Ministry of Nature, Environment and Tourism, Mongolia

Korea Environment Corporation

Mongolian Nature and Environment Consortium

RESEARCH REPORT ON WASTE MANAGEMENT IN DARKHAN CITY, MONGOLIA

Prepared by: Ministry of Nature, Environment and Tourism of Mongolia

with cooperation of KECO

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Preface

The final report of Waste management study in Darkhan city was produced with great efforts of the relevant staff of the Ministry of Nature, Environment and Tourism of Mongolia and National consultant team from the Mongolian Nature and Environment Consortium. The research was carried out during August 2010 and January 2011. Several meetings held in Darkhan and Ulaanbaatar cities to discuss project planning, progress and completion of the final report.

The study was supported within framework of the Research Agreement signed on 12nd May, 2010 in Ulaanbaatar between Korea Environment Corporation and Ministry of Nature, Environment and Tourism. The purpose of the research was to assess existing solid waste management practices in Darkhan city and to carry out waste characterization feasibility study at waste disposal site.

Acknowledgements

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The report also benefited with great collaboration and assistance of the Government of Darkhan city, and representatives from the Public Utility Services Department and Nature, Environment and Tourism Authority of Darkhan city.

The unique onsite details contained in the report would not have been possible without contribution for the bagh, khoroo, kheseg /local administrative units/ and community leaders, as well as local residents, who volunteered their time to meet repeatedly with research team.

Summary

The Government of Mongolia attaches high priority to environmental protection and nature conservation. About 2 percent of annual GDP is allocated for the environmental protection including energy efficiency, sustainable use of resources, and reduction of environmental pollution and promotion of environmental public education programs. The Ministry of Nature, Environment and Tourism (MNET) is responsible for development and implementation of national environmental policies including policies and management on solid waste throughout the country.

Over the past few years, Mongolia have experienced trends towards increasing solid waste output, mainly due to concentration of the population in urban areas, increased consumption and changes to economic structure. There is no proper solid waste management practice is existing in Mongolia. Therefore inadequate waste disposal system creates huge problems on the environment and human health.

The law on "Environmental Protection" was enacted by the Mongolian Parliament in 1995 and the Government National Plan on "Waste reduction management" was approved in 1999. Several national policies have been developed and approved by the Government such as National Policy on Ecology in 2000, Law on Household and Industrial Waste in 2003 and Law on Hazardous and Toxic Chemicals in 2006. Currently the Ministry of Nature, Environment and Tourism is developing a Waste Reduction Action Plan which expected to get approval by the Parliament in 2011. In addition, the Nature, Environment and Tourism Authority of Darkhan city is completed "Darkhan-clean city" program which was adopted by the Aimag Representative's Khural in 2010.

However, the there is a lack of national coordination on waste management policies and the technical and human resources for the solid waste management in the country are inconsistent. Currently insufficient budget is allocated to the waste management at national as well as local level and poor public involvement, particularly NGOs and civil groups.

According to the waste management structure the local governments are responsible for overall management of industrial and domestic solid waste in Mongolia, although most local governing authorities have limited human resources or have neither sufficient financial resources nor the machinery or technology to properly manage waste. The implementation of the Government policy has been delayed, however, in all but areas around the capital city, due to sparse population and insufficient finances, as well as lack of knowledge and technology in relation to the management of waste.

In this connection, the Ministry of Nature, Environment and Tourism has submitted research proposal to the Ministry of Environment of Republic of Korea to seek for technical assistance to undertake the pilot research study on existing solid waste management in Darkhan city. The Government of Korea has accepted the request and the Research agreement was signed between MNET and KECO in May, 2010. The purpose of the research agreement is to assess existing waste management practices in Darkhan city and to develop further management options for the waste management practices for the city.

Currently, the apartment complexes of Darkhan city have relatively efficient waste collection transportation management systems. Separate transfer spaces are installed on the first floor of each building, and waste is discharged into those spaces by trash chutes directly connected to individual apartment units.

However, the Ger areas /traditional dwelling/ has poor waste management system. The current solid waste collection practices seem to be inefficient and costly.

The research study assessed solid waste management issues and the existing waste disposal site at “Baraat” in Darkhan city. The report included background on waste management and results and findings from the waste characterization study of Darkhan city. Based on our research finding we propose 4 project outlines for improving the waste management in Darkhan city.

Chapter I

Urbanization in Mongolia and Government policy on waste management

1.1. Urbanization in Mongolia

Mongolia is one of the most sparsely populated countries in the world, with 1.67 persons per square kilometer. Yet, the population is also remarkably urbanized. According to 2010 population census the total population is 2.7 million. About, 60 percent of the population lives in urban areas. The Capital city of Ulaanbaatar alone has over 1 million people. .Each of 21 aimags, including those with larger settlements, such as Darkhan (Darkhan-Uul aimag) and Erdenet (Orkhon aimag), has fewer than 5 percent of country's population. There are severalt highly urbanized aimags such as are Orkhon (91.9 percent urban), Darkhan-Uul (81.6 percent urban), Dornogobi (53 percent urban) and Dornod (50 percent urban).

Mongolia's urbanization has been both rapid and ad-hoc. The country had a majority nomadic population well into 20th century. Beginning of 1930s, a number of small towns emerged along and around railway lines, roads and power plants. Social services were provided mainly to the larger population centers. Ulaanbaatar, Erdenet, Choibalsan, Darkhan, Murun, and Khovd were among the first population clusters in the country. The socialist government provided economic subsidies to the remoter population clusters such as Khovd, and created some other larger towns such as Choibalsan as military bases, for political and military security reasons. Migration was strictly controlled until the New Democratic Constitution was approved in 1992.

In the last decade the Government of Mongolia has completed a rapid transition to a market economy, and to a democratic structure of government. As the centralized economy has fallen away, state subsidies and income supports have also declined, and this has, in part, contributed to a rapid movement of people toward urban areas. The Government has been unable to stem the flow of migrants to Ulaanbaatar and to other urban areas. Ulaanbaatar is both the political and economic capital of the country, attracting large numbers of migrants every year.

1.2. Demographic and Economic Profile of Darkhan

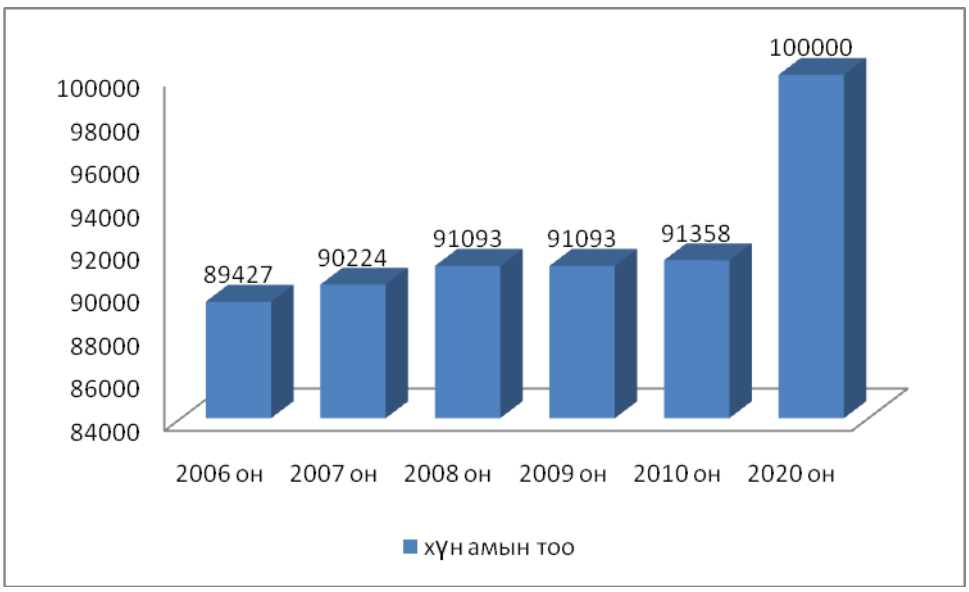
Darkhan is Mongolia's third largest city, with a population of 91,300 in 2009.

The 

Darkhan-Uul aimag has 4 soums /counties/. soums are Darkhan, Orkhon, Khongor and Sharyn gol. Darkhan soum is also named as Darkhan city or aimag center.

The city has three percent of the country's population and 85 percent of the population of entire Darkhan-Uul aimag.

At an annual population growth rate of 1.9 percent, city authorities project that population increase up to 100,000 by 2020. The increase in population is due to natural growth, as the city has been experiencing a net out-migration since 2003.



Graph 1. Demographic statistics of Darkhan

Mining and manufacturing industries in Darkhan city employ 19,000 people which is about 16 percent of the population of Darkhan aimag /province/. The construction industry, which once dominated employment, has declined and now employs only six percent of the labor force. In the last few years the economy has begun to diversify with investments in transportation, storage and communications which take advantage of the road and rail links to Erdenet and Ulaanbaatar cities.

Although the share of mining employment has fallen, Darkhan's economy is still dominated by the mining sector approximately 19 percent. Steel production and processing have experienced the greatest growth in the past few years. Lime quarrying, milk and milk products, and metal foundries have also experienced large growth. The size of these enterprises varies greatly, and not all have environmental assessments. In general, most enterprises are quite small, so very basic technology and employ very few people at low wages.

1.3. Government policy on waste management

Over the past few years, the Mongolia have experienced trends towards increasing solid waste output, mainly due to concentration of the population in urban areas, increased consumption and changes to economic structure. Since Mongolia have no proper solid waste management projects in place, the waste disposal creates huge problems not only on public health, but also on the country's ecology.

1.3.1. National Government policy on waste management

The law on "Environmental Protection" was enacted by the Mongolian Parliament in 1995 and the Government National Plan on "Waste reduction management" was approved in 1999. Several national policies have been developed and approved by the Government such as National Policy on Ecology in 2000, Law on Household and Industrial Waste in 2003 and Law on Hazardous and Toxic Chemicals in 2006. Currently the Ministry of Nature, Environment and Tourism is developing a Waste Reduction Action Plan which expected to get approval by the Parliament in 2011. In addition, the Nature, Environment and Tourism Authority of Darkhan city is completed "Darkhan-clean city" program which was adopted by the Aimag Representative's Khural in 2010.

Waste Reduction National Plan (1999). The National Action Plan on Waste Reduction action plan has been implemented since it's approval in 1999. Currently the Ministry of the Nature, Environment and Tourism is developing a new Waste Reduction Action Plan which is expected to get an approval by the Mongolian Parliament in 2011.

National policy on ecology of Mongolia. The National Policy on ecology was approved by the Parliament in 1997. The policy outlines the fundamental issues that ensures healthy and safe environment for the people of Mongolia.

The National policy on Ecology specifically identified the following objectives on environmental pollution and waste management:

- The protection of water, air and soil from deterioration is considered to be an essential condition for the conservation of pristine nature and ensuring the right of people to live in clean surroundings, and to preserve the environment from negative human impacts. Thus, the policy aims to help people establish considered and balanced links with their environment and to use natural resources in a rational way consistent with the environment's carrying capacity and potential.
- The abatement of air pollution in big towns stage by stage through improvement of the technological regime and demands for the protection of the atmospheric sphere from the impacts of radioactive, toxic and physically harmful substances, reduction of emissions of greenhouse gas and restriction of polluting sources shall be the highest priority objective to be carried out.
- Action shall be conducted with regard to establishment of zones to protect the sources of drinking water of urban areas, to ensure healthy living conditions, to encourage tree planting and gardening, to clean industrial and household waste water, to create water points for urban areas in the desert and steppe zones, to improve water quality, and to use solar, wind and water energy and other renewable energy sources.
- Activities shall be directed to proper treatment of household sewage, disposal of solid wastes; protection and prevention of urban soil cover from pollution, to urban gardening, establishment of urban green zones, rehabilitation of degraded land and their proper use.
- Efficient control shall be established on the implementation of guidelines to reduce the use of radioactive and toxic substances that have a negative effect on human health, environment, livestock and wild animals and to limit trade, use, transport, storage and import of certain toxic substances.
- Environmental safety shall be ensured through taking preventive measures against loss and release of radioactive and toxic substances that may occur during natural disasters, industrial and motor vehicle accidents and the addressing of their negative consequences.

The Law on Households and Industrial Waste (2003)

The purpose of this Law is to govern the collection, transportation, storage, and landfill of household and industrial waste and the reuse of waste as a source of raw materials to prevent and eliminate hazardous impact of household and industrial wastes on public health and the environment. (Unofficial translation of the Law on Household and Industrial Waste is attached in Annex 1).

According to the Legal review assignment done by UNDP funded "Environmental Governance" Project the followings have been identified as areas which require further investigation for legislative improvement include:

- Review powers of state and local administrative bodies and common rights and duties of individuals, economic entities and organizations;(article 6-10)
- Review procedures for waste disposal, collection, transportation, land-filling, and re-utilization;(article 11-16)
- Review procedures for a waste information database;(article 17)
- Review procedures for economical management of waste(article 18-21)
- Review procedure for monitoring implementation of legislation on waste and liability for breaches of the legislation;(article 22)

Law on Hazardous and Toxic Chemicals (2006)

The purpose of this Law is to regulate the export, import and transportation of toxic chemicals across borders of Mongolia and production, storage, trade, transport, use removal and control of toxic chemicals.

Some areas which require further investigation for legislative improvement identified by Environmental Governance project are include:

- Review classification of toxic chemicals;(article 4)
- Review regulation of activities involving use of toxic chemicals;(article 6.1-6.4)
- Review requirements to coordinate activities related to hazardous and toxic chemicals, including requirements for protection, transborder transportation, storage, sage, deposition, admissible levels, estimating risks;(article 8-17)
- Review control of use procedures;(article 18)
- Review penalties for violation of legislation on hazardous and toxic chemicals;(article 19)
- Review procedures for deciding compensation for damage;(article 20)
- However, the equipment and institutional structure for collecting and recycling solid waste are inadequate. The centralization of population has significantly increased and household and industrial waste amount has increased substantially, becoming a major source of environmental pollution.

1.3.2. The Darkhan city Government's policy on Waste Management

The Local government of Darkhan has developed "Darkhan –clean city" program that was adopted by Darkhan Citizens Representative's Khural in 2010. The Programme covers the period from 2010 to 2014. (Unofficial translation of this program is attached in Annex1).

This programme has three objectives as follow:

Objective 1. Establish an efficient and suitable for Darkhan-Uul aimag system that seperates wastes at original sources:

- To develop methodology to identify amount, types, structures of solid wastes from apartments, ger or peri-urban district, enterprises and plants and to conduct necessary studies to define waste structures, quantity, and density etc;
- To build database for Aimag wastes with regular registration of solid wastes from households, businessess (restaurants, hotels etc) and plants; procedures for registration of solid wastes shall be developed accordingly;
- To implement pilot projects of waste seperation at selected demonstration bags and districts and select the optimum alternatives suitable for peri-urban districts, apartments and enterprises;
- To run specific site for collection of secondary raw materials in order to support voluntary waste and raw material collection and sales by individuals and residents;
- To increase involvement of enterprises in seperation of secondary raw materials at original sources through locating specific waste seperation tanks (bins) at the shops, supermarkets, service providers and in the streets;

Objective 2. Establish waste recycling plant through implementing projects to re-use, restore, and recycle household and industrial wastes and secondary raw materials

- Adopt economic tools suitable for local conditions to motivate less emission of wastes and efficient use of resources in production, services and other sectors at the local level;
- Run regular site for exchange, sales and of used stuff (books, clothings, newspapers, journals,home furnitures etc) and information /introductions and advertisements of entities collecting secondary raw materials/ in order to support waste seperation, recycling, restoring and production with participation of residents and individuals;
- Study types, quantity and structure of local secondary raw materials and financial abilities of potential enterprises and inviduals to buy and reuse these along with recent

techniques and technologies and to built waste recycling and restoring plant;

- Implement projects of waste recycling, procesing and restoring based on waste composition (structure) from peri-urban areas, apartments, enterprises and public places /e.g.: project to separate and process organic wastes, main raw material of fertilizer, at household and restaurants /;
- Support enterprises running temporary storage, collection and transportation of secondary raw materials.

Objectives 3. Improve temporary storage, collection, transportation and disposal of solid wastes.

- Transport all solid wastes from enterprises, public organizations and households;
- Modernize waste disposal routine of enterprises;
- Improve current services of waste collection, storage and transportation;
- Locate waste collection and storage sites in consideration of specific conditions of peri-urban, enterprises, public areas and apartments respectively;
- Increase public awareness with distribution of manuals and training pamphlets about efficient management of solid wastes – with specific dates and schedules for seperation, temporary storage, and transportation of solid wastes;
- Review and adopt new routines and schedules for cleaning wastes in nearby areas of public property, enterprises and residential apartments and make sure regular cleaning and waste collection;
- Estimate costs for waste collection and cleaning of lands used by enterprises and individuals for purposes such as unfinished construction and garages and collect costs from them;
- Promote public officers, apartment ownership committee, governors of Bags and Soums, other public organizations, enterpirses and individuals for their accomplishments and efforts made in improving waste management in local areas;
- Announce "WASTELESS DEMONSTRATION ORGANIZATION" competition amongst bags, apartment ownership committees, individuals , enterprises and plants with no open waste sites;
- Improve solid waste disposal method of landfill.

The following principles will be adopted into the programme implementation.

1. Make sure consistency with main priorities of policy documents of the Environmental strategies, and other regulatory documents on waste management issued by the international

and domestic organizations in Mongolia;

2. Carefully define partnership type for state and private organizations;
3. Adopt “Polluter pays” principle and increase social responsibilty of individuals and enterprises concerning the wastes;
4. Enable participation of state and community in reduction of waste amount, and reuse and process waste

There was established special committee that shall be in charge of management and reinforcement of the programme, reporting to the Aimag Governor on a seasonal basis. This newly established Committee shall take the following actions:

- Provide consultancy on identifying waste dump sites of disposing household, industrial and hazardous wastes according to the Major Land Planning of the respectiva aimags and soums;
- Develop procedures for evaluation and financing of waste collection, transportation and disposal activities carried out by individuals and enterprises and content of an agreement to enter with respective Soum and District Governors;
- Provide assistance in selection of individuals and enterprises involved in waste disposal business according to the procedures approved by the Environmental public authority;
- develop procedures for registration of solid wastes from households, businesses (restaurants, shops and hotels) and industries

Chapter TWO

Environmental services of Darkhan city

In 2003, about 37 percent of households lived in ger communities, covering 444 hectares area of land. The ger areas in Darkhan city are similar to those in other urban centers. Solid waste collection is poorly developed and limited therefore the garbage disposal is seen as a major problem. However, according to the City Development Strategy the available land area that has access to all utilities, and privatization and titling of lands in Darkhan city is ahead of the national average. As of December 2004, 36 percent of the planned land privatization had been completed and 64 percent of the privatized plots were allocated for new occupation. It is unclear whether these plots were built up by new immigrants or by people moving out of apartment homes into single family dwellings and whether these homes had access to environmental services. The privatization of plots has made land too expensive for many poorer rural immigrants who will continue to settle on the outskirts of towns where no amenities are available.

2.1. Water Supply

Darkhan city is supplied with 18 ground water wells located along the Kharaa River. Of these wells, seven are used for residential water supply and total of 25000-27000m^3 water is pumped daily for Darkhan city water consumption. Water is supplied by Darkhan Us Suvag Co Ltd, a joint stock company that handles both water supply and sanitation.

The power plant in Darkhan city consumes 37.8 percent or 2,500,000 m^3 of water from underground wells, 160,000 m^3 used for Cement production industry, and 150,000 m^3 water used for Sheep skin processing factory, and rest used for other small industries and residents. In addition the river also a major source of water for the city. Local herders and ger area residents those live along the Kharaa River use water directly from the river for drinking and household purposes. Since 1995, city's water consumption has increased five times, and the water table has been falling steadily.

Water distribution fee is 3.79 MNT /Mongolian currency Tugrug/ per liter for the city and 1.0 MNT per liter for ger areas, which supplied by local kiosks where water transported by truck equipped with water tank. The majority of the population (72.7%) has access to the central water supply network; the rest uses water kiosks and surface water for drinking.

2.2 Sewage and Sanitation

In ger areas, the sanitation facilities consist of on-site pit latrines. Many of these latrines are inadequately maintained, and waste removed seldom from the plot. Overflowing latrines are a major source of pollution in ger areas of the city.

Apartments and office buildings are connected to proper sanitation facilities. The total capacity of the wastewater treatment plant /WWTP/ is 50,000 m^3 per day, but the actual treatment ranges around 15,000-17,000 m3/day. In addition, the chlorinating equipment has broken down for sometime. The WWTP discharges into the Kharaa River through 12 oxidation ponds and a bio-aquifer. Periodically, chromium-6 enters the WWTP, reducing the effectiveness of the treatment. The Thermal Power Company is the largest user of water and it has its own treatment facility. The treatment facility often encounters technical problems and untreated industrial waste water often discharged into the area outside the plant. This area is largely residential, and close to the ger district. The Environmental Report issued by the local government argues that this pollution contributes to the higher incidence of disease among ger residents in the vicinity of the plant.

In addition to residential and industrial waste, gold mines close to the Sharin-Gol River also discharge waste water directly into the river without any treatment.

2.3. Water quality

Surface water quality is inspected in environmental laboratories in the Central Water treatment plant, local water treatment plants, sheep skin processing factory and thermal power plant water treatment plant. There are several national standards have been applied for surface water quality and waste water treatment requirements. However, the enforcement is poor due to the low human and technical capacity of Environmental Inspection Agencies of the city. The water quality indicator of Kharaa River is shown in the table below.

Table 2.3.1 Kharaa River Quality Indicators

Parameters / Years	2000		2001		2002		2003		2004	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
pH	8.40	7.80	8.30	7.30	8.22	7.56	8.10	7.24	8.18	7.59
Suspended Solids,	105	10.0	83.4	4.5	260	9.5	137	22.0	209	1
Dissolved Oxygen,	12.	7.80	7.35	11.70	12.40	7.20	12.40	7.04	11.0	8.28
BOD, mg/1	5.6	1.1	5.1	1.3	3.5	1.3	5.3	1.2	6.5	0.8
COD-Mn, mg/1	2.9	1.0	6.0	1.4	4.5	1.1	5.9	1.4	4.8	1.0
S04, mg/1	66.2	19.6	50.4	12.6	59.7	28.0	52.4	29.7	55.6	9.3
CL,mg/l	24.8	7.4	19.1	4.3	23.0	7.1	10.6	« c	21.3	6.4

Total Dissolved Solids, mg/1	399	288	364	250	360	286	336	262	359	166
Hardness, mg-eq/1	3.62	2.40	3.20	2.44	2.86	1.79	3.24	1.79	3.43	1.68
NH4-N, mg/1	0.87	0.08	0.99	0.04	0.40	0.05	0.64	0.09	1.63	0.03
NO2-N, mg/1	0.020	0.002	0.097	0.002	0.096	0.004	0.139	0.00	0.024	0.003
N03-N,mg/l	1.10	0.02	0.65	0.04	1.59	0.08	1.05	0.16	0.73	0.08
P04-P, mg/1	0.416	0.016	0.188	0.022	0.176	0.028	0.161	0.014	0.161	0.020

Source from: Engineer the CLEM Y, Erdenebayar, Power plant in Darkhan, Source PADCO

2.4. Air quality

Air quality deteriorates significantly in winter months when there are regular exceed of ambient nitrogen oxide. Air pollution is seen as main problem in ger areas where incomplete combustion from household stoves presents major health risks. According to City Government reports, dust from construction companies is also serious problem. However, local authorities do not sample for suspended particulate matter or total suspended particulates.

Low rainfall during the summer months limits grass growth throughout Darkhan city territory. The lack of rain and grasses causes the soils to become dry and dust levels become highly increased.

Air test results showed that average sulfur dioxide concentration was 0.011 mg/m^3, nitrogen dioxide concentration was 0.035 mg/m^3, and carbon monoxide concentration was 0.423 mg/m^3.

Table 2.4.1 Concentration of air pollutants

	Average concentration mg/m3	**Maximum concentration mg/m3**
Dust	0.423	1.069
Sulfur dioxide SO2	0.011	0.148
Carbon monoxide CO	0.423	5.12
Nitrogen dioxide NO2	0.035	0.125

2.5 Land and soil degradation

According to the State of the Environment of Darkhan city that published by the local government, the soil pollution and erosion have become major problems. Grasslands have been diminishing as a result of overgrazing and three consecutive year droughts. Only 30 percent of the total land area of Darkhan city has some sort of vegetation on it. Forest resources are also declining. Currently 73.6 thousand hectares of forest have been destroyed due to illegal logging and forest fire. Ger areas on the banks of the river extensively use trees and shrubs for housing and firewood.

2.6. Mining pollution

The Shariin Gol coal deposit is located 75 km southeast of Darkhan city. It is an open pit mine, which began operating in 1965 with a total capacity of 2.5 million ton/year coal production. The mine occupies an area of 580 ha. It comprises one open pit, one large and several smaller waste rock piles. Presently the open pit covers an area of 300 ha and extends to a depth of 200 m below ground surface. Water inflow is collected in a sump and removed at unknown rates and quality.

The deposit is covered by 100 meter clay stone overburden. Coal is mined in two seams, which are 4 to 50 meters thick. The average thickness is 28 meters. The two seams are separated by a 2 to 30 meter thick layer of sandstone and siltstone. Coal quality is good (20% ash, 0,9% sulfur, 71s30 kcal/kg heating value). Mining involves drilling, blasting excavating and hauling. The mining equipments include blast hole drills, electric cable excavators and an in-pit railway. Waste rock is produced at a rate of 4.5 million m^3/year, and it is dumped in the immediate vicinity of the open pit.

The waste rock piles contain 210 million m^3 earth materials. Reclamation at the mining has not started yet. The mine plans flattening the waste rock piles. At the current production rate the estimated remaining lifetime of the mine is 20 years. The mine employs 1,000 workers and supports a small town in the immediate vicinity. In October 2003, the Russian company KRASO purchased 80 percent of the state-owned shares in the Shariin Gol Stock Company and plans to implement measures aimed at reducing the environmental impacts of this mining operation.

Acid mine drainage from waste rock piles may pose a long-term risk at Shariin Gol. An overall decommissioning plan showing the final topography after waste rock pile reclamation and restoration of the hydrological regime is yet to be established. Apparently the Shariin Gol operating license does not contain discharge and effluent limits. Up to 2000, the mine operated without any local control. Only since 2000, after the introduction of new regulations, the mine is obliged to coordinate its activities with the aimag and soum authorities. In Darkhan-Uul Aimag, a committee consisting of the Vice-Governor, the mine inspector and a sum representative review a mining license application and advise the cadastre department of the MRA.

Other significant issues are the rehabilitation of the waste rock mines and water management. The reclamation of waste rocks has been under discussion for two years; however, no action has been taken yet. According to the mining inspector of the Darkhan-Uul Aimag, the Shariin Gol mine is run without proper environmental monitoring program although pertinent legislation is in place.

Chapter THREE

3.1. Current situation of solid waste management in Darkhan City

Solid waste generation in Darkhan city has been increasing during 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 Darkhan city.

In multi-storied apartment buildings, the solid waste is deposited in a room on the ground floor and collected by waste management local companies. In areas with lower buildings and individual houses, community bins are available for each block. Solid waste from these areas is collected twice a week. However, in reality the 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. Most of access 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.

Until 1990, outdoor burning was commonly practiced as a method of waste disposal throughout the country to reduce household waste quantities and also to separate recyclable material from waste. Concerns about the impact of this practice on air quality led to its banning nationawide. 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 to human health. Hazardous waste from the hospitals is commonly burned in special parts of the dumps, causing soil and groundwater pollution. Solid waste dumps remain unregulated have 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.

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.

Darkhan city has the Baraat central waste disposal site and other unofficial five disposal sites. The Baraat disposal site is located in northern area of the city and 15 km from Darkhan city. Solid waste sorting activities is not in the all level and landfilling in Baraat disposal site.

Figure 3.1.1. Baraat waste disposal site

Figure 3.1.2. The office building of Public Utility Service Department

The Public Utility Service Department is responsible unit for collecting and transporting solid waste from apartments, ger area, offices, restaurants, shopping centers and street cleaning in Darkhan city.

The Public Utility Service Department was established by the Decision of the Presidiums Meeting, dated on April 11, 1999 and the order No.92 of the Governor of the Province of 1999. The Department employs 160 workers. It also owns 9 dump trucks. The main types of activities are:

- Cleaning of roads and squares
- Transporting and removing the household or industrial waste
- Maintenance and rehabilitation of the streets, public territories, green areas

The major task is collection of solid waste from households, hotels, restaurants, canteens and commercial and administrative buildings directly from the streets. There is no sorting of solid waste at collection stage. All solid wastes are transported without sorting to the disposal sites. In addition, there is none official recycling program in place.

In 2007 the City has developed and implemented a project on furnishing the centralized solid waste center financed by the Ministry of Nature, Environment and Tourism. At the request of the Ministry the Institute of Geo-ecology of the Mongolian Academy of Sciences developed general guidelines for landfill facility in Mongolia. Through the financial support from the Ministry in 2008 the solid waste at site was removed into smaller are in order to minimize the area under disposal site and some rehabilitation and tree planting was done as well.

The total territory of the centralized solid waste center is 15.02 ha, the average amount of waste per person out of the 91.3 residents is 0.05 m^3, per day 200 m^3 of waste.

Figure 3.1.3. Clearing 31 ha disposal site with the Project supported by the Ministry

Figure 3.1.4. Rehabilitee in 24 ha and 8400 trees planted and built fences around 15 ha areas during the project

Part of the project investment the following equipments were provided to the Public Utility Service Department:

- Universal tractor
- Trigger car
- Dislodge and load car
- Large scale

Today, daily 24-32 truck or 190-230 m3 solid waste regularly transported to the disposal site.

In 2010, totally 8 waste transportation trucks and 9 loaders have been used for implementation of waste management plan. Within the municipality, only 8 inspectors are employed for inspection of waste transportation from housing regions. Another 8 inspectors are responsible for waste removal from ger districts. Employees are scheduled to work 5 days a week as it is constituted in Labor law of Mongolia.

In order to ensure the implementation of the Law on Household and Industrial Waste at the municipal level 16 bag governors and 28 directors of Association for housing owners has been contracted to remove waste at the daily basis with 71 % of total households in housing regions and ger districts, and 85 % of total organizations and legal entities operating within the municipality. This activity showed quite effective results by reducing the number of violations related to waste generation in the public areas, along the gullies and roads.

The budget allocation for waste management is at national and municipal level still very limited. Existing system for collection of fees is ineffective especially in rural areas. 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.

The fee for waste generation was by Darkhan soum governor's order #328 dated from 2nd September, 2004. In accordance with the established rate each household has to pay 2200 tugrugs per 1m^3 or approximately 0.25 tons of waste depending on its volume and density.

The schedule for removal of waste from individual families is approved by bag governors and monitored by the office. Currently, only about 80 percent of total households in ger district follow the approved schedule and well cooperate bag governors, which positively influenced on reduction of waste in public areas. In the apartment building districts, the municipality signed the contract with Associations for apartment housing owners to transport waste generated in 328 specialized points. Approximately, 320 m3 of waste daily, 4977.8 m3 monthly and 39231 m3 annually transported from these points to the Baraat waste disposal area. It is obvious that the reduction of household and industrial waste, especially its generation in public area depend wider participation and acknowledgements of local residents and administration of organizations and legal entities in waste removal service programs. However, there is an increase of total volume of waste from year to year which can be explained by increased willingness and interest of local residents in number of people urban population and development of waste collection programs. According to the survey results

done in 2002, the total annual waste load was 5249 tons, however the data might have been underestimated due to lack of designated official disposal site at the time.

The following table shows the amount of fees collected from transportation of urban waste during the last 5 years. From the table it is seen that the fees collected from transportation is increased which may indicate the expansion of such activities within the city. Moreover, such increase also may have a correlation with expansion of ger district within the research area.

Table 3.1.1 The amount of fees collected, million tugrugs

	2006	2007	2008	2009	2010
Annual gain	54.5	60.1	89.1	91.0	106.0

Source: Public utility service department

In 2010, the roaster facility was settled in the General Hospital of Darkhan city for burning hospital's hazardous wastes and extinguishing wastes of more than 30 state and private hospitals of the city.

Figure 3.1.5. Hospital's roaster

On May 17th, 2010, 'Darkhan clean city' waste management program was approved by the Citizens Representative Meetings of the Darkhan-Uul Province. The program implementation period is 2010-2014.

Chapter FOUR

Waste characterization study, Darkhan city

4.1. Waste characterization methodology

Collection of Samples

Samples were collecting at the City's main disposal site to study the composition of waste and estimate daily production of waste generated by the city.

The composition of waste delivered by waste dumping trucks was determined by manual sorting of samples collecting from the vehicle loads. The loads were coded according to districts and type of sources. The sources types were as follow:

- residential (apartments and single family);
- ger areas;
- commercial (offices, shopping centers and restaurants);
- streets

The following personnel and methods were used for the study:

Personnel:

1. eight personnel for sorting 8 hours per day
2. two personnel for collecting the samples at the disposal site
3. bulldozer operator
4. driver for vehicle used to transport samples
5. two supervisors (one at the disposal site and one at the sorting area)

Equipments:

1. temporary use of enclosed area to perform the sorting process
2. front-end loader to aid in sample collection
3. weigh scale capable of reading from 0 to 60 kg (in 0.1-kg increments)
4. two shovels, preferably wide-mouth shovels
5. two rakes
6. twenty 120- to 200-liter drums and twenty 60- to 80-liter pails to store segregated materials for weighing
7. one 1 x 1 m sheet of 2 cm plywood for use as a base on which to set the weigh scale (or a solid, level area in a building)

8. safety equipment for the sorters
9. drinking water
10. vehicle and operator to transport samples from disposal site to sorting area
11. safety equipment for the sorters, including: gloves, fiber masks, and a first aid kit

4.2 Field Sorting

Methodology

The methodology used in the study was adopted from the Method for Determining the Composition of Unprocessed Solid Waste promulgated by the American Society for Testing and Materials (ASTM), Method D5231. A description of the methodology follows:

Preparation

1. A flat and level area was identified for discharge of the vehicle load. The surface should be swept clean or covered with a clean, durable tarp prior to discharge of the load. It is important to select a location for discharge of designated loads, manual sorting activities, and weighing operations that is flat, level, and away from the normal waste handling and processing areas.
2. The scale was placed on a clean, flat, and level surface and the level of the scale was adjusted as needed.
3. The accuracy and operation of the scale was checked with a known (i.e., reference) weight. All weigh scale equipment was calibrated according to the manufacturer's instructions. Appropriate corrective action was taken when the readings were different than the calibration weights.
4. Arrangements were made for delivery of waste to sorting location. The test plan was used as a guide to select vehicle loads for sampling. Selection of the vehicles and routing method to the sorting area was coordinated with supervisors, etc., at the facility, as well as from the various bags as required, in order to assure that selected vehicles found their way to the location where the sampling took place. The number of samples for each waste source was in accordance to the test plan. The field supervisor obtained the vehicle information and instructed the driver where to discharge the load. At least one load was kept in inventory so that the sorting crew was not idle waiting for material to sort. Every effort was made to collect weights of 100 to 150 kg for sorting samples of unprocessed solid waste.

Sorting

1. Vehicles for sampling were selected at random during each day of the sampling period. Vehicles

were selected that had been assigned to collect waste from specific areas on a given day. The waste was selected based on source (bags) and type of generator: residential (apartments and single family dwellings), ger areas, commercial (offices, shopping centers, and restaurants); street cleaning; and hospitals.

2. The designated vehicle containing the load of waste was directed to the area secured for discharge of the load and collection of the sorting sample.
3. The vehicle operator was directed to discharge the load onto the relatively flat, clean surface in one continuous pile, i.e., to avoid gaps in the discharged load.
4. Required information was collected from the vehicle operator prior to the vehicle leaving the discharge area and the discharged load was labeled for the purpose of maintaining its identification as other loads were discharged nearby.
5. The bulldozer operator was asked to collect 100 to 200 kg samples from two different sections of the load and to deposit them on the ground.
6. Once the samples were on the ground, the sampling crew divided the mix in half, and collected one of the halves. If an oversize item constituted a large weight percentage of the sorting sample, a notation on the data sheet was added and the particular item weighed.
7. The storage containers were positioned around and conveniently close to the sorting sample.
8. All containers such as capped jars, paper bags, and plastic bags were opened and emptied of their contents.
9. The sorters were instructed to remove the various categories of materials (i.e., components) and place them in their respective containers.
10. In the case of composite items found in the waste, individual materials where separated when practical and the individual materials were placed into the appropriate storage containers. Where impractical, the composite item was segregated and classified according to the following order:

    a. If there were many identical composite items (e.g., plastic-sheathed aluminum electrical conductors), the materials were placed into the waste component containers corresponding to the materials present in the item and in the approximate proportions according to the estimated mass fraction of each material in the item.

    b. If there were only a few identical composite items, they were placed in the storage container corresponding to the material that comprised, on a weight basis, the majority of the items (e.g., bi-metal beverage cans were placed in the ferrous container).

11. Once all of the large particles were removed, the sorters used a shovel, brush, dustpan, and screen to remove the fine material from the residue. The material that passed through the 2.5 cm screen was considered "fines" and the material that remained on the surface of the screen (the overs) was further segregated into the various categories. Sorting was continued until the maximum particle size of the remaining waste particles was approximately 1 cm.

12. The remaining particles were apportioned into the storage containers corresponding to the waste components represented in the remaining mixture. The apportionment was accomplished by making a visual estimate of the mass fraction of waste components represented in the remaining mixture.

Figure 4.1.1 Apartment buildings waste transported in disposal site

Figure 4.1.2. Collecting sample

Figure 4.1.3. Sample sorting

Figure 4.1.4. Sample sorting

4.2. Results of Study

A total of 15 samples were taken and analyzed during the waste characterization program.

The quantity of waste delivered to the disposal sites was calculated using the number of the dumping truck along with bulk densities of the various types of waste generated in Darkhan city. The results of the truck counting for the summer were used to estimate the waste delivered to the disposal sites on a yearly basis.

Table 4.2.1 Summary of waste quantity, Darkhan city (tons/year)

Source	Ger area	Apartments	Offices, shopping and restaurant	Construction	Other	Totals
2006	5400	10400	4780	540	1080	22200
2008	6780	10990	7300	280	950	26300
2009	10210	11450	7680	168	-	29508
2010	12790	11780	8400	430	22250	35830

Source from: Data of Public Utility Service Departments, engineer Lkhamsuren.O

According to our observations, the volume of domestic waste increases in certain months due to various reasons. For instance in February, because of Tsagaan sar holidays, May and July because of celebration of extended to National Festival “Naadam” and other public events, and from September when all schools start. The quantity of waste delivered to the disposal sites is summarized in Table 4.2.2. The data in the table shows four types of sources divided by component in tons per year. As shown in the table, based on the data obtained from the waste characterization survey and from the truck counting, the Darkhan city disposed approximately 49640 tons of waste in 2010. The report developed by the Department of Public Service on annual waste disposal rate shown much less results comparing to what we observed. This may caused by inaccuracy in researches due to the monitoring of waste disposal was done in beginning of September when the volume of waste spontaneously increases. Using a total population of approximately 74450 people of Darkhan city, the per capital waste disposed at the landfill is about 1,8 kg/day. Based on the level of collection coverage combined with the error that may have been introduced in the estimates through the truck counting (+/- 20%), we can project that the amount of waste disposed in Darkhan ranges between 1.8 and 2.0 kg-per capita/day.

Table 4.2.2 Waste Quantity and Composition by Sources, 2010 (tons/year, wet weight)

Source	Apartments	Ger area	Offices, shopping, restaurant	Street	Totals
Paper	1057.33	744.6	2283.44	297.84	4383.21
Cardboard	2730.2	282.948	2591.21	620.5	6224.86
Glass	1588.48	819.06	2874.16	397.12	5678.82
Metal	1022.58	1027.55	357.408	248.2	2655.74
Plastic	953.088	794.24	1360.14	0	3107.46
film plastic	1444.52	1384.96	1747.33	248.2	4825.01
wood/green waste	680.068	868.7	1653.01	1.092.08	4293.86
animal remains	585.752	1310.5	1002.73	0	2898.98
other organic	1007.69	2874.16	412.012	516.256	4810.12
other inorganic	694.96	5544.79	819.06	0	7058.81
HHW	238.272	387.192	665.176	0	1290.64
mixed waste	610.572	794.24	511.292	496.4	2412.5
Total	12613.5	16832.9	16277	3916.6	49640

In order to calculate annual solid waste quantity we used amount annual solid waste quantity of transported to disposal site and sample waste's density not including winter waste quantity.

To compare with earlier years the quantity of waste delivered to the disposal sites in 2002 is summarized in Table 4.2.3.

Table 4.2.3. Waste Quantity and Composition by Sources, Darkhan city, 2002 (tons/year)

Waste composition	Apartments	Offices/shopping	Ger area	Totals
Paper	512.5	94.015	244.12	850.635
Glass	132.83	82.78	13.95	229.56
Metal	149.2	21.345	22.675	193.22
Plastic	352.19	54.08	32.8	439.07
Organic	1359.07	193.17	233.465	1775.305
Inorganic	650	227.105	940.2	1817.305

HHW	17.32	3.165	2.365	22.85
Special waste	9.695	1.725	50.5	84.77
Totals	22418.3	24564.5	23615.5	**5249**

Source from: Waste characterization study in Darkhan, 2002, WHO

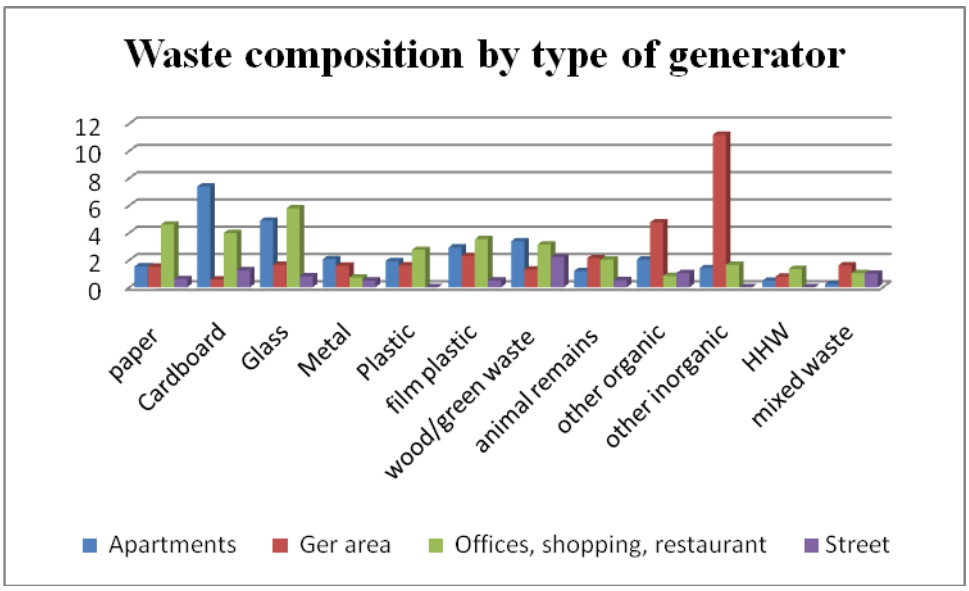
Below Table 4.2.4 summarizes main waste types by sources in percentage. It shows that offices, shopping centers and restaurants (31.34%); ger areas (30.9%); apartments (29.37%); street (8.4%) of the waste were collected. It is important to note that during the winter periods ash totals more than half of waste generated in the ger districts.

Table 4.2.4 Waste Composition by Sources in percentage

Source	Apartments	Ger area	Offices, shopping, restaurant	Street	Totals
paper	2.13	1.5	4.6	0.6	8.83
Cardboard	5.5	0.57	5.22	1.25	12.54
Glass	3.2	1.65	5.79	0.8	11.44
Metal	2.06	2.07	0.72	0.5	5.35
Plastic	1.92	1.6	2.74	0	6.26
film plastic	2.91	2.79	3.52	0.5	9.72
wood/green waste	1.37	1.75	3.33	2.2	8.65
animal remains	1.18	2.64	2.02	0	5.84
other organic	2.03	5.79	0.83	1.04	9.69
other inorganic	1.4	11.17	1.65	0	14.22
HHW	0.48	0.78	1.34	0	2.6
mixed waste	1.23	1.6	1.03	1	4.86
Total	25.41	33.91	32.79	7.89	100

Below graph indicates the waste type percentage by major sources. It is very clear from the graph that the ger districts are a main organic waste generator.

Graph 4.2.1 Waste Composition by Sources



Below Table 4.2.5 shows waste moisture estimated in summer and winter of 2002[1] under WHO project. Our study is conducted this summer season only. The rain passed just day before our survey in Darkhan city it may add value to moisture results in our study this summer. To compare the moisture of waste with 2002 results it was difficult to distinguish without known weather condition of that time.

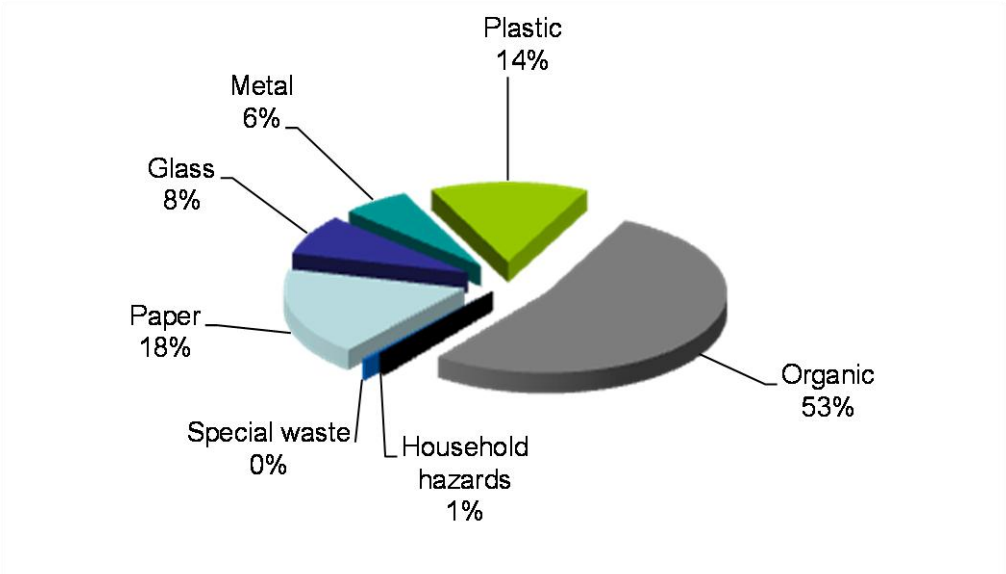
Table 4.2.5 Moisture of waste in summer and winter 2002 and summer 2010

Composition of waste	Moisture %, summer	Moisture %, winter	Moisture %, summer of 2010
Paper	17.01	27,76	21.04
Cardboard	2.29	5.99	2.79
Film plastic	3.59	13.4	4.5
Wood/green waste	22	9.76	19.3
Food remains	39.85	20.2	34.75
Other mixed	22.43	11.4	18.98
Other organic	23.08	9.7	22.50
Mixed paper	13.69	10.5	10.75
Mixed waste	1.23	1.6	1.35
Total	16.13	10.31	15.10

[1] Report of Waste characterization study in Darkhan city, 2002, WHO

Based on WHO project the waste composition by percent in 2002 is shown in below graph 4.2.2. According to the graph the waste composition as follow: 53 percent of total waste is organic, 18 percent is paper, 14 percent is plastic, 8 percent is glass, 6 percent is metal and 1 percent is household hazards waste.

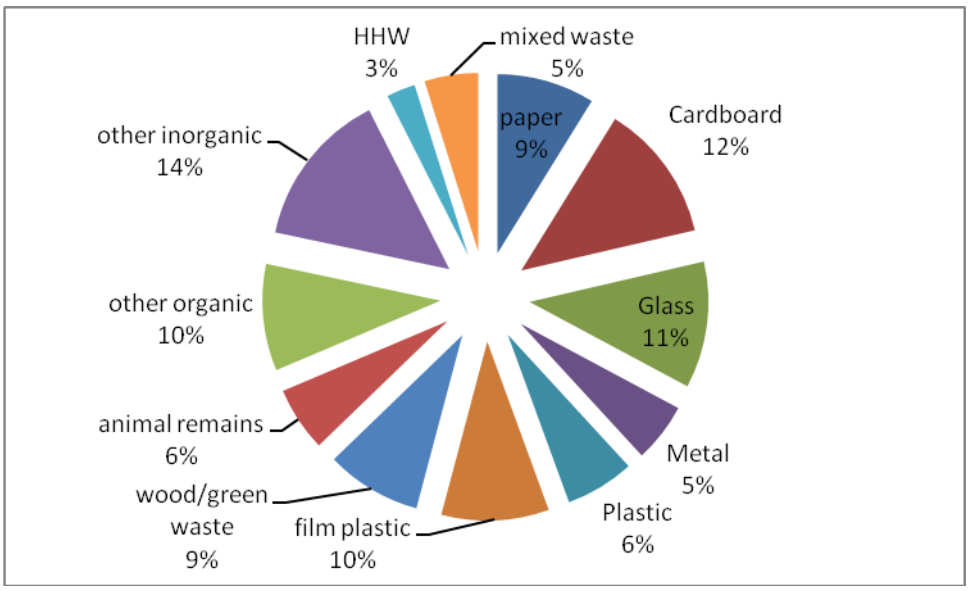
Graph 4. 2.2 Waste composition by percentage, Darkhan city, 2002



Source from: Report of Waste characterization study in Darkhan city, 2002, WHO

Based on our study we estimated the waste composition in percentage by main types. Below Graph 4.2.3 shows the percentages.

Graph 4.2.3. Waste composition by percentage , Darkhancity, 2010



Total waste composition by percentage assessed in 2002 and 2010 summarized in Table 4.2.6. The waste composition changes were observed in paper, glass, plastic and inorganic waste which were slightly increased in 2010. Due to increase of computers, printers and copy machines comparing to 2002, the volume of paper and hazardous waste have increased. The same can be explained about plastic bags and packages which are mainly related to increased consumption of bottled drinks by people, plastic bags in supermarkets and other. The increased volume of non-organic waste maybe relevant with augments in infrastructure sector mainly determined by construction of apartments and other buildings.

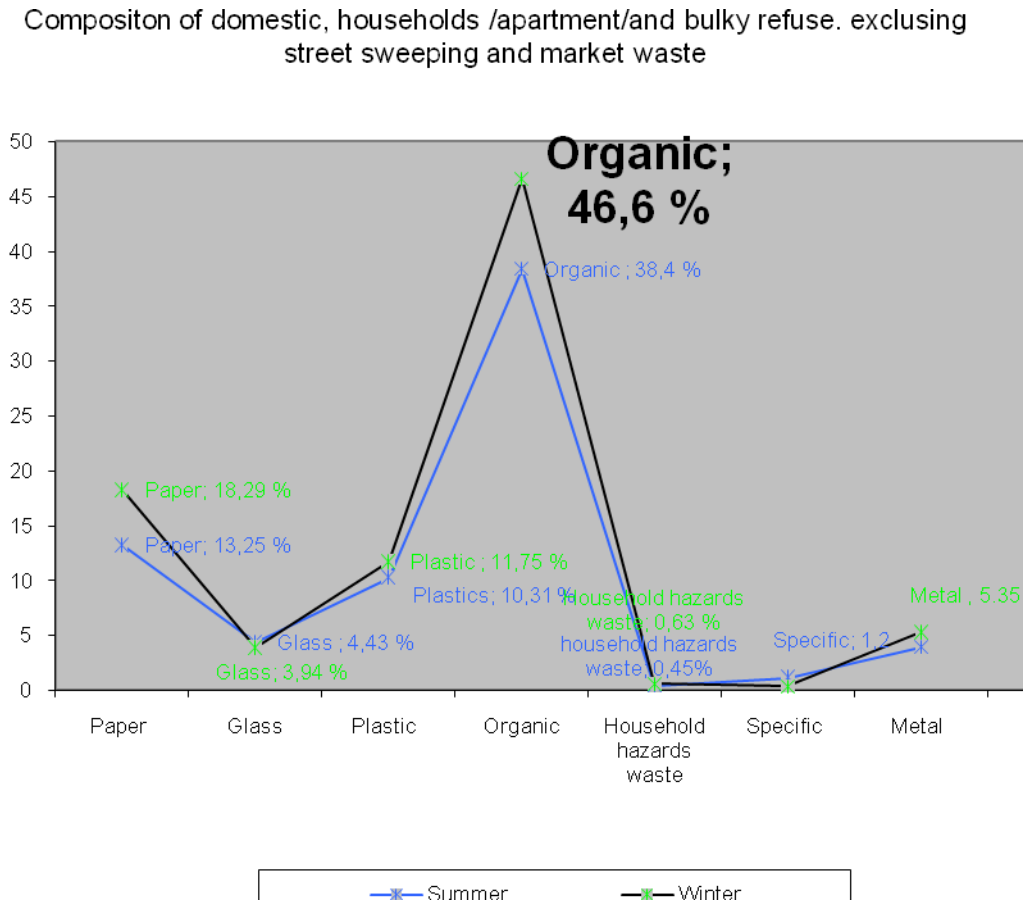
Table 4.2.6 Waste composition by percentage 2002 and 2010

Composition	2002	2010
Paper	18	21.37
Glass	8	11.44
Metal	6	5.35
Plastic	14	15.98
Organic	53	24.18
Inorganic	-	14.22
HHW	1	2.6
Mixed	-	4.86

4.3. Waste composition by Sources of Darkhan city in 2002 and 2010

Waste composition generated in apartment districts by percentage in summer and winter seasonsin 2002 is shown in below Graph 4.3.1

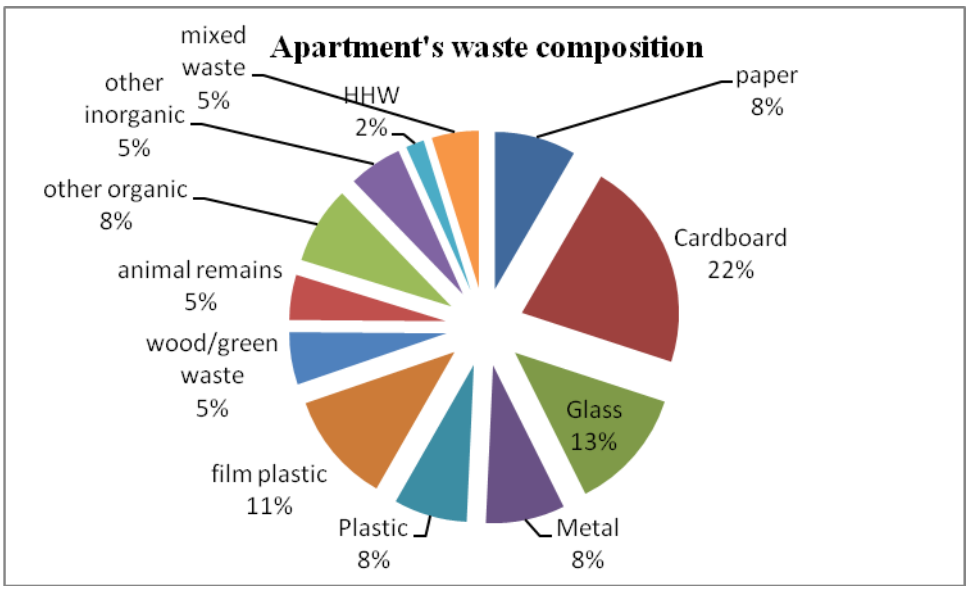
Graph 4.3.1 Apartment' waste composition, Darkhan city, 2002



Source from: Report of Waste characterization study in Darkhan city, 2002, WHO

Waste composition generated in apartment districts in 2010 by percentage is shown in below Graph 4.3.2.

Graph 4.3.2. Apartment' waste composition, Darkhan city, 2010



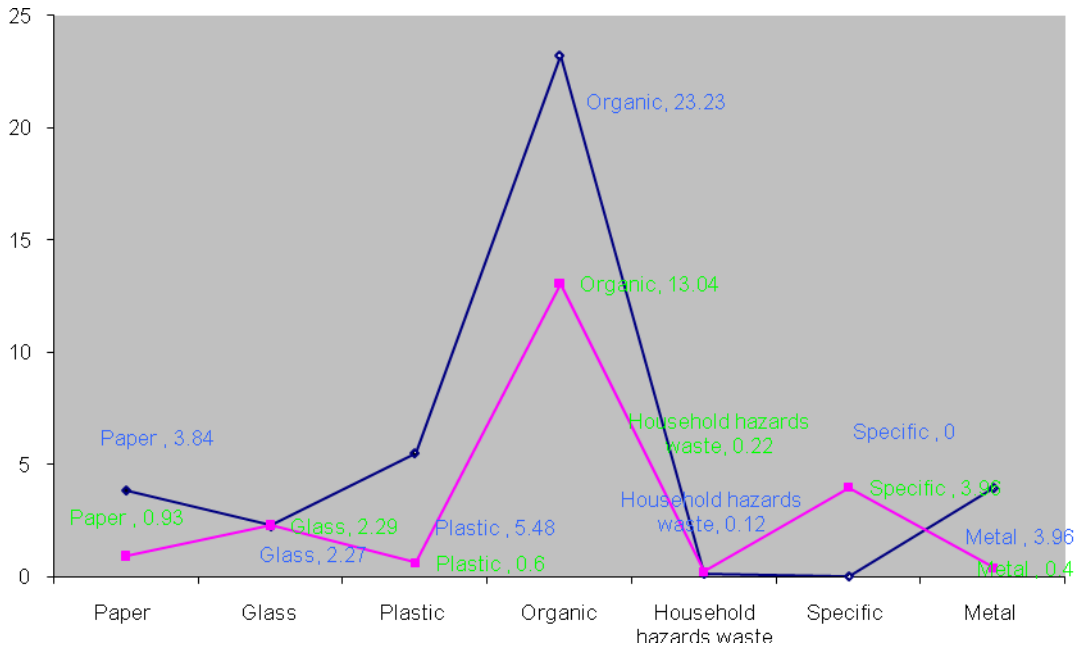
Apartment district is one of the main sources of solid waste production in Darkhan city. Below table summarizes comparison of waste composition by percentage generated in apartment districts in Darkhan city of 2002 and 2010. Paper, glass, plastic wastes were increased and organic, inorganic wastes were declined in 2010. The growth of paper waste associated with development of information technology and its use. The increased tendency of glass waste can be explained by increased consumption of import products packaged in glass. We noticed decrease in organic waste which may related with inaccuracies in reporting made in 2002 when all household wastes were transported with trashes coming from hotels.

Table 4.3.1 Apartment' waste composition 2002 and 2010

Composition	2002	2010
Paper	15.9	30
Glass	4.18	13
Plastic	11.03	19
Organic	42.5	18
Inorganic	20.8	5
HHW	0.54	2
Mixed	-	5
Specially	0.8	-
Metal	4.65	8

Waste composition of ger areas by percentage in summer and winter seasons in by 2002 is shown in Graph 4.3.3. 23.23 percent of total waste is organic, 3.84 percent is paper, 5.48 percent is plastic, 2.27 percent is glass, 3.96 percent is metal and 0.12 percent is household hazards waste in winter. 13.04 percent of total waste is organic, 0.93 percent is paper, 0.6 percent is plastic, 2.27 percent is glass and 0.22 percent is household hazards waste in summer.

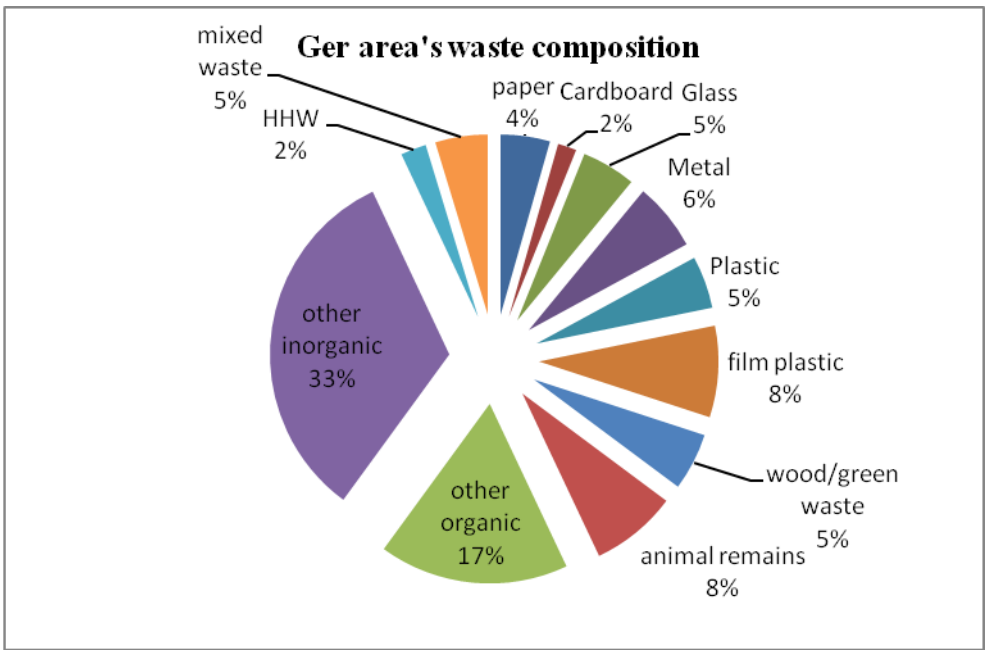
Graph 4.3.3 Apartment districts waste composition Darkhan city, 2002



Source from: Report of Waste characterization study in Darkhan city, 2002, WHO

Waste composition of ger area by percentage in 2010 is showed in Graph 4.3.4. 2 percent of total waste is cardboard, 5 percent is paper, 13 percent is plastic, 5 percent is glass, 6 percent is metal, 29 percent is organic, 33 percent is inorganic and 2 percent is household hazards waste.

Graph 4.3.4. Ger area's waste composition, Darkhan city, 2010



Waste composition by percentage in 2002 and 2010 are shown in Table 4.3.2. According to data indicated in the table, inorganic waste is decreased in 2010. The waste from ger district is directly carried to waste disposal area. High rate of plastic waste may associated with increased use of products with such packages. However, the volume of non-organic waste have decreased, which may relates to use of better and improved construction materials. Although, we should note that the survey conducted in warm period of the year when people living in ger district doesn't burn coal, thus the volume of ash, the main non-organic waste, was not so high.

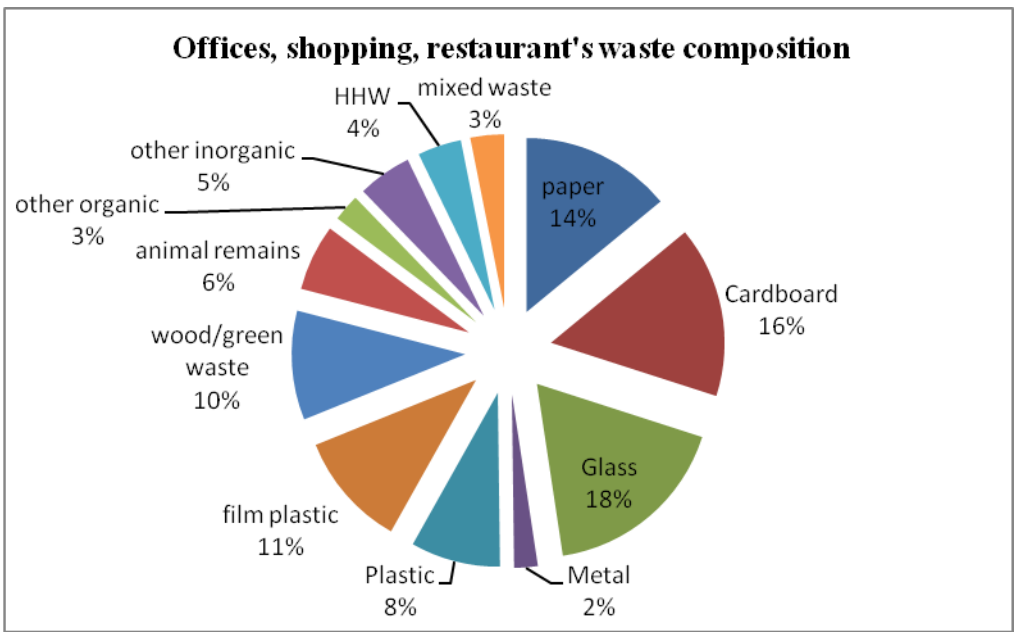
Table 4.3.2 Ger area's waste composition 2002 and 2010

Composition	**2002**	**2010**
Paper	2.38	6
Glass	1.28	5
Plastic	3.04	13
Organic	18.13	30
Inorganic	69.7	33
HHW	0.17	2
Mixed	-	5
Specially	3.15	-
Metall	2.18	6

Waste composition generated by office buildings, restaurants and shopping centers by percentage in 2010 is shown in Graph 4.3.5. According to the graph 4.3.5 main types of waste by

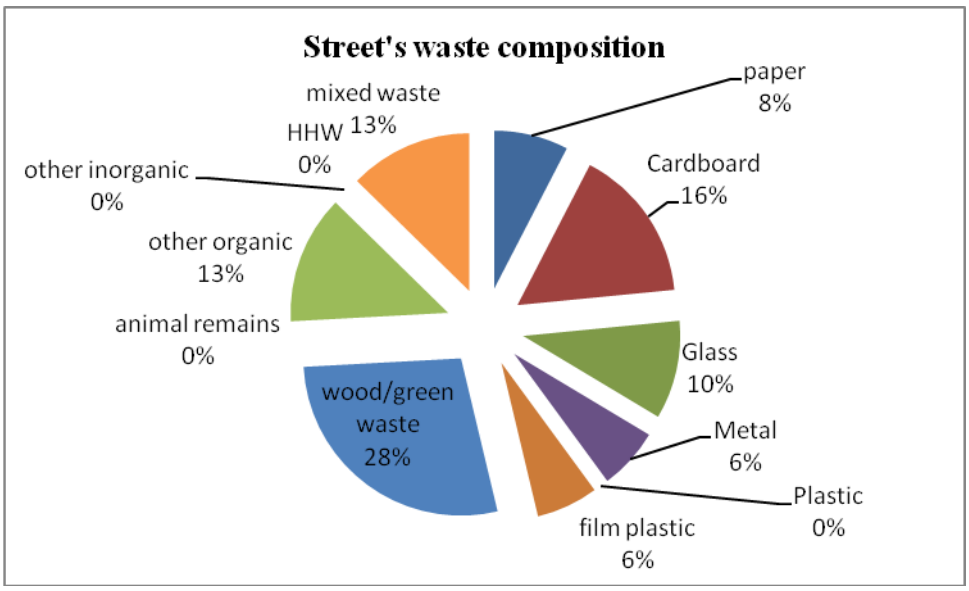
main types are as follow: cardboard 16 percent, paper 14 percent, plastic 19 percent, glass 18 percent, metal 2 percent, organic 19 percent, inorganic 5 percent, mixed 3 percent and household hazards waste 4 percent..

Graph 4.3.5 Office, restaurant and shopping center waste composition, Darkhan city, 2010



Waste composition generated by office buildings, restaurants and shopping centers by percentage in 2010 is shown in Graph 4.3.6. According to the graph 4.3.6. about 16 percent of total waste is cardboard, 8 percent is paper, 6 percent is plastic, 10 percent is glass, 6 percent is metal, 39 percent is organic and 13 percent is mixed waste.

Graph 4.3.6. Street's waste composition, Darkhan city, 2010



Recyclable waste summarized in Table 4.3.3. According to the survey 74.46 percent of total waste is subject to recycling.

Table 4.3.3. Recyclable waste

Recycling waste	Percent
Paper	8.23
Cardboard	13.17
Glass	13.12
Plastic	6.27
Film plastic	9.21
Wood and green waste	9.99
Animal remain	5.83
Other organic	8.64
Total	74.46

Opportunities and constraints

Our study indicates that main responsibilities and institutional structure for solid waste management are decentralized to district level. The Public utility services department of Darkhan city is responsible for collection and transportation of solid waste from home and business entities, and other locations including public, spaces.

The formal garbage collection system is inefficient in general it commonly seen that residents dispose most household waste by themselves illegally dumping outside their houses, on hills, in yards, and alongside roads and waterways. This ad hoc waste disposal poses a risk to public health and sanitation, causing potential respiratory diseases. Open garbage disposal also pollute the environment, including the contamination of soil and underground water. On the other hand, the apartment areas run a relatively efficient and proper system. Separate transfer spaces are installed on the first floor of each building, and waste is discharged into those spaces by trash chutes directly connected to individual apartment units.

Ger area garbage is collected by dump truck that approves each household, door-to-door, and collect fees onsite. The waste collection team consists of driver and 2 supporting staff. It goes around to households to collect garbage and to levy the waste collection charge.

The quantity of waste produced in ger areas varies significantly by seasons. This quantity depends largely on heating fuel (mostly wood and coal) that have been used with large quantities during the cold winters. Ashes are separated from general garbage and usually are discharged into 200-liter iron drums or sacks. During the summer when fuel used only for cooking, ash normally not separated. Throughout the year, recyclable materials are sorted for sale to the recyclable materials stores.

The frequency of waste collection in the ger areas is low, it may range between once a month to once every three months. Low frequency of collection may have a number of factors. First, the current vehicle-based system of collection at each household is not efficient given the low density of ger areas. Collection can cover only 20-30 households during summer and 15-20 households in winter per two to-three hour trip. Collection vehicles operate on average nine hours per day; hence, each vehicle can cover fewer than 100 households per day.

Second, a shortage of collection vehicles, equipment, and workers commonly seen as another problem. The Public utility department has limited resources for equipment and vehicles, because their revenue comes from the fees collected. According to the survey, only one open truck, one driver, and two assistant workers are assigned in each ger area to cover 1,677 to 3,000 households.

Third, poor road conditions or in some cases the lack of an access road to ger households, add to the difficulty for regular collection.

In addition, a lack of public awareness and ecological education limits effective management and implementation of waste programs. The field survey indicates that ger residents generally think garbage collection is the responsibility of city government, so they are not used to the notion of paying for public service. Furthermore, some residents feel not to pay fees instead they can freely dump waste on public land around their house.

Based on the findings from waste management study in Darkhan city, the research team and Ministry of Nature, Environment and Tourism propose 4 pilot project ideas (annex 2) which may improve the existing waste management in Darkhan city and further to apply in other regions of Mongolia.

Conclusions and Recommendations

1. 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 Darkhan City's solid waste management system is outdated and inefficient. There is needed to modernize the solid waste management system with the collective efforts of the public and private sectors, including NGOs, in order to improve the environment and quality of life in the city.
2. Based on the results of the waste characterization study, we have estimated that the City of Darkhan disposes from 138 to 200 tons /day of residential/commercial waste into one disposal site which called “Baraat”.
3. The major sources of solid waste in Darkhan city include: offices, shopping centers and restaurants (31.34%); ger areas (30.9%); apartments (29.37%); Approximately, 8.4% of the disposed waste have collected from the streets.
4. Solid waste management in Ger areas has most serious health and environmental concerns. Some residents especially poor family dispose of most household waste themselves—usually by dumping it outside their houses, on hills, in yards, and alongside roads and waterways. This ad hoc waste disposal poses a risk to public health and sanitation, including respiratory diseases.
5. Apartment areas run a relatively efficient and clean system. Separate transfer spaces installed on the first floor of each building, and waste discharged into those spaces by trash chutes directly connected to individual apartment units.
6. The results of the waste characterization analysis indicate that the waste contains about 24 % organic matter and substantial quantities of ash. Ger areas contribute to almost half of the waste that is collected by the City. The waste generated in ger areas consists of mostly ash, particularly during the winter season. In some cases, the waste from ger areas largely combined with animal manure. The average composition of the waste disposed in Darkhan city very similar to other cities which rely on the use of wood or coal for heating and cooking.
7. Waste generated in apartment buildings contain relatively large amount of paper and other organic matter than the waste generated by other sectors of the population.
8. There is need for organizing the training for officials involved in waste management on the importance of, and methodology for, conducting waste characterization analyses.
9. The results of dump trucks counting indicate that the waste collection service system not covering the entire city and relatively large amounts of waste still disposed in illegal disposal sites.

10. Promote community participation in solid waste management
    - to encourage community participation in solid waste management planning and project implementation,
    - to provide information relevant to solid waste management to community , and enhance awareness of community for participation in solid waste management planning process,
    - support NGO's activities and provide opportunity to participate in the decision making process
11. Strengthening waste management through promoting public sector participation;
12. Technological advances in waste disposal sites and treatment technology with special emphasis on the establishment of a specialized facility for the treatment of hazardous waste;
13. To increase awareness of the impacts to human health and the environment caused by improper use of chemicals, amplify the existing toxic substance registry to include associated diseases and toxic effects;

References

1. Report on waste characterization study in Darkhan city, WHO, 2002

2. Report on waste characterization study in Ulaanbaatar city, WHO, 2002 (Mongolian)

3. Environmental challenges of Urban development, World Bank, 2004

Annex 1.

LAW OF MONGOLIA ON HOUSEHOLD AND INDUSTRIAL WASTE

November 28, 2003
Ulaanbaatar city (State news #47, 2003)
(unofficial translation)

CHAPTER ONE
CENRALPROVISIONS

Article 1. Purpose of the Law

1.1. The purpose of this law is to govern the collection, transportation, storage, and ' depositing in landfills of household and industrial waste, and re-using waste as a source of raw materials to eliminate hazardous impacts of household and Industrial waste on public health and the environment.

Article 2. Legislation on Household and industrial waste

2.1. The legislation on household and industrial waste shall consist of the Constitution of Mongolia, the Environmental Protection Law, the Law on Environmental Impact Assessment, the Subsoil Law, the Sanitation Law, this law, and other acts of legislation enacted in conformity therewith.

2.2. If an international agreement to which Mongolia is a party contains provisions contrary to those provided in this law, then the former shall prevail.

Article 3. Definitions

3.1. For the purposes of this law:

3.1.1 "household and industrial waste" (hereafter "waste") shall mean any objects and substances that are created through and from con sumption and industrial and service activities, and that are not reusable for the same purposes;

3.1.2 "hazardous waste" shall mean waste containing explosive, toxic, flammable, infectious, or actively reactive substances harmful to humans, livestock, animals or plants, and having potentially adverse impacts on progeny of humans, livestock, animals or plants, and disrupting environmental balance;

3.1.3 "waste land-filling" shall mean land filling of non-reclaimable waste under the ground in a secure locality in order to prevent its adverseimpact on the environment;

3.1.4 "waste storage" shall mean temporarily storing waste in designated waste storage sites for land filling, detoxifying, and processing;

3.1.5 "using waste" shall mean re-using waste for, *inter alia*, manufacturing goods and products, performing works or services, or as ;i source of energy;

3.1.6 "making waste hazardless" shall mean processing waste by way of incineration, refining, disinfecting and detoxifying in a special facility with the purpose of eliminating the hazardous impacts of waste on human health and the environment;

3.1.7 "waste normative" shall mean the identified level (amount) o!' a certain type of waste to be produced by manufacturing a unil product;

3.1.8 "waste land-filling facility" shall mean a technological facility thai meets the conditions of prescribed standards to store waste in secure and hazardless conditions;

3.1.9 waste storage site" shall mean special containers or facilities established for collecting waste;

3.1.10 "waste land-filling capacity" shall mean the maximum permissible level of certain types of waste that can be put in land-filling facilities in accordance with the prescribed methods and set period by taking into account the ecological conditions of the territory where the land-filling process will take place;

3.1.11 "passport of hazardous waste" shall mean a document issued by a competent authority that contains information on the content and category of danger of the waste, and describes the methods of its transportation, storage and disposal

Article 4. Scope of the Law

4.1 This law shall govern all types of wastes except for atmospheric, aquatic, environmental, and radioactive waste.

Article 5. Right to Own Waste

5.1 Any person who produces waste shall have the right to own it.

5.2 Right of ownership to waste may be transferred to others under agreement.

5.3 A person's right to own waste shall terminate at the moment the person dis poses of the waste through the means specified in this law, and the right of an individual or a legal entity engaged in waste land-filling to own waste shall accrue.

5.4 I fan owner of hazardous waste transfers right of ownership, the owner shall report such transfer to the State Administrative Central Organization of Nature and Environment and shall ensure that the transfer of ownership is recorded at (he state registry of hazardous waste.

CHAPTER TWO

POWERS OF STATE AND LOCAL ADMINISTRATIVE |U HUES AND COMMON RIGHTS AND DUTIES OF INDIVIDUALS, ECONOMIC ENTITIES AND ORGANIZATIONS

Article 6. Powers of the State Great Khural

6.1. The State Great Khural shall exercise the following powers: 6.1.1 define state policies on waste management; and 0.1.2 other powers as conferred by law.

Article 7. Powers of the Government

7.1 The government shall exercise the following powers:

7.1.1 coordinate and organize the implementation of the state policy on waste management;

7.1.2 approve the methodologies of charging fees from producers of waste and for establishing waste normatives; and

7.1.3 such other powers as conferred by law.

Article 8. Powers of State Administrative Central Body in Charge of Environment

8.1 The State Administrative Central Body in Charge of Nature and Environment shall exercise the following powers:

8.1.1 enforce the implementation of the state policies on waste management and the

national program on waste;
8.1.2 keep national statistics of hazardous waste;
8.1.3 approve procedures for recording and reporting national statistics of hazardous waste;
8.1.4 approve the types of and requirements for waste land-filling facilities and centralized waste landfill sites, and procedure for operations of individuals, economic entities and organizations engaged in waste land-filling activities, and such other powers conferred by law.

Article 9. Powers of Khurais of Citizen's Representatives and the Capita! City, Aimag, Soum and District Governors

9.1 Capital city, aimag, soum and district khurais of citizen's representatives shall exercise the following powers:
- 9.1.1 monitor the implementation of legislation on waste;
- 9.1.2 establish waste normatives to be observed in their respective territories in accordance with the methodologies approved by the government;
- 9.1.3 approve local program of reducing waste and assess its implementation;
- 9.1.4 such other powers as conferred by law.

9.2 Capital city and aimag governors shall exercise the following common powers:
- 9.2.1 organize and ensure the implementation of the state policies on waste management in their respective territories;
- 9.2.2 develop, have approved by the khurais of citizen's representatives local programs of reducing waste and ensure implementation thereof;
- 9.2.3 keep local statistics of waste in accordance with approved procedure;
- 9.2.4 approve procedures for assessing and financing the operations of individuals, economic entities and organizations engaged in collection, transportation and land-fill of waste, and approve the sample of agreement to be entered between such individuals, economic entities and organizations and governors of soums and districts;
- 9.2.5 organi/e monitoring and inspection of the implementation of legislation on waste in their respective territory;
- 9.2.6 define the locations of centralized waste disposal sites in accordance with general land management plans of their respective aimag centers and soums;
- 9.2.7 such other powers as conferred by law.

9.3 The capital city governor shall exercise the following powers:
- 9.3.1 define locations of centralized waste disposal sites in accordance with the General Land Management Plan of the capital city;
- 9.3.2 select economic entities and organizations to engage in the wasteland fill ing activity in accordance with the regulation approved by the State Administrative Central Organization of Nature and Environment;
- 9.3.3 such other powers as conferred by law.

9.4 Soum governors shall exercise the following powers:

9.4.1 define locations of centralized waste disposal sites and temporary waste storage sites in the soum center in accordance with the General Land Management Plan of the soum;

9.4.2 select, through bidding, the economic entities and organizations to *carry* out wasteland filling activities in accordance with the regulation approved by the State Administrative Central Organization of Nature and Environment;

9.4.3 select individuals, economic entities and organizations to engage in waste collection and transportation, enter into agreements in accordance with the approved form, and finance the activities conducted and services rendered under agreement by taking into account performance of their contractual obligations;

9.4.4 approve the methods land filling waste produced by individuals re-siding in areas other than cities, towns, villages or other non-urban areas;

9.4.5 organize cleansing of land designated for public use;

9.4.6 monitor the implementation of legislation on waste;

9.4.7 such other powers as conferred by law.

9.5 District governors shall exercise the following powers:

9.5.1 define the locations of temporary waste storage sites;

9.5.2 select economic entities and organizations to engage in waste col[4] lection and transportation, enter into agreements with them, and finance such economic entities and organizations by taking into ac count the performance of their contractual obligations;

9.5.3 organize cleansing of land designated for public use;

9.5.4 monitor the implementation of legislation on waste, and

9.5.5 such other powers as conferred by law.

9.6 Bagh and khoroo governors shall exercise the following powers:

9.6.1 involve individuals in public waste cleansing activities in their respective territory;

9.6.2 ensure the proper payment of waste fees;

9.6.3 ensure that individuals and legal entities dispose their waste at designated waste disposal sites;

9.6.4 define the location of temporary waste storage sites to be used by groups of households and economic entities and organizations that reside or are located in remote areas.

Article 10. Common Rights and Responsibilities of Individuals, Economic Entities and Organizations

10.1 Individuals shall have following rights and responsibilities;

10.1.1 report to the state and local administrative bodies hazardous waste produced and its sources;

10.1.2 timely pay waste fees in the amount set forth in law;

10.1.3 not dispose waste in places other than designated waste disposal sites;

10.1.4 sort and dispose the produced waste at temporary waste storage sites;

10.1.5 exercise public control pursuant to the procedure prescribed by this law. and demand relevant authorities impose liability on persons who breach legislation on waste:

10.1.6 other rights and responsibilities as provided in law.

10.2 Economics entities and organizations shall have the following rights and responsibilities:

10.2.1 classify waste depending on the type of production or services, and discharge the sorted waste at designated temporary waste storage sites; correctly report to the state and local administrative bodies the industrial waste generated from their activities;

10.2.2 observe relevant rules, procedures and standards on waste;

10.2.3 timely pay waste fees in the due amount;

10.2.4 receive technical assistance and advice on waste management from specialized institutions;

10.2.5 provide relevant knowledge to their staff on waste sorting, and comply with safety standards in their operation:

10.2.6 enter into contracts with individuals, economic entities and organizations holding permits for collection and transportation of waste, and ensure the performance of contractual obligations;

10.2.7 such other rights and responsibilities as provided in law.

10.3 Individuals, economic entities and organizations shall be obliged to participate in public waste cleansing activities.

10.4 Individuals, economic entities and organizations when constructing, dismantling or repairing buildings in their ownership or possession, shall, in advance, enter into agreements for collection and transportation of waste and pay relevant fees and transfer the waste to be produced to individuals, economic entities, or organizations holding permits for collection, transportation and land-filling of waste.

10.5 Individuals, economic entities or organizations shall be prohibited from engaging in waste collection, transportation and land filling business without a proper permit.

CHAPTER THREE
WASTE DISPOSAL, COLLECTION, TRANSPORTATION, I AND FILLING AND RE-UTILIZATION

Article 11. Waste Disposal and Land filling

11.1 Individuals, economic entities and organizations residing in cities, villages and other urban areas shall dispose of their waste using the following procedure:

11.1.1 residents living in apartments with special waste disposal facilities shall dispose of their waste in such a facility;

11 .1 .2 individuals living in ger representatives and housing without special waste disposal facility, and economic entities and organizations other than those specified in Article 11.3 of this law, shall dispose of their waste in temporary waste disposal sites defined by soum or district governors at specified times.

11.2 Individuals residing in rural areas, or non-urban areas shall landfill their household waste using methods approved by the soum governor.

11.3 Economic entities and organizations engaged in industrial activities that produce a significant amount of special category waste shall land-fill the industrial waste in a special waste

land-filling facility that meets the prescribed standards and requirements.

11.4 The government shall approve the list of industrial activities referred to in Article 1 1.3 of this law.

11.5 Individuals, economic entities and organizations holding over-sized and/or heavy waste that cannot be disposed in temporary waste disposal sites may transfer the waste, under agreements, to individuals, economic entities and organizations holding a waste land-filling permit.

Article 12. Waste Collection and Transportation

12.1 Capital city and soum governors shall ensure that waste collection and/or transportation activities are handled by individuals, economic entities or organizations selected through a bidding procedure, and who have entered into agreement for waste collection and/or transportation.

12.2 The following requirements shall apply to waste collection and transportation:

12.2.1 waste shall be collected through established routes and transported to centralized waste disposal sites;

12.2.2 waste shall he transported in specially equipped vehicles that meel the technical conditions and safety requirements;

12.2.3 other requirements provided in the legislation and agreement.

12.3 Capital city and soum governors shall define the routes for waste transportation

12.4 Individuals, economic entities and organizations engaged in waste collection and transportation shall cooperate with individuals, economic entities and or ganizations holding a permit for waste landfill under agreements. Soum and district governors shall monitor the performance of such agreements.

Article 13. Waste Landfill

13.1 Specialized organizations, businesses entities and individuals with relevant permits shall carry out waste landfill at centralized waste disposal sites.

13.2 Individuals, economic entities or organizations wishing to be engaged in waste landfill, shall enter into an agreement with soum or district governors.

13.3 Economic entities and organizations specified in Article 11.3 of this law shall landfill their waste at specified places under the supervision of specialized organizations. A member of the government in charge of environment shall determine technological requirements for wasteland filling.

13.4 The State Administrative Central Organization of Nature and Environment shall determine the maximum capacity of centralized waste disposal sites, temporary waste storage sites, and designated waste landfill facilities of the economic entities and organizations specified in Article 11.3 of this law.

Article 14. Re-Using Waste

14.1 Individuals, economic entities and organizations engaged in waste landfill shall be entitled to use the waste disposed at temporary and centralized waste disposal sites.

14.2 The government shall decide matters of granting permits for using hazardous waste.

Article 15. Prohibited Areas for Establishing Centralized Waste Disposal Sites

15.1 It shall be prohibited to establish centralized waste disposal sites in urban settlement areas, water sanitary and protection zones, mining areas, areas where mineral reserves are defined, and areas which are prohibited by other legislation.

Article 16. Additional Requirements for Collection, Transportation and Landfill Of Hazardous Waste

16.1 Members of government in charge of health, science and environmental matters shall jointly approve the classification and levels of hazardous waste by taking into account the level of hazardous impact of the waste on environment and human health.

16.2 The government shall approve the procedure on issuing passports for hazardous waste.

16.3 The government shall define the requirements for collection, transportation and landfill of hazardous waste.

16.4 Relationships related to cross-boundary transportation, importation, and exportation of hazardous waste shall be governed by a separate law.

CHAPTER FOUR
WASTE INFORMATION DATABASE

Article 17. Consolidated Waste Information Database

17.1 The capital city, aimags, soums and districts shall have a waste information database.

17.2 Individuals, economic entities and organizations possessing waste shall prepare and furnish a report on the waste under their possession to the governor of a bagh or khoroo respectively within the specified periods.

17.3 The member of government in charge of environmental matters shall approve a procedure for establishing the database specified in Article 17.1 of this law and on providing information to public from the database.

CHAPTER FIVE
PCONOMICAL MANAGEMENT OF WASTE

Article 18. Basic Principles of Economical Waste Management

18.1 The following basic principles shall be observed in economical waste management:

18.1.1 reducing and re-using of waste:

18.1.2 payment of fees in case of producing waste;

18.1.3 providing economic incentives to those who participate in the col lection, transportation, storage and land filling of waste.

18.1.4 payment of fees for non-reclaimable imported materials, goods and waste shall be regulated by separate law.

Article 19. Programs for improving Economical Management of Waste

19.1 To plan waste reduction, re-using and land-fill activities in line with the perspectives of public health and environment, and the level of social and economic development of a given territory, the state administrative and local self-governing bodies shall develop state, regional and local development programs for improving the collection, transportation, storage and land-filling of waste.

Article 20. Fees for Producing Waste

20.1 Economic entities, organizations and individuals shall pay fees for producing waste.

20.2 Aimag and capital city khurals of Citizen's Representatives shall approve the rates of waste fees to be applied in their respective territories in accordance with the methods approved by the government.

20.3 Revenue from waste fees shall be accumulated in the waste service fund of the capital city and soums.

Article 21. Waste Service Fund

21.1 Capital city and soum governors shall establish and operate a Waste Service Fund. The purpose of the fund shall be to finance waste collection, transpor tation and land filling activities.

21.2 Revenue accumulated in the Waste Service Fund shall form a part of the capital city or soum budget, and the budget management procedures shall equally apply to the planning, financing, controlling of and preparing expen diture reports on the waste service fund.

21.3 Revenue of the Waste Service Fund shall consist of the following sources:

21.3.1 waste fees:

21.3.2 loans, aid and donations;

21.3.3 local funds allocated for collection, transportation and landfill of waste from public use land;

21.3.4 other revenues.

21.4 The Waste Service Fund shall be spent for the following purposes:

21.4.1 collection, transportation and land filling of waste;

21.4.2 support of activities for reducing waste;

21.4.3 rehabilitation of central waste disposal sites;
21.4.4 provision of information to and training of population and raising public awareness.

CHAPTER SIX
MONITORING IMPLEMENTATION OF LEGISLATION ON WASTE AND LIABILITY FOR THE BREACHES OF LEGISLATION

Article 22. Monitoring Implementation of the Legislation on Waste

22.1 An authorized specialized inspection agency and governors of all levels shall exercise monitoring of the implementation of the legislation on waste.

22.2 Soum, district, bagh and khoroo governors may employ public inspectors in their respective territory to oversee the fulfillment of administrative duties as set forth in the legislation on waste. Articles 12 and 13 of the Crime Prevention Law shall govern matters concerning employment of and providing monetary incentives to public inspectors.

22.3 The State Administrative Central Body in Charge of Specialized Inspection Matters shall suspend the operation of any waste facility and have damages caused paid by any person responsible, if the location where the waste disposal facility is situated is not included in the city and land management plans, or if waste land filling technology or activity is hazardous to environment and/ or human health or does not comply with law.

22.4 State inspectors or governors of soums, district, baghs and khoroos shall impose the following administrative sanctions for breaches of the legislation on waste unless the person responsible is subject to criminal liability:

22.4.1 for disposing waste in non-designated places a fine of MNT 1,000-15,000 on an individual and MNT 150,000-200,000 on an economic entity, with compensation of the damage caused;

22.4.2 for breach of Article 14.1 of this law, a fine of MNT 30,000-50,000 on an individual and MNT 150,000-250,000 on a economic entity;

22.4.3 for disposal of plastic bags, chewing gum and cigarettes not in designated waste storage sites and /or public places a fine of MNT 1000-10000 on an individual.

Article 23. Entry Into Force

23.1 this law shall come in force in July 1,2004

Annex 2

Unofficial translation

LAW OF MONGOLIA
ON HAZARDOUS AND CHEMICAL TOXIC WASTE
May 5, 2006
Ulaanbaatar

CHAPTER ONE

GENERAL PROVISIONS

Article 1. Objectives of this Law

The objective of this Law is to regulate relations concerning the export, import and transportation of toxic chemicals across the borders of Mongolia and production, storage, trade, transport, use, removal and control on thereof.

Article 2. Legislation on Toxic Chemicals

2.1. The legislation on hazardous and toxic chemicals consists of the Constitution of Mongolia, Law on Environmental Protection, Law on Licensing, Law on Estimation of situations affecting the environment, Law on Restrictions on import, trans-border transportation and export of hazardous waste, La won Control upon explosive substances and detonation means, Law on protection against emergency situations, this Law and other legislation adopted consistent with this laws.

2.2. The relations pertaining to medicine having narcotic effect and affecting mentality, and also chemicals of radioactive and food purposes are to be regulated by special law.

2.3. If the International Treaty of Mongolia stipulates otherwise, the provision of the International Treaty shall prevail.

Article 3. Legal terms

3.1. The terms used in this law shall be understood as follows:

3.1.1. “toxic chemicals means chemicals and their composition having hazardous affect on the health, environment, livestock and wild life, moreover driving to extinct;

3.1.2. “hazardous chemicals” means chemicals and their compositions of explosive, oxidant, m, corrosive and irritable character;

3.1.3. “prohibited chemicals” means hazardous and toxic chemicals and their compositions that are prohibited to use in the territory of Mongolia;

3.1.4. “limited use chemicals” means hazardous and toxic chemicals allowed to use according to prescribed purpose, amount and technology under certain control and only at specially permitted places;

3.1.5. “pesticides” means chemicals and their compositions purported to prevent livestock, animals and plants from diseases and protect against harmful insects, rodents and weed;

3.1.6. “hazardous and toxic chemicals’ waste” means hazardous and toxic chemicals that are prohibited in use pursuant to international treaties, or which are expired or don’t comply the quality standards, or which title and utilization period are unclear, or the remaining substances or their containers and packets;

3.1.7. “removal of hazardous and toxic chemicals” means removing of hazardous and toxic chemicals by detoxification and neutralization;

3.1.8. “risk estimation” means investigation and estimation of potential negative affects of hazardous and toxic chemicals and their compositions on the health, environment, livestock and animals in the course of conduct with thereof, and determination of preventive and diminishing measures;

3.1.9. “admissible level” means the high content of hazardous and toxic chemicals that doesn’t cause negative impact to the health and environment.

Article 4. Toxic Chemicals and their Classification

4.1. According to their nature and affects chemicals are:

4.1.1. hazardous and toxic for human health;

4.1.2. hazardous and toxic for the environment;

4.1.3. hazardous and toxic for the livestock and animals.

4.2. The list of hazardous and toxic chemicals and their compositions included into the classification stated in the Article 1 of this law shall be jointly adopted by the members of the Government responsible for the matters of the environment and the health.

Article 5. Permissions for hazardous and toxic chemicals concern activities

5.1. The permission to hold activities on export, import, production, trade and use of hazardous and toxic chemicals are issued in compliance with the Law on Licensing.

Article 6. Regulation of Activities Involving Use of Toxic Chemicals

6.1. The State Administrative Central Agency responsible for the matters of environment shall exercise the following powers upon coordination of activities related to hazardous and toxic chemicals:

6.1.1. to adopt in cooperation with the state administrative central agency responsible for the matters of production and trade the procedures for export, import, trans-border transportation, production and trade of hazardous and toxic chemicals;

6.1.2. to adopt in cooperation with the state administrative central agency responsible for the matters of the health and state administrative agency responsible for emergency situations the procedures for storage, transportation, use and removal of hazardous and toxic chemicals;

6.1.3. in cooperation with the state administrative central agency responsible for the matters of food, agriculture and health adopt on annual basis the list and amount of pesticides, chemical fertilities, and disinfection, clearing and extermination chemicals to be used against harmful insects and rodents;

6.1.4. adopt in cooperation with the state administrative central agency responsible for the matters of food, agriculture and health the procedures for experimental and utilization activities;

6.1.5. adopt in cooperation with the state central administrative agency responsible for the matters of the health and the state administrative agency responsible for the matters of emergency situations the procedures of hazardous and toxic chemicals' risk estimation procedures;

6.1.6. take appropriate measures to confirm the list of hazardous and toxic chemicals prohibited or restricted to use in Mongolia, and to submit it to the international organizations;

6.1.7. aggregate data and reports on export, import, trans-border transportation and production, storage, trade, transportation, use and deposition of hazardous and toxic chemicals, and found a databank thereof;

6.1.8. approve annual reports on activities concerning the use of hazardous and toxic chemicals;

6.1.9. provide undertakings related to the use of hazardous and toxic chemicals with professional and methodological guidance and approve necessary recommendations;

6.1.10. exchange with international organizations with the data on hazardous and toxic chemicals, provide the citizens with the information on physical, chemical and hazardous characteristics thereof, measures to take in case of accidents, the particular chemical and its composition and methods of deposition and transportation;

6.1.11. exercise powers on enforcement international treaties on hazardous and toxic chemicals which Mongolia is party to;

6.1.12. submit particular proposals related to the assistance from international organizations on elimination of harm impact caused by hazardous and toxic chemicals to the national security, human health, environment, livestock and animals to the government;

6.2. The non-staff National Council authorized to provide advice and conclusions on policy and regulations of hazardous and toxic chemicals shall function under supervision of the Prime Minister, subsidiary councils by the related state central administrative agencies and aimag or capital city governors, and the Government shall approve the composition and rules of the National council.

6.3. The state central administrative agency responsible for the matters of defense shall undertake activities related to hazardous and toxic chemicals for military purposes and submit to state central administrative agency reports and data concerning these activities.

6.4. The Government shall approve the list of restricted and prohibited chemicals stated in the provisions of the article 6.1.6 of this law.

Article 7. Toxic chemicals Databank

7.1. The databank mentioned in the provisions of the article 6.1.7 of this law shall consist of international databank of hazardous and toxic chemicals and national databank consistent to thereof.

7.2. The state central administrative agencies for health, food, agriculture, production, trade, state borders and customs and other related organizations shall have databanks of corresponding hazardous and toxic chemicals which are

consistent to the databank stated in the provisions of the article 7.1 of this law and connected

with it by network connection.

7.3. Citizens, businesses and organizations shall have free access to the databank stated in the provisions of the article 7.2 and information stated in the provisions of the article 6.1.10 of this law.

CHAPTER TWO

REQUIREMENTS FOR COORDINATION OF ACTIVITIES RELATED TO HAZARDOUS AND TOXIC CHEMICALS

Article 8. Requirements for protection from hazardous and toxic chemicals

8.1. Individuals, businesses and organizations shall recover by own expenses the measures on preventing from and eliminating dangerous impact of hazardous and toxic chemicals caused to human health, the environment, domestic animals and wildlife during export, import, trans-border transportation and production, storage, trade, transportation, use, deposition thereof.

8.2. Individuals, businesses and organizations carrying out activities mentioned in the provisions of the article 8.1 of this law shall comply with respective legislation, safety regulations and technological procedures.

8.3. It shall be prohibited to export, import, and transport across state borders, produce, store, trade, purchase, transport, use and transfer to others the hazardous and toxic chemicals and their composition for the purposes of chemical weapon and terrorist acts.

Article 9. Basic requirements for export, import, trans-border transportation and production of hazardous and toxic chemicals

9.1. In accordance with the provisions of the article 5.1 of this law, the following information shall be presented in order to get permission to export, import, produce and use hazardous and toxic chemicals:

9.1.1. name and official termination of the chemical;

9.1.2. commercial and technical term of the chemical;

9.1.3. number of international registration;

9.1.4. the premises, purpose, period and amount of use;

9.1.5. physical, chemical and hazardous characteristics;

9.1.6. measures in case of potential accidental and risky situations;

9.1.7. activity premises conditions;

9.1.8. deposition and transportation methods of a particular chemical and its components.

9.2. The procedures approved in compliance with the provisions of the article 6.1.1 of this law shall be maintained in export, import, tarns-border transportation and production of hazardous and toxic chemicals.

Article 10. Basic requirements for storage of hazardous and toxic chemicals

10.1. The Governor of the appropriate instance shall determine the store premises for hazardous and toxic chemicals on the basis of the related professional organization conclusion.

10.2. Hazardous and toxic chemicals shall be stored with respect to their specific characteristics in the appropriate special storehouses under the procedures adopted in compliance with the provisions of the article 6.1.2 of this law.

10.3. Containers, boxes and packages of hazardous and toxic chemicals shall contain attention marks, labels of the name of chemicals written in bold capitals.

10.4. In the event of hazardous and toxic chemicals, individuals, businesses and organizations, owner thereof, shall inform the police, intelligence agency and related organs within 24 hours and are obliged to provide with entire assistance in investigation process.

Article 11. Basic requirements for selling of hazardous and toxic chemicals

11.1. Licensed individuals, businesses and organizations when selling hazardous and toxic chemicals shall provide 2 certified copies of documents that indicate the name and address of the purchasing person, name, type, amount and purpose of the chemicals, and render one copy to the purchaser and reserve the remaining.

11.2. Hazardous and toxic chemicals shall be conveyed through special points in compliance with the procedures adopted in comply with the provisions of the article 6.1.1 of this law and sold separately from food and other products.

Article 12. Basic requirement for transportation of hazardous and toxic chemicals

12.1. Hazardous and toxic chemicals shall be transported in accordance with the procedures adopted by the provisions of the article 6.1.2 of this law by transport means comply with the technical and safety requirements and attention and safety warning sign shall be applied to those transport means.

12.2. After transportation of hazardous and toxic chemicals the transport means used shall be disinfected and rendered non-toxic.

12.3. It shall be prohibited to transport hazardous and toxic chemicals together with people, animals and goods and products.

12.4. It shall be prohibited to post, transport in public and common transport means the hazardous and toxic chemicals.

Article 13. Basic requirements for the use of hazardous and toxic chemicals

13.1. Activities related to the use of hazardous and toxic chemicals shall be maintained in premises and places that comply with labor protection and safety conditions and requirements.

13.2. It shall be prohibited during the utilization process of hazardous and toxic chemicals to exceed their admissible level set by the authorities in the premises and environment.

13.3. Businesses and organizations that use hazardous and toxic chemicals shall draft safety rules and adhere to them upon approval by the local inspector for the environment and sanitation.

13.4. Persons with proper professional knowledge and experience reached 18 years old are allowed to work with hazardous and toxic chemicals.

13.5. It is prohibited to employ pregnant women and breading mothers for the positions related to hazardous and toxic chemicals.

13.6. Businesses and organizations shall organize on own expenses the training on safety work and prevention from potential accidents and risks and on providing the first aid assistance for the personnel engaged in operations with hazardous and toxic chemicals.

13.7. Individuals, businesses and organizations shall register the utilization and consumption of hazardous and toxic chemicals used for industrial purposes and submit the reports to soum and district governors within 15 November every year and to the state central administrative agency within the end of January of the next year.

13.8. It is prohibited to use hazardous and toxic chemicals with unclear name, characteristics and use instructions in the case if the professional authorities did not provide sufficient conclusions.

13.9. Individuals, businesses and organizations shall comply with procedures adopted with respect to the provisions of the article 6.1.2 of this law.

Article 14. Basic requirements for deposition of hazardous and toxic chemicals

14.1. The waste of hazardous and toxic chemicals shall be deposited on the basis of conclusion of the related professional organization to the place determined by the soum or district governor in compliance with the procedures set by in the provisions of the article 6.1.2 of this law by means that don’t endanger or intoxicate human health, the environment, domestic animals and wildlife, and the commission consisted of the local environment and sanitation inspector and officer, specialist in emergency situations, shall be engaged in this operation.

14.2. The commission stated in the provisions of the article 14.1 of this law shall sign the act

on deposition of hazardous and toxic chemicals and deliver it to the soum, or district governor.

Article 15. Transportation of hazardous and toxic chemicals across state borders

15.1. Customs professional inspection office shall control the passage of hazardous and toxic chemicals across state borders.

15.2. Customs professional inspection office shall register hazardous and toxic chemicals that are passing across the state borders and deliver the information to the state central administrative agency on monthly rate.

15.3. The government shall determine the custom port for passing hazardous and toxic chemicals.

15.4. It is prohibited to transport hazardous and toxic chemicals without proper permission.

Article 16. Determination of admissible level of hazardous and toxic chemicals

16.1. The admissible level of hazardous and toxic chemicals that impact the human health and the environment shall be determined by the proper standards.

Article 17. Estimation of risks

17.1. Individuals, businesses and organizations engaged in activities to produce, store, use the hazardous and toxic chemicals shall be obliged to estimate the risks of those chemicals as set forth by in the law on Estimation of factors that impact the environment.

17.2. The estimation shall include issues on determination of toxic and dangerous nature of that chemical, potential risks, measures of the prevention, neutralization of waste and its deposition.

CHAPTER THREE

MISCELLANEOUS

Article 18. Control of use of hazardous and toxic chemicals

18.1. The national professional inspection office shall control the implementation of the legislation on hazardous and toxic chemicals.

18.2. Individuals, non-governmental organizations enjoy the right to submit recommendations and requests on the violation of legislation on hazardous and toxic chemicals to the appropriate state administrative agencies for resolution thereof.

18.3. Businesses and organizations shall exercise the inferior control on the use and consumption of hazardous and toxic chemicals.

Article 19. Penalties on violation of legislature on hazardous and toxic chemicals

19.1. If the violator of the legislation on hazardous and toxic chemicals is not subject to the Criminal Code, the court or the state inspector shall make the violator to recover the damages caused and impose the following administrative penalties:

19.1.1. for the violation of the procedures set by in the provisions of the article 6.1 of this law fine the officers by 30000-60000 tugrugs;

19.1.2. for the violation of the provisions of the articles 7, 8.1 and 8.2 of this law fine the officers by 30000-6000 tugrugs and the businesses and organizations by 200000-25000 tugrugs;

19.1.3. for the violation of the provisions of the article 10 of this law fine individuals by 20000-50000 tugrugs, officers by 30000-60000, businesses and organizations by 150000-200000 tugrugs;

19.1.4. for the violation of the provisions of the article 11 of this law fine individuals by 30000-50000 tugrugs, businesses and organizations by 200000-250000 tugrugs;

19.1.5. for the violation of the provisions of the article 12 of this law fine individuals by 30000-50000 tugrugs, businesses and organizations by 200000-250000 tugrugs;

19.1.6. for the violation of the provisions of the article 13 of this law fine individuals by 20000-40000 tugrugs, businesses and organizations by 100000-150000 tugrugs;

19.1.7. for the violation of the provisions of the article 14 of this law fine individuals by

20000-50000 tugrugs, businesses and organizations by 100000-250000 tugrugs;

19.1.8. individuals who are engaged in activities related to hazardous and toxic chemicals without due permission from the authorities and if the risks were not estimated, the illegally gained profit and hazardous and toxic chemicals being used shall be confiscated and the law breaker individuals shall be fined by 30000-50000 tugrugs as well as businesses and organizations by 20000-250000 tugrugs;

19.1.9. for the violation of or attempt to violate the provisions of the article 15.4 of this law the illegally gained profit and hazardous and toxic chemicals being used shall be confiscated and individuals shall be fined by up to 50000 tugrugs, businesses and organizations by 150000-250000 tugrugs;

19.1.10. for the violation of the provisions of the article 18.1 and 18.3 of this law fine officers by 30000-60000 tugrugs.

19.2. For the violation of the provisions of the article 8.3 of this law the person shall be the subject to a criminal penalty in accordance with the respective legislation.

19.3. The person, who used the hazardous and toxic chemicals in improper way, caused intentionally or with negligence serious harm to others health and the environment, shall be subject to criminal penalty.

Article 20. Compensation of damages

20.1. The person guilty in the violation of legislation on hazardous and toxic chemicals, caused damages to the health of others, the environment, domestic animals, wildlife and property shall compensate for the damage.

CHAIRMAN OF THE
STATE IKH KHURAL TS.NYAMDORJ.

Annex 3

"Darkhan- Clean City " Programme

Programme Approval (unofficial translation)

Based on the provision #20.1.7 of the Article # 20 the Mongolian Law on Administrative and Territorial Unit and their authorities, it is DIRECTED by the Citizens Representative Meetings of the Aimags to:

1. Approve the Aimag Program "Darkhan- Clean City " as it is annexed;
2. Delegate G.Erdenebat, the Aimag Governor, to ensure reinforcements of this programme and allocate respective financial resources required for the programme implementation into annual budget.

Annex to 32nd Directive of the Aimag Seal Office, year of 2010

"Darkhan- Clean City " Programme

/ 2010-2014 /

ONE. GENERAL

Official understanding about the wastes – identified as materials or items discharged from household and industrial activities and those cannot be re-used for original purposes, was introduced into our country with adoption of the law on "Household and industrial wastes" in 2003. Related laws and regulations, also, directed to regulate certain important matters of storing, collecting, transporting and disposing of household, industrial, and hazardous wastes.

In the last years, most part of solid waste management capital is spent in collection, transportation, and disposing services in urban areas. Costs of dumping wastes is increasing with its negative impact on the environment as well. Building a waste management system that seperates wastes at original sources and supports reusing, recycling and restoring wastes is very much needed in this condition.

TWO. GOALS, OBJECTIVES AND DURATION OF THE PROGRAMME

2.1. PROGRAMME GOAL

To set up waste recycling factory and reduce waste dumping at centralized waste disposal point by building a waste management system that seperates wastes at original sources and supports reusing, recycling and restoring wastes.

2.2. MAIN OBJECTIVES OF THE PROGRAMME

1. Establish an efficient system seperating wastes at original sources. The system shall be suitable in Darkhan- Uul aimag.
2. Establish waste recycling plant through implementing projects to re-use, restore, and recycle household and industrial wastes and secondary raw materials
3. Improve temporary storage, collection, transportation and disposal of solid wastes.

2.3. PROGRAMME DURATION

The Programme will be implemented from 2010 to 2014.

THREE. CORE PRINCIPLES OF THE PROGRAMME

The following principles will be adopted into the programme implementation.

5. Make sure consistency with main priorities of policy documents of the Environmental strategies, and other regulatory documents on waste management issued by the international and domestic organizations in Mongolia;
6. Carefully define partnership type for state and private organizations;
7. Adopt "Polluter pays" principle and increase social responsibilty of individuals and enterprises concerning the wastes;
8. Enable participation of state and community in reduction of waste amount, and reuse and process waste

FOUR. IMPLEMENTATION ACTIVITIES

4.1. Management activities:

1. A Committee of the Program Reinforcemen and other related laws, and regulations will be established next to the Aimag Governor – shall be in charge of management and reinforcement of the programme, reporting to the Aimag Governor on a seasonal basis.
2. Representatives of government and non-government organizations, residents, interested parties, and enterprises and other institutions involved in reusing, processing, cycling, transporting, collecting and seperating of local wastes shall join the committee.
3. The Commettee shall be working with short and long term activity plans to manage local wastes.
4. The Committee shall take the following actions:
    4.1. Provide consultancy on identifying waste dump sites of disposing household,

industrial and hazardous wastes according to the Major Land Planning of the respectiva aimags and soums;

4.2. Develop procedures for evaluation and financing of waste collection, transportation and disposal activities carried out by individuals and enterprises and content of an agreement to enter with respective Soum and District Governors;

Provide assistance in selection of individuals and enterprises involved in waste disposal business according to the procedures approved by the Environmental public authority;

Develop procedures for registration of solid wastes from households, businesses (restaurants, shops and hotels) and industries

4.5. Monitor reinforcements of respective laws and regulations.

4.6. Others

4.2.Implementation measures

Objective 1. Establish an efficient and suitable for Darkhan-Uul aimag system that seperates wastes at original sources:

- To develop methodology to identify amount, types, structures of solid wastes from apartments, ger or peri-urban district, enterprises and plants and to conduct necessary studies to define waste structures, quantity, and density etc;
- To build database for Aimag wastes with regular registration of solid wastes from households, businessess (restaurants, hotels etc) and plants; procedures for registration of solid wastes shall be developed accordingly;
- To implement pilot projects of waste seperation at selected demonstration bags and districts and select the optimum alternatives suitable for peri-urban districts, apartments and enterprises;
- To run specific site for collection of secondary raw materials in order to support voluntary waste and raw material collection and sales by individuals and residents;
- To increase involvement of enterprises in seperation of secondary raw materials at original sources through locating specific waste seperation tanks (bins) at the shops, supermarkets, service providers and in the streets;

Objective 2. Establish waste recycling plant through implementing projects to re-use, restore,

and recycle household and industrial wastes and secondary raw materials

- Adopt economic tools suitable for local conditions to motivate less emission of wastes and efficient use of resources in production, services and other sectors at the local level;
- Run regular site for exchange, sales and of used stuff (books, clothings, newspapers, journals,home furnitures etc) and information /introductions and advertisements of entities collecting secondary raw materials/ in order to support waste seperation, recycling, restoring and production with participation of residents and individuals;
- Study types, quantity and structure of local secondary raw materials and financial abilities of potential enterprises and inviduals to buy and reuse these along with recent techniques and technologies and to built waste recycling and restoring plant;
- Implement projects of waste recycling, procesing and restoring based on waste composition (structure) from peri-urban areas, apartments, enterprises and public places /e.g.: project to separate and process organic wastes, main raw material of fertilizer, at household and restaurants /;
- Support enterprises running temporary storage, collection and transportation of secondary raw materials.

Objectives 3. Improve temporary storage, collection, transportation and disposal of solid wastes.

- Transport all solid wastes from enterprises, public organizations and households;
- Modernize waste disposal routine of enterprises;
- Improve current services of waste collection, storage and transportation;
- Locate waste collection and storage sites in consideration of specific conditions of peri-urban, enterprises, public areas and apartments respectively;
- Increase public awareness with distribution of manuals and training pamphlets about efficient management of solid wastes – with specific dates and schedules for seperation, temporary storage, and transportation of solid wastes;
- Review and adopt new routines and schedules for cleaning wastes in nearby areas of public property, enterprises and residential apartments and make sure regular cleaning and waste collection;
- Estimate costs for waste collection and cleaning of lands used by enterprises and individuals for purposes such as unfinished construction and garages and collect costs from them;
- Promote public officers, apartment ownership committee, governors of Bags and Soums, other

public organizations, enterpirses and individuals for their accomplishments and efforts made in improving waste management in local areas;

- Announce “WASTELESS DEMONSTRATION ORGANIZATION” competition amongst bags, apartment ownership committees, individuals , enterprises and plants with no open waste sites;
- Improve solid waste disposal method of landfill.

4.3. Economical regulation

According to the provision 21.1 of the Mongolian Law on "Household and industrial wastes ", a service fund of wastes will be set up. Income of the fund will be collected as stated in the Article 21.3 of the laqw and from compensations, its interests and fines for exceeding wastes and other substances from approved level. The Article 21.4 of the law will be followed in the expenditure of the fund.

4.4. Public awareness and traininings

- Organize regular trainings on solid waste management aimed for children of pre-school age, secondary school, families, community and individuals in Darkhan-Uul aimag;
- Run a monthly campaign “Health Environment- Civil Participation” to reduce wastes from peri-urban areas;
- Improve performance and synergy of local public authorities and organize trainings and public awareness activities on solid waste management on a seasonal basis;
- Start having every April a month of having the Cleaner City and 20th of every month as a day of Clean Day in Darkhan-Uul aimag;
- Distribute information on waste collection, its temporary storage and transportation services provided by the local authority such as on where and how wastes should be disposed, seperated and how to collect secondary raw materials in order help residents and individuals have less wastes.

Annex 4.

PUBLIC UTILITY SERVICE DEPARTMENT

The Public Utility Service Department was established in 1999 by the decision of the Civil Representatives' Meeting of Darkhan-Uul province.

The activities of the Department have been expanding from year to year and currently, it has been serving for the industries and public as follows:

- Cleaning of the public and industrial wastes, roads and squares Serve with auto park, special vehicles for loading wastes
- Rehabilitation and care service for gardening of park and street as well squares
- To provide with the normal operation of the city decoration and projectors
- Service work in flood dike (dam), canal maintenance, its treatment, auto roads and pavements and the engineering facilities of natural water remove.

Enhancement and service of the environment

Within the preparatory work for implementing the 2nd level of the Government program to privatize the Public Utility Service Department, we have been working by the management contract for over 4 years. During this period, we have improved the scene of the city, provided with peaceful atmosphere, planted trees and bushes, put down a lawn. We have newly planted 64.900 deciduous and needled trees, 13.700 bushes, from them, 500 decoration spruces and 1.500 leafy trees we imported from our south neighbor country and they have adopted without any problem to the Mongolian climate.

Flower gardening and decoration has been occupying 330 square meter, lawn 24, and newly planted tree area 11.4 ha field. Our local state organizations paid special attention to provide with peaceful and comfortable atmosphere for the citizens for their recreation and in this purpose "Morin Khuur" complex and "My Mongolia" Park were built.

The organization takes care of 16 fountains, water sites, swimming pools and 4.5 km of distribution pipes in the city.

By the local budget financing, we have renewed the city decoration and projectors within the last 4 years and in total, have spent 503.9 million tugrugs. As a result, all the streets in Darkhan city are now have regular light.

Professional group of 4-5 people are working to provide the city with normal illumination and are responsible for the its maintenance and service. In order to protect from the poisonous insects, we paint 34 km of road fences and 23.500 aspens in autumn and spring seasons.
In order to provide the professional officers with comfortable working conditions, we have done repair work and furnished the administration and office building by ourselves and as a result, the state officers are fully provided with computers, techniques and furniture.

Service to remove the public wastes

We divide our service into 4 sections in the territory of Darkhan soum inclusive the 34 km or o2.4 ha auto road, 38.5 ha pavement and 325.6 ha square of ger district. We make regular treatments, then, transport the garbage to the special site by more than 10 garbage service tracks and eliminate there. In other words, on average, 40.000-45.000 square meter of garbage is transported annually.

More than 60 people are regularly doing the cleaning of the city streets, roads and squares and on average, the age is 30-35, which shows that we have young and healthy staff.

About 10 people are regularly cleaning 17 km of flood dam and canal facilities, and rain water removing lines of 12.5 km auto road within the city.

We provide with the normal operation of more than 10 bus stops, monuments and statues, and all the decoration in the city streets and squares, meanwhile, we purchase trees and bushes and the seeds of perennial plants and fertilizers from our south neighbor and the local supplies, take care, plant and water them in autumn and spring seasons.

We have put a goal and have been working in order to provide by the normative the service employees and officers with social security, labor security operations, the necessary tools and protecting facilities, to increase gradually the transportation vehicles, machines and equipment. In this way we can improve the scope and the capacity of our service.

Last years, the organization has very good contacts and cooperation with Irkutsk and Ulan-Ude

of Russia, Khukh city of China and the Regina state of Canada. We are studying the possibilities to develop projects and programs, to purchase techniques and technologies, which will suit to our country's conditions and the possibility to establish a small-scale waste processing factory.

Annex 5.

1. **Country:** Mongolia
2. **Project Title** : Solid Waste Management Service Upgrading Project in Darkhan city
3. **Project location:** Darkhan city, Mongolia
4. **Estimated duration:** two years
5. **Type of project:** Institutional building and solid waste services upgrading
6. **Project Implementing Organization:** Public utility services department and Nature, Environment and Tourism authority of Darkhan city
7. **Pre-project and end of project situation:** At present time, Darkhan City's solid waste management (SWM) system is outdated and inefficient. At end of project, Darkhan City's solid waste management (SWM) system management will be modernized and its technical capacity will be enhanced
8. **Development objective:** Development objective of this project is to enhance development and management of solid waste management sector of Darkhan city, through improving technical capacity of the Public utility services of Darkhan city.
9. Immediate objective: Immediate objective of this project is promote efficiency of solid waste management through update its technical capacity.
10. **Project Description** The system of storage of solid waste at-source, its primary collection from the doorstep, community storage, transportation to the processing and disposal site in as environmentally acceptable manner are to be introduced into the city with active public participation. Public awareness is to be built, vehicles and equipment are to be procured, staff is to be trained and processing and disposal sites are to be constructed and operational.
11. **Major outputs:** Darkhan City's solid waste management system is strengthened. The solid waste management system will be modernized with the collective efforts of the public and private sectors, including NGOs.
12. **Project Beneficiaries:** Improved environment, liability, better health and sanitation in the city. Beneficiaries are entire city population.
13. **Important assumptions conditions for the project:** It is assumed the city government would invite public and the private sector participation in the project and would provide necessary land and funds for the implementation of the project and make suitable laws for enforcement.
14. **Project Budget(USD)** : For project implementation in total: About US$ two million
    1). For vehicles and equipment US$ 1,000,000
    2). For treatment and disposal: US$ 1,000,000

Annex 6.

1. **Country:** Mongolia
2. **Project Title** : Solid Waste Management training in Drakhan
3. **Project location:** Darkhan city, Mongolia
4. **Estimated duration:** two year
5. **Type of project:** capacity building on solid waste services upgrading
6. **Project Implementing Organization:** Public utility services department and Nature, environment and tourism authority of Darkhan city
7. **Pre-project and end of project situation:** At the present, solid waste management officers at local Government agencies and public utility services department have limited knowledge of solid waste management. This is obvious obstacle in proper solid waste management. At the end of the project, the knowledge of various aspects of solid waste management of relevant officials of Dakhan city Government will be enhanced so that they can effectively carry out their respective functions leading to improvement in the development and management of the solid waste management sector
8. **Development objective:** Development of objective of this project is to enhance development and management of the waste management sector, through improving capabilities of personnel responsible for managing solid waste management
9. **Immediate objective:** Immediate objective of this project is enhance the knowledge and capabilities of relevant officials and university faculty to more effectively guide and manage the solid waste management sector.
10. **Project Description:** Organized a series training in the country on basic knowledge of solid waste policy and management, principles of and techniques of solid waste planning in market analysis, project planning, economic and financial analysis and environmental and social impact evaluation.
11. **Major outputs:** Appropriate legislation that will enforce solid wastes management will be prepared. The strategy " clean Darkhan city" revised. The capacity of solid waste management staff of Darkhan city enhanced. The wastes management education system enhanced through installation of computer technology in Technical University of Darkhan city, organized visit wastes management experts to the countries facing similar climate condition such as Sweden, Norway, Canada and Korea on environment sound wastes management.
12. **Project Beneficiaries:** Improved solid waste management that helps to improve environment, better health and sanitation in the city. Beneficiaries are entire city population.

13. **Important assumptions conditions for the project:** It is assumed the solid waste management officials and other staff relevant to solid waste management would be invited to the training.
14. **Project Budget(USD)** : For project implementation in total: About US$ 0.7 million
    1). In country training US$ 650,000
    2). Familization visit : US$ 50,000

Annex 7.

1. **Country:** Mongolia
2. **Project Title** : Project for recovering and protecting forest in solid waste site " Baraat", Darkhan city
3. **Project location:** Darkhan city, Mongolia
4. **Estimated duration:** two year
5. **Type of project:** Institutional building and solid waste services upgrading
6. **Project Implementing Organization:** Public utility services department and Nature, environment and tourism authority of Darkhan city **Pre-project and end of project situation:** In Darkhan City, the forest surrounding the urbanized area (green belt area) as well as solid waste disposal site has begun to gradually disappear, because of urban expansion and illegal felling of trees. In addition, currently some insects have severely damaged the forest surrounding the urbanized area.
7. **Development objective:** Development objective of this project is to protect and recovery the forest of green belt zone of Darkhan city.
8. **Immediate objective:** Immediate objective of this project is to protect and recovery the forest surrounding the area of the Darkhan city.
9. **Project Description:** Formulate a comprehensive city government policy for protecting and recovering the forest in the green belt area, by setting up a Project Unit including relevant government authorities and universities. Implement measures for recovering forest by:
    - controlling the development activities of surrounding areas of "Baraat" disposal site;
    - planting the appropriate species of tree at the surrounding of "Baraat" disposal site
    - conducting countermeasures for protecting forest from insects.
10. **Major outputs: Protection and recovery of forest in surrounding area of "Baraat" waste disposal site strengthened.**
11. **Project Beneficiaries:** Improved environment, liability, better health and sanitation in the city. Beneficiaries are entire city population.
12. **Important assumptions conditions for the project:** It is assumed the city government would invite public and the private sector participation in the project and would provide necessary land and funds for the implementation of the project and make suitable laws for enforcement.

13. **Project Budget(USD)** : For Project Implementation in Total: US$ 420,000

1). by the National Government US $ 20,000

2). by foreign assistance US $ 400,000

Annex 8.

1. **Country:** Mongolia

2. **Project Title** : Establishment of solid waste processing pilot plant in Darkhan city

3. **Project location:** Darkhan city, Mongolia

4. **Project duration:** 2 years

5. **Type of project:** Institutional building and solid waste services upgrading

6. **Project Implementing Organization: Darkhan city Government**

7. **Pre-project and end of project situation:** Before the project, Mongolia had no current waste processing unit. After ends of project Mongolia will have some waste processing experiences according international good practice;

8. **Development objective:** Development objective of this project is to reduce solid waste in Darkhan through establishing of waste processing pilot plant and it's sustainable operation

9. **Immediate objective: I**mmediate objective of this project is **t**o establish waste processing pilot unit in Darkhan city.

10. **Project Description:** Person produce 0.0023 m3 solid waste per year. Total population of Darkhan city is 120 thousand. The total generated waste (0.0023x365x120000) will be around 100740 m3 which is indicates the capacity of processing unit. The unit will separate 4 type of waste and will deliver products to customers. Therefore, project suggests to establish pilot waste processing unit in the Darkhan which will produce a compressed plastic and paper materials and fertilizer for cultivation. In terms of location of waste processing unit, the unit is planned to be established north-east of Darkhn city or near the current waste disposal site based on the dominant wind direction.

11. **Major outputs:** Produced a compressed plastic materials through collecting, shredding and warming different plastic wastes and Paper wastes will be processed and send fine products to toilet paper producing factory, Food or vegetable originated waste will be processed using drying

technology for producing livestock fodder and nutritious fertilizer for cultivation, remaining waste (construction or metal) will be transported to landfill site.

12. **Project Beneficiaries:** Improved environment, liability, better health and sanitation in the city. Beneficiaries are entire city population.

13. **Important assumptions conditions for the project:** It is assumed the city government would invite public and the private sector participation in the project and would provide necessary land and funds for the implementation of the project and make suitable laws for enforcement.

14. **Project Budget(USD)** : For Project Implementation in Total: US$ 4 million

    1). by the National Government US $ 1 million

    2). by foreign assistance US $ 3 million

Scale and scope of environmental impacts caused by solid waste processing pilot project

Scoping checklist

The various environmental impacts resulting from establishment of solid waste processing pilot project have been listed on the following scoping checklist, encompassing all anticipated environmental categories, and potential environmental and social impacts have been evaluated. **Ratings have been allocated in one of four categories, A to D.(** Table 9)

'A' indicates significant anticipated impact,

while 'B' indicates some anticipated impact.

The rating 'C' indicates that the impact is unclear and requires further investigation and that consideration should be given to the fact that the impact may become clear as the survey progresses.

The rating 'D' indicates a minimal or zero impact. The basis for each category is also explained below.

Table 9. Scoping check list（Waste Disposal " Baraat" site）

Environmental category			Details	Rating	Basis
Social environment	01	Displacement of local residents	Movement due to possession of land (transfer of residency / land ownership rights)	B	There are no residents living close to the pilot plant, but there are 2 security quad family for watchtower wastes management areas living within the waste disposal plant area. Construction work will require an interim displacement of these two Family. Since a consensus has been reached. It is thought that any impact can be reduced or avoided altogether.

	02	Economic activity	Loss of production opportunities in land etc., and other changes to economic structure	B	The planned wastes site is not currently in use, so no impact is anticipated on general economic activities. Impact is anticipated, however, on the 15 people currently engaged in collecting of valuable materials (glass, break, cement, coal and fuel) from within the landfill site. At present, they are considering plan where to be more organized approaches for them. Therefore, we thought that impact can be minimized or avoided entirely.
	03	Transport and educational / health facilities	Increase in number of accidents due to traffic congestion, and impact on schools / hospitals	D	There are no schools or hospitals in the planned site area, and it is not thought that there will be a significant increase in the number of waste collection vehicles in operation in the area.
04		Ancient remains / cultural assets	Destruction or loss in value to religious buildings or underground cultural assets	D	There are no religious buildings or cultural assets either in the site area or on the routes taken from the cities to the plant by collection vehicles.
05		Pasture / access rights	Disruption access rights to pasture mountains and forests	D	No impact, since the relevant land is currently unused land, already owned by the city.
06		Health and sanitation	Worsening health and sanitation conditions, due to waste products or occurrence	D	The occurrence of vermin and general sanitation conditions are expected to improve with the improvements to the landfill site.

			of vermin		
07		Waste product	Emissions of waste construction products, leftover soil, incinerator ash etc.	D	There is no plan to incinerate waste. Incinerate wastes burned in incinerator which located in another place. Waste construction products and leftover soil etc. to be disposed of in an appropriate manner.
08		Disaster (risk)	Increased risk of accident such as ground collapse / falling rocks	D	The pilot project involves construction work, but sufficient safety precautions have been built in to ensure the impact is minimized.
Natural Environment	9	Geography / geology	Changes to valuable geography or geology due to excavation / earth filling	B	There is no particular value associated with the landscape / history of the area. There may be some faults close to the area in question, but impact on the geography / geology of the area can be avoided through the sufficient safety precautions in built of construction.
	10	Soil erosion	Topsoil erosion after rain, due to land construction / logging	D	Some land construction and logging will take place in the pilot project, but impact should be minimal due to sufficient safety measures being taken to prevent erosion.
	11	Groundwater	Pollution of groundwater	B	The newly built area of the pilot plant is designed to recycle water and not emit any outside the areas that t is considered possible to avoid any impact on the groundwater.
	12	Lake / river flow conditions	Changes to flow quantity or riverbed from landfill or wastewater incursion	B	The newly built area of the pilot plant is designed to recycle water and not emit any outside the area. It is considered possible to minimize or avoid any impact on flow conditions.

	13	Plant / animal life	Reduced reproduction or extermination of species through changes to habitat	D	There have been no reports of natural parks, endangered or rare species in the area, so impact is considered to be almost zero..
	14	Atmosphere	Changes in temperature or wind conditions due to large-scale land development or construction of buildings	D	Impact considered minimal, as sufficient safety measures have been put into place.
	15	Scenery	Geographical changes due to land development, or impediments to the harmony of the landscape due to	D	No construction that could impact the scenery is to be carried out.
Construction of new buildings.					
Environmental damage	16	Atmospheric pollution	Pollution caused by emissions from vehicles / plant, and by noxious gases	D	There will only be a very minimal increase in the number of waste collection trucks in operation, and the landfill of waste can not produce emissions of smoke and methane gas.
	17	Water contamination	Pollution caused by soil or plant emissions being carried into rivers / groundwater	B	The newly built area of the pilot plant is designed to recycle water and not emit any outside the area. This will be an improvement on the current situation, meaning that water contamination will be reduced or even avoided.
	18	Ground contamination	Pollution caused by incinerator ash / emissions of non-burnable waste / dispersal etc.	B	Incineration does not take place within the processing plant, and emissions / dispersal of waste will be rectified by immediate covering with soil. There will be taking relevant measures to prevent ground

					contamination to be avoided.
	19	Noise / vibration	Noise / vibration emitting from collection vehicles or processing plant	D	The processing plant is sufficient distance from the city for this not to be a problem, and there will only be a minimal increase in the number of collection vehicles traveling into the area.
	20	Odors	Odors caused by gas / waste emitted from incinerator	B	No plans for incineration. Some odors arise from land filled waste, but this should be avoided by immediate covering with earth, reducing any impact.。
Survey categories: A: Significant impact anticipated. B: Some impact anticipated C: Unknown (requires consideration, may become clear during course of survey) D: Minimal or no impact					

Annex 9.

Waste management for Darkhan city project

Minutes for the Meeting

Date: Sept. 2, 2010

1. Mongolian Nature and Environment Consortium, the Study Team for the waste management for Darkhan city headed by Dr. M. Badarch has visited Darkhan city 2 Sept, 2010.

2. During the visit, the Study Team met with Mr. Ganbold, Director of Nature, Environment and Tourism Authority of Darkhan City and Ms. Lkamsuren, Chief engineer of Public Utility Department of Darkhan City and Mr. Mr. Lkhaasuren, officer of Nature, Environment and Tourism had working meetings and discuss on waste management project in Darkhan city.

3. During the visit of the Study Team, a Kick-off Meeting for the Project was carried out on September 3, 2010. The Mr. Ganbold, Director of Nature, Environment and Tourism Authority of Darkhan City and Ms. Lkamsuren, engineer of Public Utility Department of Darkhan City has emphasized the importance of the Project for the city. The Study Team made presentations on waste management for Darkhan city project -Execise. The Darkhan side expressed the understanding of the basic idea of the Project and willingness to make every effort to make the Project successful.

4. Darkhan city expressed its gratitude to the Ministry of Nature, Environment and Tourism, the Government of Korea for the support of Darkhan city for being involved in waste management - Exercise.

The List of participants to Meeting 2 Sept, 2010

5.

	Name	Position
1.	Mr. Bayaraa	Director, PUSD, Darkhan
2.	Mrs. Lkamsuren	Senior officer, PUSD, Darkhan
3.	Mrs. Uranchimeg	officer, PUSD, Darkhan
4.	Ms. Altantuya	officer, PUSD, Darkhan
5.	Mr. Ganzorig	Director , NETA, Darkhan
6.	Mr. Lkasuren	Vice director, NETA, Darkhan
7.	Mrs. Bolormaa	Senior Officer, Nature and Environment Inspection Department
8.	Mrs. Suren	Officer, hospital management, Darkhan
9.	Mr. Boldbaatar	Waste management officer, Darkhan soum
10.	Mrs. Selenge	Officer, development policy, Darkhan
11.	Ms. Shine tsetseg	MNEC, Ulaanbaatar
12.	Ms. Burmaa	MNEC, Ulaanbaatar

Annex 10.

Minutes of Meeting

October 27, 2010

Meeting for discussion of interim report was held on Oct,27, 2010 and 13 participants attended it. (See appendix -1) The objective of the meetings were to discuss and analyze interim report prepared by

The Mongolian Nature and Environment Consortium..

1- Meeting on Oct 27, 2010

1. After brief explanation of the working schedule of meeting, Dr. Badarch Director of MNEC, the participants discussed Interim report.

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2. Agenda of meeting were:
    1. Open speech by Mrs. Khorolmaa, MNET
    2. Major problems of waste management issues in Darkhan city by Mrs. Lkamsuren, PUSD, Darkhan City
    3. The results of waste characterization study by Mrs. Shinetsetseg, MNEC
    4. Preparation of Interim report by Dr. M. Badarch, MNEC

Identified Problems and comments to interim report

1) major problems in waste management:.

- Lack of basic infrastructure in waste management (truck, car, waste collection and land fill techniques)
- Soil erosion and contamination in the ger area.
- Ger areas are expanding without any solid waste control
- Inefficient waste collection system.

2) Environmental Problems

- Not enough greening in city.
- old technology of sewerage treatment

- Decreasing and damage of forest in Darkhan surrounding.
- Lack human and technical capacity in Solid waste management

3. Comments to Interim report:s

- Lack technical capacity (vehicle, truck and facility)
- Lack of solid waste management training
- There is no any experiences recycling solid waste
- Weak implementation " Clean-Darkhan " strategy
- Lack of greening in urban area as well as waste disposal site

List of participants of 27 Oct. 2010

	Name	Position
1.	Mr. Lkaasuren	Vice Director, Nature, Environment and tourism Authority of Darkhan
2.	Mrs. Khorolmaa	Senior Officer of MNET, Ulaaanbaatar
3.	Mr. Munkhbat	Officer of MNET, Ulaanbaatar
4.	Mrs. Lkamsuren	Senior officer, PUSD, Darkhan
5.	Mrs. Uranchimeg	officer, PUSD, Darkhan
6.	Mrs. Tsgaan bayar	officer, PUSD, Darkhan
7	Mrs. Altantuya	officer, PUSD, Darkhan
8	Mrs. Bolormaa	Officer of Inspection agency, Darkhan
9,	Ms. Suren	Officer, hospital management, Darkhan
10.	Mr. Munkhbat	Chief of land management, Darkhan
11.	Ms. Shinetsesteg	MNEC, Ulaanbaatar
12.	Boldbaatar	Environment officer, Darkhan suom
13.	Tsendkhuu	Officer, Inspection agency, Darkhan
14.	Lkhagvajaw	Officer of PUSD, Darkhan
15.	Munkhtuya	Officer of land management, Darkhan
16.	Dr. Badarch	MNEC, Ulaanbaatar
17.	L.Shinetsetseg	MNEC, Ulaanbaatar

Annex 11.

Minutes of Meeting
January 12, 2011

Meeting for discussion of final report was held in Ulaanbaatar on 12 January, 2011. It was organized by Ministry of Nature , Environment and Tourism and KECO, Korea to discuss final report on Waste management of Darkhan city and 21 participants attended the meeting. The attendants list was attached in Appendix-1.

1. After brief explanation of the working schedule of meeting, Mr. A. Enkhbat, MNET, Dr. Badarch,Director of MNEC, the participants discussed final report. Mr. Lee, KECO and Mr. Ganzorig, Director of Nature, environment and Tourism of Darkhan city made speech on open session.

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2. Presentations:
   - Current status of waste management of Darkhan city by Ms. Lkhamsuren, engineer of PUSD, Darkhan city
   - Waste management experiences and challenges by Mr. Lee Seung Hoon, representative of the KECO,
   - Preparation of final report by Dr. M. Badarch, MNEC

Major comments to interim report

Need reference materials to the report

- Include geographic maps of Darkhan Uul aimag
- Need more explanation for the text
- Use one unit (m3 or tone) in the report
- Comments of KECO should be included in Interim report
- English text of report should edited
- Include all e-mail addresses of participants in annex of report

Conclusion

The above major comments will be included in the report and present it to KECO, Korea before 19 January, 2011.

Mr. A. Enkhbat closed the meeting with his closing remark to making effort for successful the waste management of Darkhan city's exercise and also stressed importance of the cooperation between MNET and KECO, Korea.

Appendix-1 Attendants List

Participants list

№	Name	Organization	Contact address
1.	A.Enkhbat	Head of Clean Technology and Science Division, MNET	United Nation's street 5/2, Government Building -2, Ulaanbaatar 15160, Mongolia

			Aenkhbat@mne.gov.mn
2.	G.Khorolmaa	Officer of Clean Technology and Science Division, MNET	United Nation's street 5/2, Government Building -2, Ulaanbaatar 15160, Mongolia khorolmaa@mne.gov.mn
3.	J.Soyombo	Officer of Sustainable Development and Strategic Planning Department, MNET	United Nation's street 5/2, Government Building -2, Ulaanbaatar 15160, Mongolia Soyombo@mne.gov.mn
4.	D.Gantumur	Officer of Sustainable Development and Strategic Planning Department, MNET	United Nation's street 5/2, Government Building -2, Ulaanbaatar 15160, Mongolia Gantumur@mne.gov.mn
5.	Mr. Lee. Seung Hoon	Deputy general manager, Global environment cooperation team	Environmental research complex, Kyungseo-dong, Seo-gu, Incheon, 404-708, Korea shlee@keco.or.kr
6.	Mr. Kang, Jongil.	Assistant manager from Korea Environment Cooperation, Global environment cooperation team,	Environmental research complex, Kyungseo-dong, Seo-gu, Incheon, 404-708, Korea
7.	Ts.Munkbat	Office of Natural Resource and Environment Department, MNET	United Nation's street 5/2, Government Building -2, Ulaanbaatar 15160, Mongolia Munkhbat@mne.gov.mn
8.	G.Ganzorig	Inspector, State Inspection Agency	United Nation's street 5/2, Government Building -2, Ulaanbaatar 15160, Mongolia
9.	Ganzorig	Nature, Environment and Tourizm department, Darkhan city	Darkhan soum, Darkhan-Uul aimag, Mongolia Tel: 99373438
10	Lkhasuren	Nature, Environment and Tourizm department, Darkhan city	Darkhan soum, Darkhan-Uul aimag, Mongolia Tel: 99039097
11	S.Byambasuren	Head of UB city Maintenance Department	
12	Lkhamsuren	Public Utility department of Darkhan city	4th bag, Darkhan soum, Darkhan-Uul aimag, Mongolia Tel: 976-375-66-33751 E: hishgee@yahoo.com
13	Tsagaanbayar	Public utility department of Darkhan city	4th bag, Darkhan soum, Darkhan-Uul aimag,

			Mongolia Tel: 976-375-66-33751 E: hishgee@yahoo.com
14	Boldbaatar	environment officer of Darkhan bag	5th bag, Soum government building, Darkhan soum, Darkhan-Uul aimag, Mongolia E: boldbaatarbadraa@yahoo.com
15	Otgon tugs	solid waste data manager Environment information center, MNET	Baga toiruu 5/4 Ulaanbaatar, Otgontugs@yahoo.com
16	M. Badarch	MNEC	11 khoroolol, Erkhuu street, Building 4G, Ulaanbaatar 210620, Mobile: 976-99199276 Tel: 976-11354365 E: mnec8@yahoo.com
17	Shine tsetseg	MNEC	11 khoroolol, Erkhuu street, Building 4G, Ulaanbaatar 210620, Mobile: 976-96695359 Tel: 976-11354365 E: l.shinee@gmail.com
18	Shuren tsetseg	MNEC	11 khoroolol, Erkhuu street, Building 4G, Ulaanbaatar 210620, Mobile: 976-99890975 Tel: 976-11354365 E: shuree.j@gmail.com
19	Buyanjargal	MNEC	11 khoroolol, Erkhuu street, Building 4G, Ulaanbaatar 210620, Tel: 976-11354365 E: mnec8@yahoo.com

Annex 12. Photos

Meeting of 2 Sept. 2010

Meeting of 2. Sept. 2010












Meeting of 27, Oct











Meeting of 27, Oct


ULAANBAATAR HOTEL




Workshop on

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ULAANBAATAR HOTEL

Meeting of 12 January, 2011