Monitoring, is responsible for air pollution monitoring, developing pollution inventories, and implementing national air quality action plans. However, absence of collaboration between this agency and other important sector players such as energy, transport, and health, have been a major impediment in the implementation of air quality action plans. While both monitoring and analysis need to be strengthened, it is equally important that data from

monitoring networks be interpreted for use by the government and by nongovernmental actors. The absence of air quality data for all other urbanizing areas is an even more glaring problem. If the problems that are now occurring in Ulaanbaatar are to be avoided in the newly urbanizing areas, it is critical that well designed air quality monitoring networks be put into place and monitoring carried out on a regular basis.

Box 3 INDOOR AIR QUALITY AND THE IMPROVED STOVES PROJECT

Air pollution resulting from incomplete combustion in household stoves is a major environmental health problem in Ulaanbaatar and other urbanizing areas. Coal is used for about 80 percent of all energy production in urban and semi-urban areas. Used for both heating and cooking, fires are set at floor level in simple metal or clay stoves. Coal, wood or biomass do not burn completely in these stoves, releasing large quantities of non-combustible contaminants into the air.

In 2000, a survey of 1,899 households with 8,296 residents revealed that pollutants such as sulfur dioxide, dust and carbon monoxide were higher than internationally-accepted standards. Another study was conducted in 2004, in conjunction with the implementation of the GEF-supported Improved Urban Stoves Project. Preliminary results show that traditional stoves use more coal or wood than improved stoves, produce comparable levels of heat, and yet release higher levels of particulate and carbon monoxide.

Source: East Asia Energy and Mining Sector Department, World Bank, 2004.



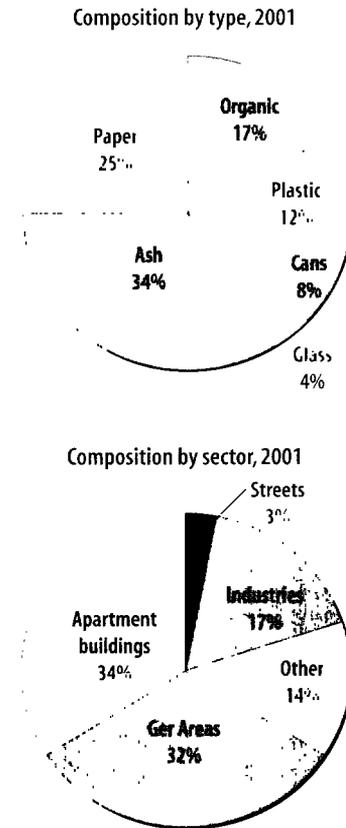
SOLID WASTE

Solid waste generation has been increasing over the past five years. The lack of environmentally sound waste disposal and treatment facilities, has compounded the problem of solid waste management. There is limited reliable and accurate data for waste generation, collection and disposal, for Ulaanbaatar and the other main urban areas. Solid waste originates from a wide range of residential, industrial, agricultural, municipal and commercial sources, including households, manufacturers and hospitals. Ulaanbaatar produces an average of 600 m³ of solid waste annually. Some reports suggest that residents of Ulaanbaatar produce more waste per capita than other East Asian countries at similar levels of economic development.

Collection and Management

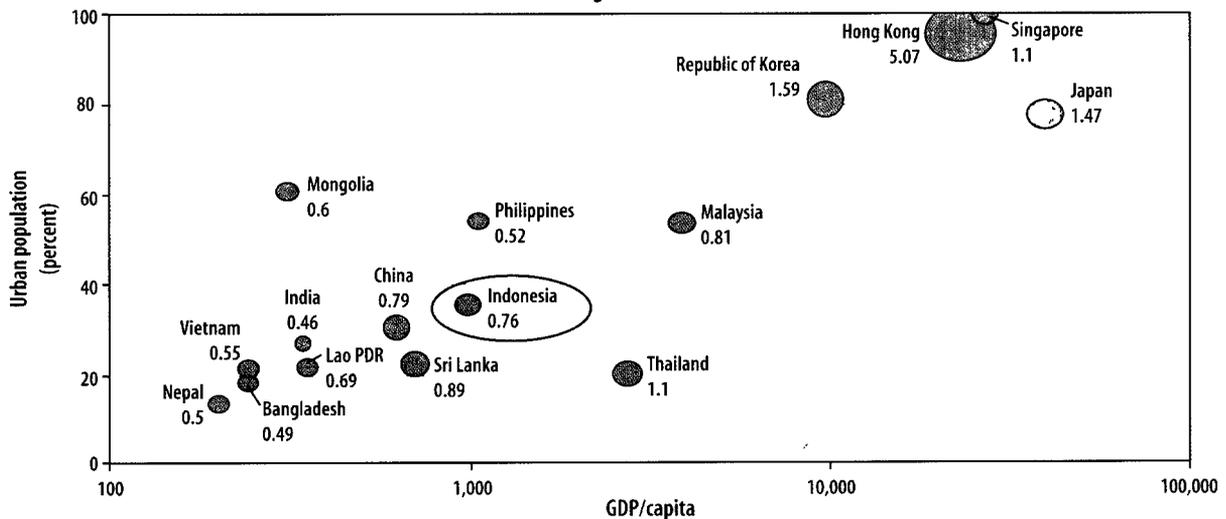
Authorities report that in 2002, approximately 1,300–1,500 m³ of waste was collected daily in Ulaanbaatar.¹⁹ Waste is collected, with varying frequency and efficiency, from both the informal and formal housing areas, and deposited at one of three open dumps on the outskirts of the city. About 40 percent of households have access to solid waste collection services. There are an estimated 200 large and small collection points in the city, and 100 small, open trucks are used to transport the wastes

Figure 7
Solid Waste Composition by Type and Sector



Source: Ministry of Nature and Environment, 2001.

Figure 8
Waste Generation in Mongolia and other Asian Countries



Note: Size of circles is proportional to unit waste generation.

Source: *What a Waste: Solid Waste Management in Asia*. Urban Development Sector Unit, East Asia and Pacific Region, World Bank, May 1999.



to 497 dumping sites throughout the country. In multi-storied buildings, solid waste is deposited in a room on the ground floor and collected by waste management companies. In areas with lower buildings and individual houses, community bins are available for each block. Solid waste from these areas is supposed to be collected twice a week. In reality, collection occurs closer to once a week, leading to severe odor and cleanliness problems.

Residents of ger areas are required to deposit their household wastes in designated areas. These open sites often overflow with waste, as waste collection is irregular, sometimes just once a month. Many roads in ger areas are in poor condition and have steep slopes. The small trucks assigned for waste collection have a difficult time reaching the dumps. Often individuals dispose of all the household waste into the nearest ravine. Coal ash from stoves makes up more than half this waste.

Disposal

Until 1990, open burning was commonly used as a method of waste disposal throughout the country to reduce households waste quantities, and also to separate recyclable material from waste. Concerns about the impact of this practice on air quality led to its banning. However, no new solutions for waste management have been introduced thus far, and open burning continues at the three main dumpsites. Accidental fires are either auto-ignited from the decomposition of organic matter, or started by scavengers for heating. Smoke from these fires is contaminated and often toxic. Infectious hospital waste is burned in special parts of the dumps, causing soil and groundwater pollution. Solid waste dumps remain unregulated; have no provision against groundwater contamination, and no separation, treatment or burying of solid waste is done. In addition, wild dogs and other animals also carry waste from open dumps to nearby residential areas.

Recycling

Only a small portion of solid waste is recycled despite the existence of a potential market for used products from recycled plastics, glass bottles, and scrap metals. In Ulaanbaatar there

are 5,000 to 7,000 scavengers, many of whom are young children. These scavengers are not integrated into the daily waste management operations of the city and are often seen as a nuisance. The Blue Bag campaign run by the Mongolian Women's Federation supports the sorting of wastes into blue bags and sending them for commercial recycling.

Solid Waste Management Costs

Data on national and municipal budget allocations and expenditures are scarce and difficult to gather. The various government agencies involved in solid waste management do not necessarily compile costs for the services they provide, and do not account for the costs of depreciation of facilities, equipment, and utilities, so that total owning and operating costs are not evident. Data from MNE show that no budget allocation was made for solid waste management for the period 1996–2000 either at the national or the local level. In 2000, the seriousness of the solid waste problem prompted the international donor community to make 1,194 million MNT available in loans and grants to address the most pressing challenges related to solid waste collection and management.²⁰

Toxic and Hazardous Waste

Toxic waste management is also weak. Some 20 percent of toxic waste is stored in non-standard storage facilities, while another 20 percent is stored at open sites. No health and environmental risk classification system currently exists for transporting, handling, and storing toxic waste. Concerns are increasing about possible water pollution and soil contamination, resulting from inappropriate management and disposal of toxic waste. However, thus far there has been no attempt to create an inventory of industrial, hazardous or toxic wastes for the country.

Policy Responses

The Government is proceeding with the implementation of the recently adopted "Solid Waste Generation Reduction Program," in several municipalities and provinces; however, it is still too early to quantify and evaluate the preliminary results on the ground.



In addition, the government is also supporting citizen-based initiatives to improve neighborhood solid waste collection. A license system to register open dumps has also been established and it has been helpful in closing down several illegal dumpsites throughout the country.



Growing urbanization and timber market in UB.

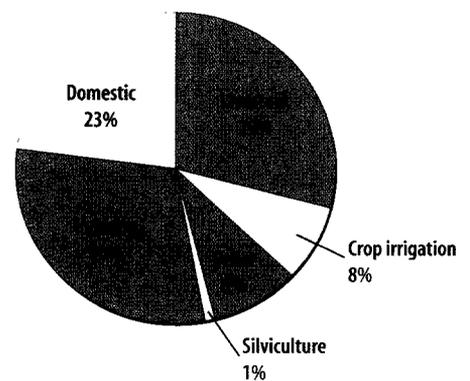
WATER RESOURCES AND QUALITY

Sources of Water

Mongolia has more than 3,800 rivers and streams with regular run-off, creating a waterway network of 6,500 km. In addition, 3,500 lakes, and 186 glaciers add up to a total surface water volume of 63 million cubic meters. Despite such abundance, only half of surface water resources is available for industrial, agricultural and human use, and account for only 20 percent of the total water consumed. Groundwater supplies 80 percent of total water consumed.

Although average per capita annual water availability is 17,300 m³, there is high variability across the regions in the country. The lowest per capita availability is in the Gobi area, with only 4,500 m³ available per person, whereas northern and central areas have the highest per capita availability with 46,000 m³ per person. Population pressures are responsible for declining water flows in the Tuul, Haraa, and Herlen rivers. Groundwater levels are also falling with increased use, thus causing some of the wells and springs to dry up completely, especially in March and April. As much as 60 percent of groundwater abstraction for commercial use is done without the required permit, and no metering system is in place to monitor withdrawal levels.

Figure 9
Water Consumption by Sector



Source: Ministry of Nature and Environment, 2002.



Access to Safe Water

In Ulaanbaatar, the only source of water is groundwater pumped from 160 bore wells in four well fields along the Tuul River; in 2002, water extraction reached 180,000 m³ per day. The distribution network supplying the city core is 350 km long. Almost half the population of Ulaanbaatar (45.3 percent) gets water from the centralized system; the rest depend on non-centralized supply points. There are vast discrepancies in access to safe water. Currently 230–400 liters of water per day is allotted to apartment residents;²¹ in contrast, ger residents usually consume between 4 to 8 liters per capita, per day. This amount is three to four times lower than the world average and the minimum daily consumption recommended by the WHO.

Most ger area residents buy potable water from communal water kiosks. Fewer than 10 percent of the households also get water from private wells, springs and the river. Current water supply to ger residents can be categorized into the

following groups: truck delivery to kiosks; kiosks connected to a piped network; private wells, use of river and springs.²² Some kiosks close during the winter months when they become inaccessible to the tankers. Family members carry water from the kiosks, for an average distance of 350 meters. A limited number of bathhouses are available for residents of ger areas. The cost of using a bathhouse can be as much as 10,000MNT per half hour, making it unaffordable to many residents.

Water Quality and Monitoring

Recent surveys reveal that both surface and ground water quality is declining across the country. Water pollution can be attributed to the discharge of human and industrial waste in and around the major urban areas, and to upstream mining operations. Pollutants include minerals, phosphorus, excessive nitrogen, organic and inorganic waste, and heavy metals. Animal waste often ends up in the river, and in wells and streams from which ger residents withdraw water. Although the water and sanitation company (USAG) contends that the water is potable, aside from a few E-coli outbreaks, there is little monitoring data to support this claim. In a study conducted by WHO in three khoroos in Ulaanbaatar, the results were very varied; in some instances the few samples of water that were tested turned out to be free of E-coli, but in others, one of three samples was contaminated.

Table 4
Degree of water pollution in
selected sampling points in Tuul River (mg/l)

Sampling point	COD	DO	BOD
Terelj	9.8	9.9	5.43
Nalaikh sewerage plant	116.6	12.09	6.82
Bayanzurkh bridge	29	9.61	4.54
Zaisan	32.7	11.7	6.4
Yarmag	68.6	11.9	6.04
Sonsgolon	58.8	11.6	6.38
Songino bridge	117.6	5.61	2.41
Shuvuun fabric	19.6	11.0	4.75
Altanbulag	49	9.12	4.31

Note: According to Mongolian guidelines, surface water classifications for cleanliness are as follows: COD <10 mg/l, dissolved oxygen >9mg/l, BOD <10mg/litre.

Source: WHO (2003) op cit.

The water quality-monitoring network consists of 140 sampling points on 70 rivers around the country. State inspectors have utilized this network very sporadically, and rangers seldom take samples or use analytical lab services. More detailed water quality monitoring has been conducted for the Tuul River, which runs through the center of Ulaanbaatar, and is reportedly the most polluted river in the country. Its upper reaches are rated Grade II, while downstream it is rated Grade IV. The water quality of the Orkhon River, which passes through mining and logging areas, and through the relatively densely populated Orkhon aimag, is also compromised. The Kherlen River near Baganuur, the country's largest supplier of lignite coal, and the Kharaa River near Darkhan have deteriorated over time. With increasing bio-chemical oxygen demand, heavy metal



Box 4 SURFACE WATER CLASSIFICATION

In 1989, GoM established a five-grade classification system to characterize the quality of surface water. Several indices of oxygen condition, mineral composition, organic pollution, biological contamination, and toxicity determine the purity grades.

Grade I—Extra clean fresh surface water resources used for:

1. Conservation, not required to pass through water treatment process.
2. Ecosystem conservation where basic organisms can breed naturally.

Grade II—Very clean fresh surface water resources used for:

1. Consumption, which requires ordinary water treatment processes before use;
2. Aquatic organisms conservation, fisheries, and recreation.

Grade III—Medium clean fresh water resources used for:

1. Consumption after ordinary treatment;
2. Agriculture.

Grade IV—Minimally clean freshwater resources used for:

1. Consumption after special treatment;
2. Industry.

Grade V—Polluted freshwater resources can be used only for navigation.

To date, only the *Khangal*, *Kharaa*, *Kherlen*, *Orkhon*, *Tamir*, *Terelj*, *Tuul*, and *Zelter* rivers have been classified. However, water quality is not systematically monitored.

Source: Ministry of Nature and Environment, 1997.

concentrations, falling dissolved oxygen, these rivers are rated Grade III.

Sanitation and Sewerage

Virtually, all ger residents in Ulaanbaatar and other cities use on-site, poorly constructed pit latrines. There are approximately 60,000 open toilets in and around the city. Surface contamination is clearly evident and ground water contamination is occurring in many areas. With growing population density, significant numbers of urban livestock, poor solid waste collection and absence of controlled drainage, the

sanitation situation in ger areas has become critical. There are 10,000 cases of diarrhea reported in Mongolia every year, and 60 to 70 percent of these occur in Ulaanbaatar. Dysentery is the second most-prevalent disease. Incidence of hepatitis is seven times the international average.

Households with no soak pits face the additional problem of having inefficient pit latrines that tend to fill up within two or three years (as compared with six or seven when used in conjunction with a soak pit). This may be because of the practice of disposing gray water in the latrines, thus slowing down the bacterial breakdown process, increasing the bulk of sludge and filling up the latrine rapidly. The practice of adding lime to latrines, previously common in Ulaanbaatar, is being discontinued, as many households cannot afford the lime. There are reports of salt being used for the same purpose. This creates additional problems by raising the sodium absorption ratio of the land and can render the soil barren.

Wastewater Treatment

There are about 102 centralized wastewater treatment plants (WWTP) of varying sizes and capabilities throughout the country and, without exception, their performance has been deteriorating over the years. Only 35 of the 102 WWTP were in operation in 2002.²³ Most plants lack standby power generation, and in the event of power failures, the entire raw domestic and industrial wastewater flows are directed to the river. In Ulaanbaatar, the main WWTP was commissioned in 1963 and expanded in 1979 and 1986. It is located 11 km west of the city center was designed for conventional secondary treatment, using an activated sludge process. The treatment plant is in a state of disrepair and is not very efficient. It was designed to treat 230,000 m³/day,²⁴ and actual flows are in the range of 150,000 m³/day. As a result, a downward trend has been noted in the quality of the effluent discharged into the Tuul River. A second treatment facility (Hargia) has the capacity to treat 130,000 m³ of wastewater from wool and leather industries. However, this facility is not working to its full capacity, and its output does not meet standards thus allowing extremely polluted industrial wastewater to pour into the main treatment plant.



Over the past decade, GoM invested MNT 3.8 billion to improve access and provision of sanitation; however, more needs to be done to prevent further river pollution, and to

strengthen the private sector's involvement, and interest in investing, in water supply and sanitation.

Box 5

URBAN SERVICES IMPROVEMENT IN ULAANBAATAR CITY

Most of the growth in urban populations is taking place in ger areas, considered informal housing, and it is these areas that are lagging behind in urban infrastructure and environmental services provision.

The Government and international donors are turning their attention to tackling the problems of these under-funded areas. In Ulaanbaatar, World Bank/International Development Association-funded Second Ulaanbaatar Services Improvement Project (UBSIP2) will provide piped kiosk water and limited sanitation assistance (on-site facilities improvement), bath-houses, roads and footpaths, and drainage. The project area covers over 1000 hectares, and total project cost is \$US 21 million. The total ger area around Ulaanbaatar is 10,000 ha. Accordingly, one could estimate that at least \$200 million (in current dollars) may be needed to provide the type of upgrading that UBSIP2 is providing throughout the ger areas of Ulaanbaatar.

Source: Authors.

Policy Responses

The law on the operation of water supply and sewerage systems was approved in 2002. Amendments to the Water Law and Law on Discharge fees are now under review by the Mongolian Parliament. In addition, Mongolia has a Standard for Industrial Wastewater Discharge into the sewage system (MNS 4288-95) and regulations governing the selection of sites for WWTPs, treatment technologies and effectiveness. However, due to the size of the country and its scattered settlements, and limited technical and financial capacity, it remains difficult to ensure industries' compliance to uniform standards.

A new National Wastewater Strategy is considering decentralization of monitoring and control to polluters, who will be routinely monitored. Smaller and decentralized wastewater treatment may also be a more practical alternative for smaller and scattered populations, while centralized treatment would be the only viable alternative in a larger city such as Ulaanbaatar. In addition to these changes, a new effluent standard for WWTPs has been prepared and is undergoing review.



LAND USE AND DEGRADATION

In the fast-growing cities of the developing world, housing, transport and commerce compete for shrinking open spaces. Yet, in the long term, the economic and social vitality of cities depends on their cultural and natural resources—architecturally and historically distinctive neighborhoods, open parks and waterfronts. Ulaanbaatar’s 1986 Master Plan, designated large areas of the city as green spaces. However, the majority of projects and programs for greening the city were not implemented due to lack of funds. Planted area per capita is now approximated at 3.2 m² per person, which is 3 to 5 times smaller than the city’s required standard. The green spaces that remain are used for social gatherings, playing sports, formal and informal events both in the summer and the winter. The open spaces within or immediately adjacent to Ulaanbaatar include the Tuul River floodplain, the parks around the Parliament Building, Bogd Khan, Tasgant Ovoo, Botanic Gardens, Children’s Park, and the dozens of open areas enclosed by apartment blocks.

Since the passing of the new Land Law in 2002, these areas have been under more pressure than ever before. The playgrounds within apartment block complexes are being transformed into office blocks and more apartments. Smaller open spaces are being used for parking lots and garages as the number of vehicles in the city keep growing. In addition, authorities in Ulaanbaatar and other aimag centers are faced with the challenge of addressing land degradation caused by overgrazing as herdsmen settle down in these areas so as to be close to markets.²⁵

Policy Responses

Combating land degradation is high on GoM’s environmental agenda. The 2000 National Environment Action Plan (NEAP) mentions the need to designate specific sites for the safe disposal of solid waste as one way to check degradation in urban areas. However, more will need to be done to prevent further degradation, restore damaged lands, preserve open spaces and forests within urban areas, provide zoning to protect environmentally fragile or vulnerable areas, and involve the private sector to help address these challenges.

The Ulaanbaatar City Development Strategy (see Section III) outlines some of the critical land management issues. However, the strategy does not make mandatory provisions for environmental assessment to ensure that the policies adopted by city managers are environmentally sound, and that their impacts are adequately addressed.

Box 6 MUNICIPAL FORESTS OUTSIDE ULAANBAATAR

Only some five percent of Ulaanbaatar is actually urban. The rest comprises steppe, larch and pine forests including most of Bogd Khan Special Protected Area—a UNESCO Man and Biosphere Reserve—to the south, and part of Khan Khentii Special Protected Area to the northeast. The forests are amongst the most southerly in the country and under natural conditions are found only on the northern slopes because the shallow soils of the southern slopes become too dry to support trees. Although nominally protected from felling, the forests are under severe pressure from collectors of fuel wood and timber, and from land claims. A major increase in felling has occurred in order to satisfy the demand for fence slats in response to the provisions of the new Land Law. The loss of forests is probably aggravating the impacts of the rare but dramatic rainstorms. In 2003 alone there were two major floods in Ulaanbaatar, in May and September, with the former causing 12 deaths. The slopes to the north of Ulaanbaatar now have less and less protection and the heavy rains tend to rush over the soil surface rather than infiltrating and recharging the groundwater.



Recent forest loss on the northern edge of Ulaanbaatar.



Box 7 URBAN AND ENVIRONMENTAL PRESSURES OF MINING

The mining industry is a significant part of the Mongolian economy. It employs close to 17,000 people, produces 30 percent of the total industrial output, and accounts for 65.5 percent of the export revenue. Copper mining alone earns between 40 to 50 percent of foreign exchange and provides almost a quarter of the government's revenue. There are presently 35 operating mines for construction materials in addition to 160 operating mines for other minerals.

The most prominent deposit in terms of size and significance is the Erdenet copper-molybdenum mine, some 360 km north of UB. The mining complex employs 6,000 of the 15,000 residents of Erdenet, thus making the city overwhelmingly dependent on the mine both for employment as well as income. The Bagannuur Coal Mine Complex is located approximately 110 km west of Ulaanbaatar in Tuv Aimag and employs only 1,400 people; yet over the years, accessibility to UB via a dirty road and proximity to the trans-mongolian railroad have attracted a significant number of migrants to Bagannuur, whose total population has reached 30,000. The Zamaar gold mining district in Tuv Aimag, approximately 250 km from Ulaanbaatar is a center of placer mining operations. Mining in the Zamaar area employs some 100,000 people, and has reduced land availability, and intensified stresses on herders already effected by extreme climatic events. In addition, artisanal mining for gold is on the rise, and has become the biggest generator of rural employment and rural cash-based income.

Mining's impact on the environment is potentially significant as Mongolia's natural ecosystems are highly susceptible to degradation both by human and natural forces, and are slow to recover. In addition to the environmental impacts that are directly related to mining activities, mining areas also attract considerable numbers of people as they offer job security that is difficult to find elsewhere in the country. While these areas are not large population conglomerations by international standards, in a sparsely populated country such as Mongolia, they represent concentrations that are equivalent to small towns. Populations in these towns are solely dependent on the economic performance of the mine supporting them. Many of the mining areas occupy lands previously used for herding, thereby displacing herders who often become artisanal miners. Such poverty-driven manual mining has serious health, social and environmental risks.

Source: Ruhrmann, Gerhard and Jochem Becker (2003) Review of the Environmental and Social Policies and Practices for Mining in Mongolia, Draft Final Report prepared for the World Bank



Artisanal coal mining



Box 8

GESER SÜM — A SACRED URBAN SPACE AT RISK

Founded in the late nineteenth century, the Geser Süm Temple Complex is a unique fusion of elements of Mongolian Buddhism, indigenous shamanism, Chinese Buddhism and Daoism. Because the army took possession of Geser Süm in 1933, it escaped demolition during the suppression of the Buddhist monasteries. The temple complex is situated at the apex of a triangular plot of land, formed by the hill rising up behind the complex; it attracts many pilgrims, as well as people simply seeking space and peace in an otherwise busy urban environment.

Unfortunately, lack of maintenance, theft of religious artifacts, and encroachment upon the hillside all pose serious challenges to the site. Although nominally designated as a protected 'National Monument', several buildings are being built at the edges of the hillside and directly behind the temple complex. A partnership between the government and the Buddhist community has led to an initiative to restore Geser Süm, and to protect the significant surrounding urban landscape. Funded by the Alliance of Religions and Conservation, the Getty Grant Program, the United Nations Environment Programme, the World Bank, and with the support of the World Monuments Fund, a team of conservation professionals has surveyed the buildings and site to prepare plans for conservation and protection of the site. The project aims to restore the temple complex, allowing continued use for religious and educational purposes. It will introduce efficient and alternative energy to the site to emphasize the ecological and sustainable aspects of traditional Mongolian Buddhist construction and land use, and protect the remaining open space of the culturally and religiously significant hill behind the temple complex, which provides one of the few undeveloped spaces in an increasingly congested city.

Source: Authors.

URBAN LAND MARKETS

Although the Constitution provides for the private ownership of non-pastoral land, in practice all land was owned by the State until 2003. In 2002, the Mongolian Parliament approved both the new Land Law, regulating possession and use of state-owned land, and the Law on Mongolian Citizens' Ownership of Land, regulating allocation of land to Mongolian families for ownership. The Land Law came into effect in January 2003, while the Law on Land Ownership became effective in May 2003. Other important urban land-related laws passed recently by the Parliament include laws on Housing, and Apartment Privatization. The Immovable Property Registration Law and the Land Fees Law—regulating fees for possessing and/or using state-owned land—were passed in 1997, while the Immovable Property Tax Law was approved in 2001. A new Land Fees Law is currently under revision.

All citizens legally residing on land are entitled to claim ownership of that land. This means that possession certificates given by local authorities are key documents to claim ownership of land. The new legal framework also recognizes the right of possession holders to transfer the certificate of land possession to others (after approval by the relevant local authorities), or to use it as collateral. However, the Law gives only households, not individuals, the right of ownership, setting up a contradiction with the Constitution.

As a result of recent transfers to households, investment in housing development has grown significantly, and housing service markets have emerged in Ulaanbaatar. However, the housing finance market is still in an embryonic stage. There is limited information available on the implementation of the Law on Land Ownership, making it difficult to assess its impact on the market and ownership patterns. There have been some positive impacts in terms of land use planning both at the city and district level, where it appears that land use plans may be adopted for the first time. Work is being carried out to establish



the certification of land rights based on a land inventory- to identify land subject to privatization, and to settle pending disputes over land.

The Local Representative Khural in Ulaanbaatar approved a land privatization plan, presented by the central Land Management Authority in 2003. Land management authorities at the central and district level are conducting all land privatization activities envisaged within this plan. The land upon which buildings stand remains state property, but about 90 percent of apartments in Ulaanbaatar are now privately owned. State-owned land that is expected to be privatized for household use in urban areas, amounts to about 0.01 percent of the total land. Families in the capital city are entitled to 0.07 ha of land free of charge, while subsequent acquisitions of land will require payment. In aimag centers, families are entitled to 0.35 ha of land, while in soum centers they are entitled to 0.5 ha. This implies that a rural families' entitlement may be five to seven times larger than that of an urban family.

Thus far, about 21,500 ger settlements have been privatized in Ulaanbaatar, and it is expected that an additional 52,000 fenced-in plots will also be privatized. Initial land cadastral surveys activities have been conducted in a few ger areas to be privatized, and land quality certificates have been given to landowners. It is estimated that about half the plots in ger areas are currently registered, while about 80 percent of private houses and apartments have been registered. During 2004, the government is planning to privatize land around Ulaanbaatar for summer camping and cottages.

The cadastre and land registration system is still in its infancy and is inadequate to meet a significant change in land ownership and use. In ger areas there are a number of barriers to land registration; an inefficient process for issuance of land permits and residency certificates, high annual land fees and registration costs, and lack of access to official registry

information. Additionally, the nomadic culture of ger populations is an important factor in explaining the difficulty in understanding the importance of registering land and the concept of tenure security.

Systems for land taxation and land information database are still being developed, and a large number of disputes over land possession and use remain unresolved. Land management authorities are not sufficiently equipped to deal with the existing privatization cases or land disputes. Also, there is little information on existing prices or trends in land and housing prices, and no clarity on how to value land for sale and purchase.

It remains to be seen if the new legal framework will be effective in ensuring a transparent and equitable privatization process and efficient land management and administration, and in safeguarding the functioning of the emerging land market. The development and privatization of ger areas existing within city limits is raising some concern in terms of allocation of ownership rights to these families. Local media report that clashes have taken place between ger dwellers and local authorities over eviction of families. In particular, some families have been forced to leave their land, which is claimed by or allocated, to companies at little or no cost.²⁶

Land use in urban areas has not been governed by established zoning and development plans. While these plans exist for most aimag centers and for the capital, housing expansion has largely taken place in ger areas, and manufacturing and industry are interspersed with commercial and housing areas. With land privatization, there is some concern that wealthier industrial and commercial establishments will price out poor housing settlements and open spaces in and around Ulaanbaatar. The environmental implications of this change have not been adequately studied either by the Land and Housing Authority or by the City Development Strategy.



Aerial view of Ulaanbaatar.

Urban areas in developing countries face formidable challenges; due to their rapid rate of growth, number of residents needing employment, housing and services. Urban growth generates new employment opportunities, increases productivity and access to better services, but also raises the risk of air and water pollution, poor sanitation and overall congestion. This puts a premium on the quality and efficiency of formal and informal institutions involved in planning urban and economic development.

Through the 2000 update of the 1995 NEAP, the Government has identified several policy options for tackling environmental problems related to urbanization and economic development. In addition, the 2001 Good Governance for Human Security Programme, GoM's official program, includes provisions to specifically address the need for land reforms, improve the living environment of Mongolians by reducing air, water, soil and solid waste pollution in urban areas, and support the implementation of environmental policies aiming at providing sustainable economic development.²⁷

The Ministry of Nature and Environment (MNE) has nationwide responsibility for environmental protection. Aimag and soum governors are responsible for issuing local permits and licenses and for natural resource management. Enforcement of regulations is the responsibility of environmental inspectors at the aimag level and rangers at the soum level. Aimag-level inspectors report to the newly created (2003) State Professional Inspectors Agency in the Prime Minister's Office. Rangers continue to report to the soum government. Aimags (and the Ulaanbaatar municipal government) have their own environmental protection agency, usually with about five staff members.

Environmental inspection functions include monitoring, operational inspections and information collection.²⁸ However, there appears to be an imbalance between responsibilities and budgets at the local level. For example, in 2003 there were only 17 environmental inspectors in Ulaanbaatar, 396 in aimags, and 310 in Special Protected Areas. These inspectors were



Box 9

PUBLIC SECTOR MANAGEMENT AND FINANCE LAW

In 2001, Ulaanbaatar had a gross domestic product of 426.9 MNT, yet official city government documents had reported that the financial capabilities of the city government were not commensurate with the responsibilities it had been given under the Constitution. Before the transition, the Municipality received most of its revenue from the operation of companies and utilities that were under its control. The gradual loss of state-owned enterprises, corporatization of utilities and withdrawal of subsidies, had left the Municipality with few revenue sources.

The Public Sector Management and Finance Law (PSMFL) that went into effect on January 1, 2003, attempts to streamline the budgeting and management of municipal responsibilities by regulating relationships among state organizations and officials with regard to the preparation, approval, spending and reporting of the budget. It also sets up a system of personnel policies, and principals of operational management of budgetary bodies, budget control and a system of accountability. One of the goals of the law is to clarify previously confusing budget responsibilities and outputs. Governors of aimags, the capital city, soums and districts act as portfolio ministers for their areas respectively. Local Assemblies in aimags, the capital city, soums and districts have the authority to debate, approve and monitor the Governors' Action and Strategic Business Plan. They are responsible for approving the yearly financial budget and monitoring budget implementation. Governors have the authority not only to manage activities of local budgetary bodies but also to select which outputs should be delivered by these bodies versus other local bodies and to make output purchase agreements to ensure the same. They also have the authority to raise revenues from local sources to carry out responsibilities outlined in PSMFL. Core local outputs are financed by revenue derived from locally mobilized taxes and non-tax-revenues and transfers from the state budget. The central budget contracts with the Governor to provide education, health and other services.

The new law has not been in effect long enough to evaluate its impact of local financial administration and management. According to it, however, city responsibilities have contracted, commensurate with the decline in taxation revenue. The law does allow local revenue-raising, but these resources complement the amount appropriated from the central budget. In addition, basic responsibilities such as education and health provision are now funded through the state on a contractual basis. However, shortfalls in the national budget appropriations can continue to translate into difficulties for local urban governments.

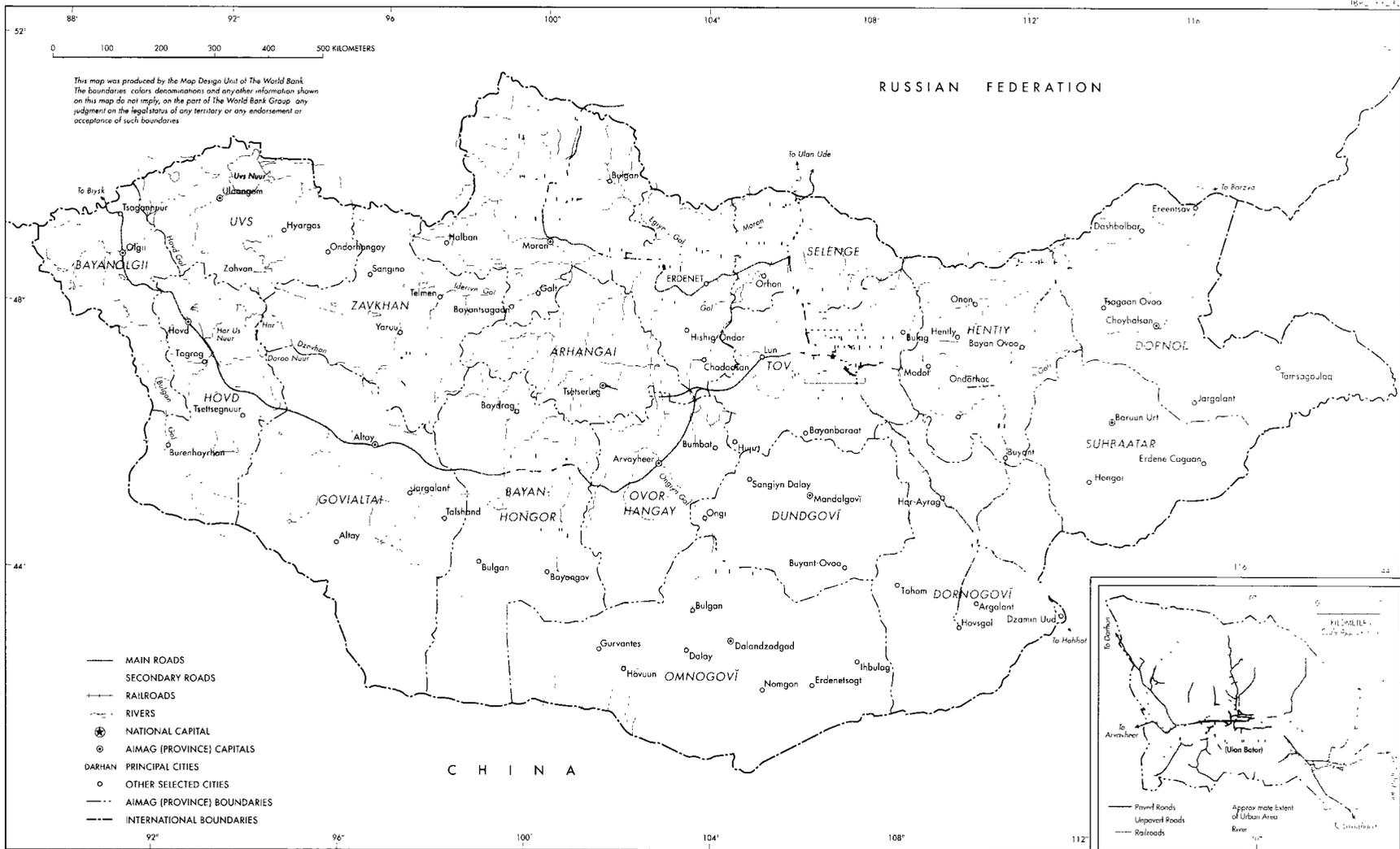
Source: Authors.

responsible for enforcing over 320 different regulations. In addition there were about 500 rangers at the soum level.

In case of prosecution for environmental offences, no protocols have been established as to the roles and responsibilities of the prosecutor, police, inspectors, rangers and government witnesses. This drawback significantly reduces the seriousness with which inspection is carried out. Moreover, there are no provisions for training or skills-upgrading for inspectors or new recruits. Most enforcement staff lack the basic technical and legal knowledge to effectively implement their roles. Nor do

they have independent transportation or other equipment, and rely on industrial operators for field visits, setting up a clear conflict of interest.

Local governments are responsible for all environmental management with the exception of protected areas management. They rely for this on budget transfers from the Central government, which apparently cover approximately a third of their estimated funding requirements. This shortfall compounds problems created by existing human resource and equipment shortages.





In an effort to ensure the sustainability of the ongoing urbanization and economic development process, especially for the poorest citizens including migrants from rural areas, GoM is supporting several key initiatives. These include the Regional Development Strategy, the Ulaanbaatar City Development Strategy, and the Development Strategy for Secondary Cities.

Regional Development Strategy

In 2001, the Mongolian Parliament ratified the main concepts of a Regional Development Strategy (RDS). Through the implementation of this Strategy, the government aims to reduce the over-concentration of population in Ulaanbaatar and minimize differences in development and economic opportunities among different regions, and between cities and rural areas. The Strategy also envisions joining Ulaanbaatar with domestic and foreign markets through investments in manufacturing and the services sector. Towards this end, it is envisaged that the first 10-year objectives of the Ulaanbaatar Master plan for the period 2000–20 will be implemented in close conjunction with RDS.

The Strategy has proposed a concept of zonal development for Mongolia. Four regional economic zones and one independent zone for Ulaanbaatar will be established. These zones include the following areas:

- *Western Zone* including Bayan-Olgii, Govi-Altay, Dzahvan, Uvs and Khovd aimags;
- *Hangay zone* including Arhangay, Bayanhongor, Bulgan, Orkhon, Ovorhangay and Khovsgol aimags,
- *Central Zone* including Gov'-Sumber, Darkhan-Ul, Dornogovi, Dundgovi, Omnogovi, Selenge and Tov aimags;
- *Eastern Zone* including Dornod, Sukhbaatar, Khentii aimags.
- *Ulaanbaatar Zone* including the capital city, the territories of its suburbs, and satellite cities in the vicinity of the city.

Different economic activities are proposed for each of the zones. One of the goals of the strategy is to identify existing

natural resources, population characteristics and employment structures, and to build upon these. The capital is seen as one independent region with all kinds of services, enterprises—information technology and with internationally ranked banking and financial networks.

Each of the economic zones will have a development node which is likely to emerge as the dominant urban area in that zone. Development nodes will be connected through road and air links, both with each other and with major cities around the world. This is a major departure from the manner in which road and rail links have emerged in Mongolia in the past, when all major roads and rail links led to Ulaanbaatar (see Map V). Two main cross-country roads have been proposed. These will link Ulaanbaatar-Tsetserleg-Uliastay-Hovdo to the West, and Ulaanbaatar-Ondorhan-Choibalsan to the East. The roads are expected to be ready by 2010. Ports on the border with Russia and China will be developed in the Western, Eastern, and Central zones.

The success of RDS is based on the completion of large infrastructure projects that will assist in the creation of urban centers of growth in areas outside the capital region. While RDS has established some general environmental protection guidelines, it has not anticipated the environmental changes that massive infrastructure development may bring to Mongolia. Guidelines have been created for the creation of an ecological fund that will provide resources for ecological rehabilitation and renewal. In addition, an independent zonal planning and management system is to be established: Interested investors, both national and foreign, will be able to gain long-term leases for the use of an area, possibly for mining, with the oversight of the zonal planning agency. The Strategy envisions that this system will be responsible for assessing the carrying capacity of the natural environment in an area. There is some concern that lack of previous experience with large infrastructure development may lead to investments that are both economically and environmentally unsustainable.



Ulaanbaatar City Development Strategy

In 2001, GoM approved a development strategy for Ulaanbaatar City. The strategy, an outcome of year-long series of workshops ending in March 2001, involved city government staff, non-government organizations, the private sector and the international donor community. The final Ulaanbaatar City Development Strategy (CDS) is divided into 26 vision statements. These are general statements about the direction of future development in Ulaanbaatar. They are not backed by implementation plans or budgets, and it is unclear who will be responsible for developing and managing these plans if they are indeed created. For example, Vision 3 outlines the goals for "Living Environment and Social Life." It includes the following statements:

- Decrease environmental pollution
- Create an integrated solid waste management system
- Recover the green belt area and increase green areas in the city
- Provide clean water
- Be prepared for forecasting and dealing with natural calamities when they occur
- Establish programs of poverty alleviation and employment generation
- Protect citizens from crimes and to take measures to strengthen social equity
- Improve public health.

The CDS was the first participatory urban planning exercise ever undertaken in Mongolia. For the first time, stakeholders from different sectors of the city were able to collectively identify the most critical urban issues. They also noted that the City has limited authority and there is very unclear division of responsibility between the local and national government. Most of the city's activities require the approval of the national government, specifically the Cabinet; the City Assembly lacks legislative authority and its annual budget needs to be approved

by the national government. In addition, the city government cannot assess taxes unless approved by the Parliament. As a consequence the city revenue base remains small.

The Ulaanbaatar Master Plan, approved in 2001, is also part of CDS. The Master Plan is based on the assumption that the urban area itself would dramatically expand to accommodate the growing population; however, such an assumption does not seem to be based on the most recent socio-economic data available. In addition, the Master Plan lacks adequate investment plans for the proposed infrastructure projects, and considerations for any of the regulatory reforms needed to manage growing urban areas in an environmentally sustainable way.

Development Strategy for Secondary Cities

The concept of regional development is central to the Development Strategy for Secondary Cities. The main objective of this DSSC is to assist aimag centers to develop strategic plans that would enable them to accomplish the following:

- Assess the level, identify strengths, weaknesses, opportunities and threats of their current development status
- Clarify their urbanization visions and share them with various stakeholders, including the urban poor and NGOs
- Formulate improved urban development strategies (with particular attention to poverty alleviation and environmental sustainability), and prioritize needed actions
- Share and discuss these urban strategies with others through workshops, consultations, and the creation of a ad-hoc website.

The DSSC will be piloted in Edernet, Darkhan, Khovd, Choibalsan, and Tsetserleg, and drafts of each city development strategy are expected to be completed by the end of 2004.



ENVIRONMENTAL PUBLIC AWARENESS

Public awareness and citizen pressure on governments and polluters are some of the most important factors in motivating environmental reform. Local environmental problems such as removal of solid waste, maintaining drainage, etc. can often be coordinated successfully at the community level. On the other hand, citywide problems need the engagement of city agencies and utilities. Even at this level, municipal authorities can rely on local communities to regularly monitor and report problems as well as to suggest cost-effective and locally appropriate solutions.

Mongolians are becoming increasingly aware of the deteriorating environmental conditions in their country. However, understanding of the root causes of the current environmental degradation is still limited, thus preventing the public from playing a more active role in managing and protecting natural resources.

In 1995, GoM and the Soros Foundation, started a distance learning program on economic and social impacts of current environmental problems for university lecturers and students, and secondary school teachers. In 1997, GoM adopted the 'National Program for Public Environmental Education', and established the National Council to organize the Program's activities, including the broadcast of a series of environmental documentaries on national television. In 1999, MNE and the

Ministry of Education, Culture and Science, established the Ecological Training Center to develop environmental and ecological curricula. They also published a basic ecology textbook to provide guidance for ecological and environmental education.

Within MNE, a Civil Society Committee has been established to ensure that public opinion is taken into account in crucial environmental decisionmaking, and to coordinate public participation activities between government agencies and NGOs at local and national levels. An information unit was also recently formed to facilitate the dissemination of environment-related information and to educate people on environmental laws and regulations. More than 40 environmental NGOs have emerged over the past 10 years, and about thirty of them formed the Union of Mongolian Environmental NGOs in 1999. An environmental information column is published in the *Daily News*, and the *Ecological Guard* is broadcast regularly on national public radio.

In 2000, the World Bank began sponsoring a series of stakeholder meetings with the aim of creating a City Development Strategy for Ulaanbaatar. Such strategies are being undertaken in several East Asian countries. They include a participatory assessment of the city's economic, social and environmental conditions and prospects, and outline priorities and actions plans for policy and investment. The Strategy introduced the concept of participatory planning in Mongolia.



In the last decade Mongolia has been undergoing a significant transformation: from a country with a diverse and largely unexploited natural resource base, to one that is transitioning to a market-based economy, overwhelmingly reliant on the use and management of natural resources.

Economic liberalization and changes in the governance structure have also accelerated the process of urbanization. Although, by international standards, Mongolia's main city, Ulaanbaatar, remains small, it dwarfs all other urban areas in the country. It also continues to be a strong magnet for rural migrants who throng to it in search of employment, education and access to other urban services. Yet, urban areas of destination are poorly equipped to receive the inflow of migrants and cannot adequately house, employ or educate many of them. In addition, the concentration of populations and industry in these areas is having serious impacts on the local environment. In an attempt to reverse spatial inequities, CoM has created a Regional Development Strategy. This Strategy, however, has an ambiguous implementation plan and does not adequately address environmental implications of development and change in what have been sparsely populated rural areas.

Based on the available information and analysis, this report identifies the following challenges for Mongolia to succeed in addressing the environmental challenges of urbanization:

- *Improved Provision of Urban Environmental Services.* Ensuring access to safe drinking water, clean air, waste collection and sanitation are major urban challenges. In ger areas these challenges are amplified as there are few transportation links and populations tend to be scattered over wide areas. The provision and maintenance of infrastructure and other services could be problematic and expensive due to limited qualified technical staff. Further, there is no experience with

private sector management of utilities and environmental services have never been associated with cost recovery.

- *Availability, Reliability and Accessibility of Environmental Monitoring Data and Information.* Accurate and reliable information and data on environmental quality is limited for Ulaanbaatar, and even more scarce for secondary cities. A lack of modern and practical sampling equipment, shortage of technical personnel who could gather and analyze samples, and absence of training in modern sampling techniques are some of the problems that need to be addressed in order to improve environmental management, especially in secondary cities.
- *Strengthening the Enforcement of Existing Environmental Quality Standards and Regulations.* An unclear regulatory framework, including lack of consistency in imposition of fines and penalties, and minimal court action against the worst offenders, has hampered effective monitoring of environmental quality parameters. Inflexibility of standards, unduly high standards in some cases and overly lax standards in others, have also created a weak and confusing regulatory atmosphere in which enforcement of existing environmental laws and regulations rarely occurs at all.
- *Strengthen and broaden the implementation of the environmental Implications of Regional Development Strategy, the Ulaanbaatar City Development Strategy, and the Development Strategy for Secondary Cities.* To date, relatively little is known about the possible environmental impacts of various economic and urban development programs planned and/or already under implementation. There is a need to ensure that environment and natural resources management are not relegated to a secondary status in the development policy agenda, and to avoid Mongolia backpedaling into environmental neglect. National and local governments should not have to choose between environment and development; both are needed for Mongolia to make progress toward achieving its Millennium Development Goals.



<i>Geography</i>	<i>Economy and Society</i>														
<p>Location: Northern Asia, between China and Russia</p> <p>Total area: 1.565 million sq km</p> <p>Land boundaries: Total: 8,161.9 km</p> <p>Border countries: China 4,676.9 km Russia 3,485 km</p> <p>Elevation extremes: Lowest point: Khoh Nuur 518 m; Highest point: Nayramadlin Orgil 4,374 m</p> <p>Mineral resources: oil, coal, copper, molybdenum, tungsten, phosphates, tin, nickel, zinc, gold, silver, iron</p> <p>Land use</p> <table border="0"><tr><td>Arable land:</td><td>5.7%</td></tr><tr><td>Permanent pastures:</td><td>81.0%</td></tr><tr><td>Forest and woodlands:</td><td>11.4%</td></tr><tr><td>Other:</td><td>1.9% (2000 est.)</td></tr></table> <p>Irrigated land: 800 sq km (1993 est.)</p> <p>Climate: continental (large daily and seasonal temperature ranges)</p> <p>National capital: Ulaanbaatar</p> <p>Administrative divisions: The aimag (= province) is the largest sub-national administrative unit; Mongolia is divided into 21 aimags. The sub-national administrative unit below the aimag is the soum (= district), which is divided into bag (= sub-district). In the capital city districts are called duureg and sub-districts khoroo.</p> <p>Fiscal Year: January 1st – December 31st</p> <p>Independence: 11 July 1921 (from China)</p>	Arable land:	5.7%	Permanent pastures:	81.0%	Forest and woodlands:	11.4%	Other:	1.9% (2000 est.)	<p>GDP: US\$ 4.7 billion (2000 est.)</p> <p>GDP growth rate: 1% (2000 est.)</p> <p>GDP composition by sector:</p> <table border="0"><tr><td>Agriculture:</td><td>36.0%</td></tr><tr><td>Industry:</td><td>22.0%</td></tr><tr><td>Services:</td><td>42.0% (2000 est.)</td></tr></table> <p>Currency: Tögrög (MNT); US\$ 1 = 1,097 Tögrög (MNT)</p> <p>Inflation rate: 7%: \$200 million (1998 est.)</p> <p>Industrial production growth rate: 2.4% (2000 est.)</p> <p>Agriculture products: Wheat, barley, potatoes, forage crops; sheep, goats, cattle, camels, horses</p> <p>Exports total value: \$454.3 million (f.o.b., 1999)</p> <p>Export partners: China 60%, US 20%, Russia 9%, Japan 2% (2000 est.)</p> <p>Imports-Total value: \$510.7 million (c.i.f., 1999)</p> <p>Import Partners: Russia 33%, China 21%, Japan 12%, South Korea 10%, US 4% (1999)</p> <p>Population, mid-year: 2,654,999 (2001 est.)</p> <p>Population growth rate: 1.4% (2001 est.)</p> <p>Poverty (percent below poverty line): 40 (2000 est.)</p> <p>Birth rate: 21.8 births/1,000 population (2001 est.)</p> <p>Death rate: 7.1 deaths/1,000 population (2001 est.)</p> <p>Infant mortality rate: 53.5 deaths/1,000 live births (2001 est.)</p> <p>Life expectancy at birth: 64 years</p> <p>Access to safe water: 60% of total population</p> <p>Access to sanitation: 25% of total population</p> <p>Literacy (at age 15) total population: 97%</p>	Agriculture:	36.0%	Industry:	22.0%	Services:	42.0% (2000 est.)
Arable land:	5.7%														
Permanent pastures:	81.0%														
Forest and woodlands:	11.4%														
Other:	1.9% (2000 est.)														
Agriculture:	36.0%														
Industry:	22.0%														
Services:	42.0% (2000 est.)														



1. In 2000, Mongolia completed the first comprehensive population census since the beginning of the economic transition. Population data gathered in this round of census are significantly more detailed and reliable than previous censuses; these data will continue to be used until 2010, when the next general census will take place.
2. Khovsgol, Uvurkhangai, Selenge, Tuv, Arkhangai aimags.
3. Bayan-Ulgii, Bayankhongor, Gobi-Altai, Zavkhan, Uvs and Khovd aimags.
4. Gobisumber, Umnugobi, Dornogobi, Dundgobi aimags.
5. Dornod, Sukhbaatar, Khenti aimags.
6. Provinces are referred to as Aimags. Soum is the subnational administrative unit below the aimag. Soum are divided into Bag. In the capital city and other urban areas, districts are called Duureg, and subdistricts are referred to as Khoroo.
7. Consistent with the Law on Cities and Villages, ratified by the Parliament in 1993.
8. Article 3—Towns and Villages, Law of Mongolia on the Legal Status of Towns and Villages.
9. Article 4—Status of Towns, Law of Mongolia on the Legal Status of Towns and Villages.
10. World Bank (2003) Poverty Reduction Strategy Paper and Joint Assessment.
11. Presentation by Mr. Ch. Bat, Director, Economy and Strategy Policy Department, Office of the Mayor, Ulaanbaatar city.
12. Approximately 4.8 percent or 225 square kilometers of the total land area of Ulaanbaatar city is considered urbanized. Surrounding this urbanized core are ger areas, municipal forests and open spaces.
13. United Nations Development Program (2003). Human Development Report Mongolia: Urban-Rural Disparities in Mongolia. UNDP, Ulaanbaatar. pp. 25–30.
14. United Nations Population Fund (2003) Fact Sheets on Migration, Mongolia.
15. World Bank (2003). World Development Report: Sustainable Development in a Dynamic World, Transforming Institutions, Growth and Quality of Life. NY: Oxford University Press. p. 111.
16. World Health Organization, Mongolian Ministry of Health and Public Health Institute (2002). Preliminary Health Risk Assessment of Environmental Pollution in Ulaanbaatar City, Mongolia.
17. WHO, Ministry of Health and Public Health Institute, op cit. p. 66.
18. Burmaa, B. (2001). Health of Mongolian Children Depending on Ecological Burden: Diagnosis and Prevention. Unpublished PhD dissertation. p. 54; and Otgon G. (1996), Physical Development, Some Functional Indicators of Ulaanbaatar City Children Living in a Different Ecological Situation. Unpublished Ph.D. dissertation.
19. Pacific Consultants International et al./World Bank (2001) Ulaanbaatar City Development Strategy, p. 3-16.
20. World Bank (2002) Mongolia Public Expenditure and Financial Management Review: Bridging the Public Expenditure Management Gap, Washington DC: World Bank, p. 50.
21. Ulaanbaatar City Development Strategy, August 2001.
22. Environmental Impact Assessment for Feasibility Study of Second Ulaanbaatar Services Improvement Project and Preliminary Design for Water Supply Facilities. World Bank, 2003.
23. Draft National Wastewater Strategy (2003) Ministry of Infrastructure in collaboration with National Water Committee and Ministry of Nature and Environment. Unpublished.
24. Ulaanbaatar City Development Strategy, p. 3-16.
25. In Ulaanbaatar, the number of cattle owned by residents rose from 180,000 in 1990 to 280,000 in 2002. In Ulaanbaatar, for example, the number of cattle owned by residents rose from 180,000 in 1990 to 280,000 in 2002. See United Nations Environment Program (UNEP) and Ministry of Nature and Environment (2002) State of the Environment—Mongolia, UNEP. p. 54.
26. <http://www.ahrchk.net/ua/mainfile.php/2003/484>;
<http://www.icsf-2003.mn/hot.htm>;
<http://www.eurasianet.org/resource/mongolia/ypermail/200303/0000.shtml>
27. Good Governance for Human Security Programme, Government of Mongolia. Ulaanbaatar. 2001.

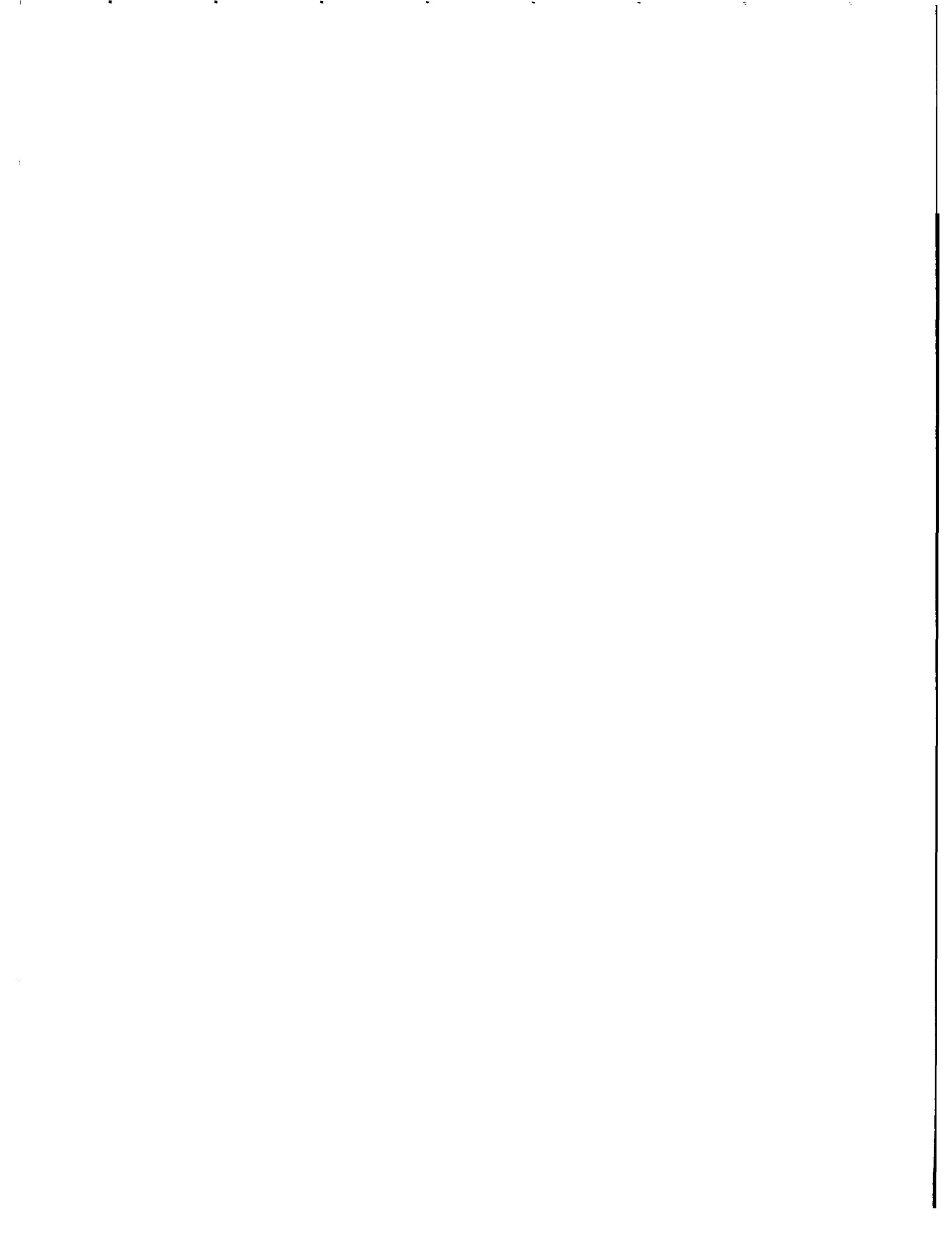


28. Inspectors have the authority to stop activities that are seen as damaging to the environment, suspend operations that violate environmental regulations or standards, impose penalties on violators, develop local programs of environmental protection and rehabilitation; relay

environmental information from surveys and monitoring to national information and data management agencies and systems; regulate and control activities of provincial commercial and industrial entities; and coordinate the activities of provincial environmental enterprises.









THE WORLD BANK
1818 H Street, NW
Washington, D. C. 20433 U.S.A.

Tel: 202-477-1234

Fax: 202-477-6391

Telex: MCI 64145 WORLDBANK
MCI 248423 WORLDBANK

Internet: <http://worldbank.org>

THE WORLD BANK
MONGOLIA OFFICE
Ulaanbaatar, 11 A Peace Avenue
Ulaanbaatar 210648, Mongolia