Master's Program in Environmental Sciences
Doctoral Program in Sustainable Environmental Sciences
University of Tsukuba, Japan

Final Report of the International Internship in Mongolia

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University of Tsukuba

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Edited and compiled by
participants of the 2012 Mongolia Internship

Foreword

Various kinds of environmental problems are caused not only by natural phenomena, but also by human activities. Rapid population growth, poverty, poor infrastructure and sanitation, and the deterioration of ecological systems often accelerate environmental problems. To solve these problems, one needs a deep recognition and understanding of culture, and its environmental, economic, political, and social backgrounds.

Based on this understanding, the Environmental Diplomatic Leader education (EDL) program offers students opportunities for internship. For students who are interested in environmental problems, having the opportunity to visit areas of concern and gain experience on the ground is the best way to learn what an environmental problem is. Mongolia, a typical example of a semi-arid country, is a showcase of environmental problems for participatory students. This is because almost all of the participating students are from wet and hot regions and have seldom visited drier regions such as Mongolia. For all students, it was their first visit to Mongolia. In this tour, we covered many topics; water supply and treatment, mining industry and environment protection, biodiversity, eco-tourism and waste management. Moreover, an international meeting with a researcher from the National University of Mongolia was held on the last day of the tour. This offered students the opportunity to enhance their presentation skills and obtain a better understanding of each environmental situation they were exposed to through participation in the internship.

This report is a summary of field research conducted during the international internship in Mongolia. It consists of four parts. The first chapter contains daily reports. The second chapter includes research reports by each student on different environmental topics. The third chapter comprises the presentation slides of each student at the international meeting. The second chapter and the third chapter show how student understanding progressed throughout the tour. The last chapter contains an appendix of general information about this internship.

Lastly, we would like to express our gratitude to the EDL office staff. Without their general assistance, this tour could not have been undertaken. We are grateful to all the people who helped and supported us during this tour; especially the warm welcome from the nomadic families were unforgettable.

I believe that students understood various aspects of the environmental problems present in Mongolia and that this internship experience will be helpful in their future research and career development.

October 3rd, 2012

Rie MURAKAMI-SUZUKI

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Chapter 1

Daily Reports

1.1 Day 1 (29th July) Ulaanbaatar city

Reported by DINH Thu Hang and WANG Wenlong

1.1.1 Zaisan Memorial

On the first day of our visit to Mongolia, we went to the Zaisan Memorial. The Zaisan Memorial is a memorial south of the Mongolian capital of Ulaanbaatar that honors Soviet soldiers killed in World War II. It is located on a hill, high above the city.

After driving to the upper parking lot on the hill, we hiked up the stairs to the top of the monument and mural. On the way, we were rewarded with a panoramic view of the entire city of Ulaanbaatar in the valley below, as well as the Tuul River flowing past the city. There are typical grey Soviet apartment buildings, worn out houses and gers all randomly interspersed throughout the city. Apart from this, the entire city is one large building site, where countless modern and luxurious apartment buildings are in several phases of construction. At the foot of the hill there is a very large statue of Buddha.

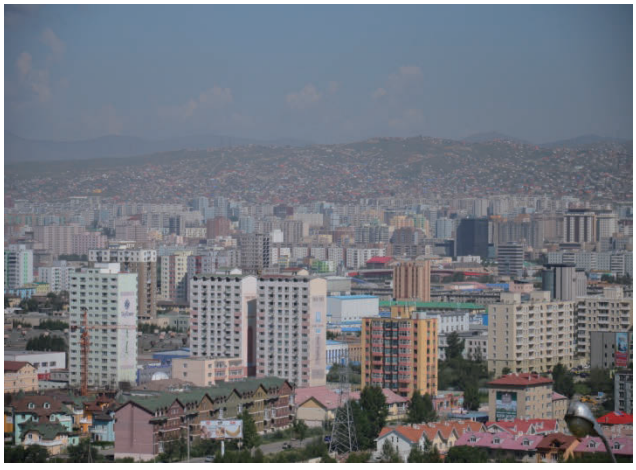

Fig.1.1.1 Ulaanbaatar city

Fig.1.1.2 Zaisan Memorial

After many steps, we reached the memorial. This modern memorial was built on the highest point of the city by the Russians. The outer skin and the statue are made from high quality Russian concrete. It features a circular memorial painting that depicts scenes of friendship between the people of Russia and Mongolia. The mural depicts scenes such as Soviet support for Mongolia's independence declaration in 1921, victory over Nazi Germany and peace time achievements such as Soviet space flights.

1.1.2 The Tuul River

After ascending from the memorial we continued on to the Tuul River.

After about 10 minutes from the Zaisan Memorial by car, we came to the bank of the Tuul River. Through the comments of Mr Byambakhuu Ishgaldan, a Mongolian official who accompanied us throughout the trip, we learnt that the Tuul River is well-known in Mongolia because it flows 819 km from Northern Mongolia, through the capital city Ulaanbaatar, and into the Selenge River, the largest confluent to Lake Baikal. It is typically frozen over from the middle of November through to the middle of April. Willow forests grow along the Tuul River, and the river itself is home to endangered species of sturgeon.

Fig.1.1.3 Tuul River

Currently, the river is suffering from pollution, partially caused by Ulaanbaatar's central sewage treatment facility, as well as heavy mineral and sedimentation pollution caused by gold mining in the Zaamar area. In addition, the steady influx of people settling near the river may be causing degradation of water

quality.

On the riverside, we saw an Ovoo. According to Dr. Byambakhuu, in Mongolia, the first thing all men and children do on the morning of Bituun is go to the Ovoo, or shrine on top of a nearby hill or mountain, carrying food and pray to nature while walking around it three times. Women are not allowed to go to the Ovoo and prepare tea and festive foods at that time. Everyone is expected to eat heartily to set a pattern for the New Year of plenty of food and prosperity. One buuz will contain a coin and the finder can expect special good fortune and prosperity.

Fig.1.1.4 The Ovoo near Tuul River

1.1.3 Museum of Natural History, Sukhbaatar Square, and Temple

In the afternoon, we visited the Mongolian Museum of Natural History (photo A&B), which is the oldest public museum in Mongolia. Numerous exhibits in this museum were collected by the Mongolian Academy of Science from all over Mongolia until 1924. This Museum has played an important role in the establishment of a museum system in Mongolia. Its displays include material from Geology, Geography, Flora and Fauna, Paleontology and Anthropology.

Fig. 1.1.5 Pictures in UB

(A: Museum of National History,B: Displayed fossils and dinosaur bones

C: Sukhebaatar Square and Government Palace, D: Gandantegchenling Monastery)

After the visit to the Museum, we went to Sukhbaatar Square (photo C) which is located in the center of Ulaanbaatar. One of the major buildings on the square is the Government Palace. Sukhbaatar Square is named after Damdin Sukhbaatar, leader of Mongolia's 1921 revolution. So, this place is very important for Mongolian people. We also visited a traditional Tibetan Buddhist temple, Gandantegchenling Monastery (photo D). We could experience and feel the Tibetan Buddhism atmosphere.

1.2 Day 2 (30th July) Dornogovi ,Mongolia

Reported by DAO Minh Khue

1.2.1 Eldev Mining Site

We spent all the second day of the international trip en route to the MAK mining company which is 300 km South East of the Mongolian capital, Ulaanbaatar. The Eldev coal mine is operated by Mongolyn Alt Corporation LLC, a domestic coal producer in Mongolia.

At 6am, we left the Flower Hotel for the MAK mining company and did not have enough time for breakfast at the hotel. However, we were provided with a packed breakfast to eat during our trip.

We divided into two groups and cars driven by Dr. Byambakhuu Ishgaldan and his friend. At 8 am, we had a breakfast prepared by the hotel at the top of a hill and enjoyed the fresh and cool atmosphere of the grassland. It even rained a little bit. There were some cow and sheep bones on the hill. We continued our journey and dropped in to a mini supermarket to buy some water and sweets in preparation for our two day stay at the Ikh Nart Nature Reserve.

We had a break 3 times and it took 7 hours to get the MAK mining company site, after getting lost once and twice asking for directions. For the first 5 hours, the road was relatively smooth and for the last 2 hours, the road corrugation, condition and heavy rain made driving difficult. There were a lot of small potholes filled with water on the road. Red mud and dirty water came up the side of the cars many times. We enjoyed singing some lovely Mongolia, English and Korean songs during the car trip.

At MAK's office, we met one person in charge of Health and Safety who gave us a basic orientation about the mining site, and then he and other staff took us to look at the site.. Protective clothes including jackets and hats were provided for us to wear before going on site.

Fig 1.2.1 Map of Eldev Mining site managed by MAK company

Fig 1.2.2 Eldev Mining site

Fig.1.2.3 Orientation meeting before visiting the mining site

We visited 3 different places at the mining site: the surface soil spoil heap (Fig.1.2.1); re-planted land (Fig.1.2.2); unplanted recovering land (Fig.1.2.3).

Fig.1.2.4 Surface soil spoil heap

Fig.1.2.5 Re-planted land

Fig.1.2.6 Un-planted recovering land

From the top of the hill, we could see the whole mining operation and the recovering land at the MAK site. After this, we saw the mining operation from the

ground level. By this time it was around 12:40 and lunchtime for the workers, so we could see the site uninterrupted. We had a Q&A session for more than 1 hour (from 12:45 to 14:00).

Fig.1.2.7 Listening to the explanation of staff from Eldev mining company

Fig.1.2.8 Staff housing

Then we had lunch at the MAK canteen until 14:45. The lunch with beef, boiled potato, sauces and sheep milk really satisfied our hungry stomachs.

1.2.2 Towards Ikh Nartiin Chuluu Nature Reserve

After the site visit, we continued on to the camping site with 2 breaks on the way; to relax and cool down the cars' engines.

Fig.1.2.9 Break time on the way to Ikh Nartiin Chuluu Nature Reserve

On the way, we met staff of the tourist company who guided us to the camping site at 18:30 after 3 hours of driving and bad road conditions. We took five

or six hours to travel from Ulaanbaatar to the NR. Before approaching the NR, pastureland was the only scenery we could see every time we woke up, but the landscape changed totally in Ikh Nart with a variety of amazing rocky outcrops.

We enjoyed discovering a new camping site with Mongolia traditional gers including a mini restaurant, shower facilities, a library with nice decorations and 14 other rooms used for tourist accommodation.

Fig. 1.2.10 Eco-Gers at Ikh Nartiin Chuluu Nature Reserve

I was very surprised that there was a small library with English books at the camping site for tourists including books on environmental conservation and the natural history of Mongolia etc.

At 20:00, we had dinner together in a lovely ger with western style food as most tourists come from European countries. We chatted and made plans for the next day until 21:30.

1.3 Day 3 (31th July) Ikh Nart Nature Reserve

Reported by DANG Nguyet Anh

1.3.1 Searching Wildlife

During dinner the day before, it started to rain, which made us worry about the next day's activities. However, we felt lucky when we welcomed a new beautiful sunny day and began our journey to explore the natural beauty of Ikh Nart. The manager of the Red Rock camping site accompanied us. At first, we visited the highest point from which we could observe the endless landscape of the NR. The experienced manager enthusiastically told us about the history of Ikh Nart NR.

Fig. 1.3.1 Roof of a Ger

Fig. 1.3.2 Continuous rocky outcrops in the Ikh Nart NR

Fig. 1.3.3 On the highest hill in the NR

Different plants used for medicine and food including herbs for making jams, mushrooms for cooking were found on the way.

Fig.1.3.4 Plants for food and medicines in the NR

In the morning, our group tried to chase the Argali and Ibex, which are famous at Ikh Nart NR, but we were not very successful. All we found were the places where they live. All of us were very impressed by the story about the Ibex which is one of the dominant animals in the NR. When and Ibex feels that it is going to die, it climbs up to a high mountain and stays there for a few weeks without eating or drinking and decides to end up its life by jumping a from high mountain. After that, we visited historical sites of ancient Mongolia where we could find some small artifacts from the past.. I paid attention to the solar system for electricity at the camping sites for International and Mongolian researchers who were working on Argali, Ibex and Vulture conservation in the NR. Unfortunately we could not meet any researchers because they had returned to the city for work and will return later for research fieldwork.

After having lunch at the camping site, we decided to search for Argali and Ibex in the NR with the help of the NR manager and binoculars. The sun was very strong and we could see some Ibex in the distance. In particular, we could approach a new born vulture on a low rocky outcrop. It was an amazing experience for all of us.

Fig.1.3.5 A group of Argali in the NR (Source: Suzan Fox, 2012)

1.3.2 Historical Sites and Herders

The manager of the Red Rock camping site and the Mongolian guide took us to some other historical sites. I could see the remains of a place that used to be a temple. It no longer looked like a temple with only simple walls and windows remaining. We were also shown some tombs of the kings and queens of Mongolia and special features of their burial place.

Fig.1.3.6 View from a window of the temple

Then we visited a winter camp site which acts as good shelter for livestock to protect them from extremely cold weather during the winter.

Fig.1.3.7 Winter camp site in the NR

On the way back to the Red Rock Camping site, we dropped in at the Ger of a

herder, the only ger in the NR. His livestock serves the food demands of tourists and are regularly supplied to the camping site. We were all very happy to be treated to milk products made by the herder's daughters.

Fig.1.3.8 Yoghurt made from goat milk

It started to rain heavily and we had to go back to the camp site. After the rain, two special rainbows appeared in the sky. The sunset in the NR was so beautiful that we had to take photos. We will never forget this wonderful memory during our life.

1.4 Day 4 (1st August) Ikh Nart Nature Reserve

Reported by SUN, Xiaogang

1.4.1 Beautiful Skies of Ikh Nart

Fig.1.4.1 Double Rainbows

Fig.1.4.2 The Plough and gers

Fig.1.4.3 Sunrise at Ikh Nart

Fig.1.4.4 Blue Sky with white clouds above green grassland

The clear and beautiful sky of the Mongolian Plateau is well known as “Mongolia Blue” but its real beauty is not just the blue color. We experienced dramatic changes in the beautiful sky at Ikh Nart in two days. Yesterday evening, after heavy rain, double rainbows appeared in the sky. They were so sharp that we could see both arches from the horizon. At midnight there was a starry sky, and the Plough was just on the top of our gers. Early in the morning, the sky was layered in red and orange just before sunrise. During the daytime, there was a blue sky with white clouds moving fast above the green grassland. People say the beauty of nature itself provides the most persuasive reason for natural conservation. Staying at Ikh Nart NR, I completely agree with this opinion.

1.4.2 Interview with the Camp Manager

Fig.1.4.5 Camp Manager Mr. N

With more than 10 years living and working in Ikh Nart NR, he knows all the path in the area, nests of endangered birds such as Cinereous Vulture, and habitats of rare mammals such as Argali Sheep and Siberian Ibex. He loves this place very much and has strong passion to share this beautiful nature with his guests.

After breakfast, we held an interview with the camp manager. He was an electronic engineer before taking an environmental training course in Germany. When he came back to Mongolia, he worked for a tour company and started to run ecotours.. Now he works not only as a camp manager but also as a conservation officer in Ikh Nart NR. The campsite opens from April to October and has about 800 to 2000 visitors every year; most of them come from overseas. There are 20 people who work as rangers protecting the national reserve. Each of them is responsible for a specific area. Every day, 10 of them patrol the area by motor bicycle. If they find any illegal activities, they inform the police immediately by mobile phone. Thanks to their vigilance, illegal hunting in the national reserve has been reduced to 2-3 cases per year. On the other hand, local herders are permitted to enter the national reserve for herding during the wintertime or in times of natural hazards such as Dzud.

1.4.3 Medical Springs

Fig.1.4.6 Hospital next to the medical spring

Fig.1.4.7 Medical springs

After interviewing the camp manager, we had to prepare for our departure. We really wanted to stay longer because there were lots of environmental issues to learn about in the NR.. We left the campsite at 11:00 am. On the way to U.B., we passed a hospital next to three medical springs. Each spring is heavily fenced in order to preserve its water quality. Spring water is regarded as medicine for headache, heart and stomach problems. Here, we were also impressed with a Mongolian custom, which prohibits people from crossing a spring or stream upstream in order to keep the water clean.

1.4.4 Nomadic Life Today

Fig.1.4.8 Nomadic household

Fig.1.4.9 Horse stable

Fig.1.4.10 Modern electronics and furniture in a ger

Fig.1.4.11 Young boy riding a horse out in a field

On the way, we also visited a nomadic household. Despite the sudden visit, the housewife and her three sons welcomed us. They served us with homemade cheese and cookies. A small boy also showed us how to ride a horse. Since there is no other household in the surrounding area, children always ride horses a long distance to meet their friends. Although the life of nomads still depends on livestock, we saw lots of industrial products in the house, such as a television with a satellite

antenna, a motor bicycle, and a small truck. It seems that they have been able to integrate these modern products into their traditional pastoral life.

1.5 Day 5 (2nd August) Ulaanbaatar

Reported by SAKAKIBARA Koichi and WANG Wenlong

1.5.1 Narangiin Enger Waste Landfill Site

In the morning, we visited Narangiin Enger Waste Landfill Site, one waste landfill site in Ulaanbaatar, which is located in northwest of Ulaanbaatar. It was constructed with the cooperation of Japan in 2009 and Korea also subsidized the recycling equipment for plastics.

Fig. 1.5.1 Dump truck carrying waste

Fig. 1.5.2 Office building (subsidized by JICA)

They have 300 trucks that carry the waste from each district in Ulaanbaatar. Recently the landfill treats 1200 t waste per day. However, it was said that the capacity of this landfill is limited and will exceed its capacity in 2020. The types of waste are mainly paper, plastic and soil waste from domestic households. The amount of food waste is very small, because most people in Mongolia have livestock, so leftover food is usually given to livestock. A workshop is located at the bottom of the landfill, which was constructed by Korea. They collect recyclable waste and classify this waste into glass, bottle, plastic and bone. After that, most of these are exported to China as resources to be used in industry.

In the afternoon, we had an opportunity to see and learn about the urban discharge system in Ulaanbaatar. After a brief investigation, we found some problems in the urban drainage system in Ulaanbaatar.

1.5.2 Waste and Water at the Ger areas in Ulaanbaatar

There are no wastewater discharge systems in the suburban areas. This situation may cause soil erosion after precipitation, and there is the of transporting some pollutants to other places (Fig.1.5.3).

Some ditches are exposed to the air. In this situation, odors may be released from the ditches and influence the air quality in urban areas (Fig.1.5.4). Some ditches retain their original dug structure without being consolidated by cement. Infiltration from surface water to groundwater may occur (Fig.1.5.5). There is a possibility that untreated waste water may directly flow into the river. This is a big problem because river water is one of the main water sources. So, once the river water is polluted, people in UB can't live there (Fig.1.5.6).

Fig. 1.5.3-1.5.6 Current situation of wastewater treatment in the ger area of UB

1.6 Day6 (3rd August) Ulaanbaatar

Reported by WANG Wenlong

We had a summary presentation of this fieldwork at the National University of Mongolia in the morning. 6 students (5 students and Ms. BADAMSED Delgermaa) and 3 professors (2 internship professors and Prof. MASUDA Misa) from the University of Tsukuba, and 1 lecturer (Dr. BYAMBAKHUU Ishgaldan) from the National University of Mongolia attended this meeting.

At the start of the meeting, Prof. Sun gave a brief introduction of the EDL program at the University of Tsukuba. After that, five students from the EDL program made presentations, which related to water resource and treatment, waste management, conservation and protection of mineral regions. The titles of each presentation are listed below:

SAKAKIBARA, Koichi: Water resource in Mongolia
DANG, Nguyet Anh: Nature conservation and Ecotourism in Mongolia
DAO, Minh Khue: Mining activities in Mongolia and Environmental Issues
DINH, Thu Hang: Waste management in Ulaanbaatar, Mongolia
WANG, Wenlong: Air and water pollution in Ulaanbaatar, Mongolia

After each presentation, students and teachers actively discussed the research results. Ishgaldan Byambakhuu, a lecturer from the National University of Mongolia answered questions and outlined some situations and policies concerning our research in Mongolia.

Fig.1.6.1 Presentation by students and Dr. Byambakhuu

Chapter 2

Research Reports

2.1 Water Resource in Mongolia

SAKAKIBARA, Koichi

2.1.1 Introduction

2.1.1.1 A Brief Introduction of Mongolia

Mongolia is located in the north of the central Asia and borders Russia and China (Fig.2.1.1). Mongolia has a population of 2,750,000 people with a density of 1.8 persons/km^2 and with a total area of 1,560,000 km^2, and is the largest most sparsely populated independent country in the world. About 80 % of its territory lies above 1000 m. Mongolia suffers extreme temperatures; average summer temperature is 20 ℃ and average winter temperature is -23 ℃. The Gobi Desert covers a large part of southern Mongolia so. Precipitation is also very low in Mongolia. Average annual precipitation varies from about 400 mm in the northern region to less than 50-100 mm in the southern Gobi region.

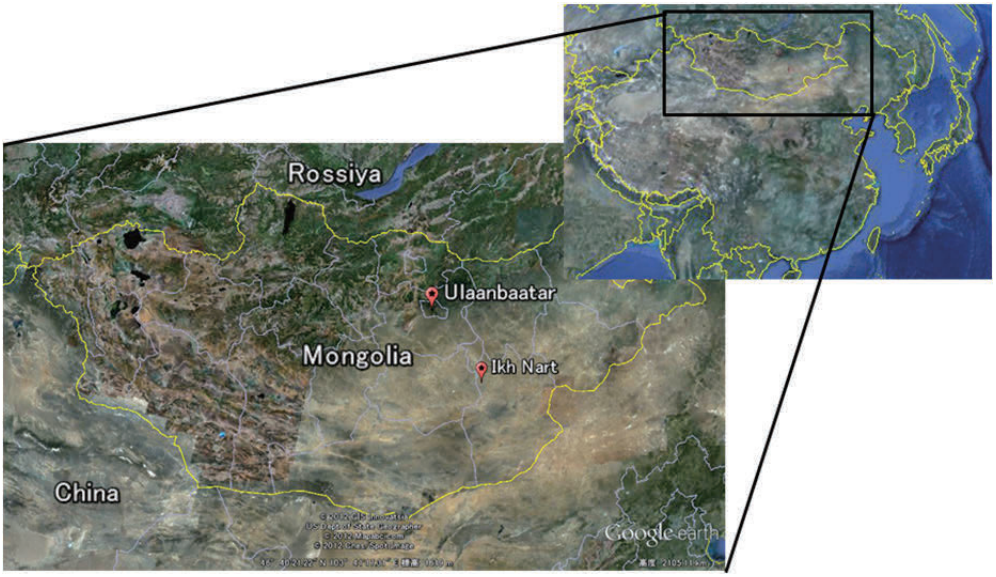

Fig.2.1.1 Geographic location of Mongolia (Source: Google earth)

2.1.1.2 Overview of Economy

Economic activity in Mongolia has been traditionally based on nomadic herding and agriculture. Agriculture and nomadic herding accounts for 18.8 % of GDP and includes wheat, barley, vegetables, forage crops, sheep, goat, cattle, camel, and horses. Recently the focus on agriculture and nomadic herding is changing towards the development of many kinds of industry. Industry accounts for 38.5 % of GDP and includes construction and mining, food and beverages, cashmere and natural fiber manufacturing and so on. Mongolia has extensive mineral deposits. Copper, coal, gold, molybdenum, fluorspar, uranium and tungsten account for a large part of industrial production and direct foreign investment. The service industry constitutes 42.7 % of GDP (Fig.2.1.2). The labor force is 1.07 million with 61 % engaged in the service industry, 34 % in agriculture and nomadic herding, and 5 % in industry (Fig.2.1.3). The unemployment rate is 2.8 %.

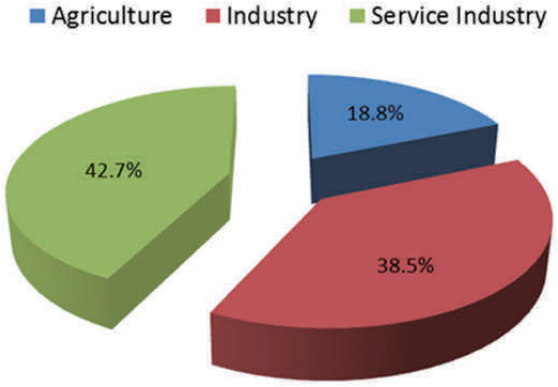

Fig.2.1.2 Ratio of Mongolian GDP
Source: Discover Mongolia

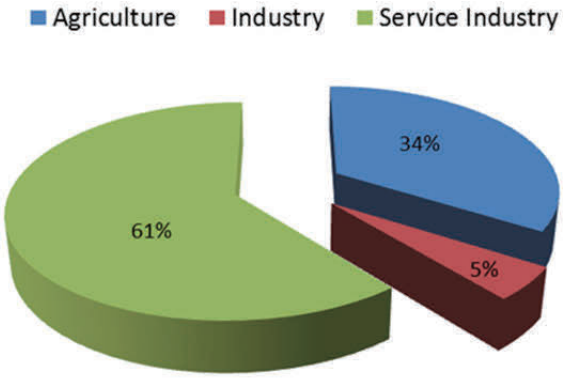

Fig.2.1.3 Ratio of the labor force in Mongolia
Source: Discover Mongolia

Mongolia joined the World Trade Organization in 1997 in order to expand its participation and integration into Asian regional economic and trade regimes. As a result, the economy of Mongolia is rapidly growing and the economic growth rate is 8.9 % with a per capita GDP of US $3200 as of 2008.

2.1.1.3 Ulaanbaatar Capital City

Ulaanbaatar is the capital and the largest city in Mongolia. An independent municipality, the city is not part of any province, and its population as of 2008 is over one million. The city is located in north central Mongolia and lies at an elevation of about 1310 meters above sea level in a valley on the Tuul River. It is the cultural, industrial, and financial heart of the country. It has many unique faces; the capital city is itself a nomad. Ulaanbaatar has changed location more than twenty times over the

past 350 years before being established in its current location. Despite its many transformations, Mongolia's capital has remained constant as the political, economic, and cultural center of the nation. Ulaanbaatar today reflects a close and sometimes amusing juxtaposition of nomadic traditions and modern society, perhaps best summarized by a skyline dotted with both gers (Fig.2.1.5) and towering skyscrapers (Fig.2.1.4).

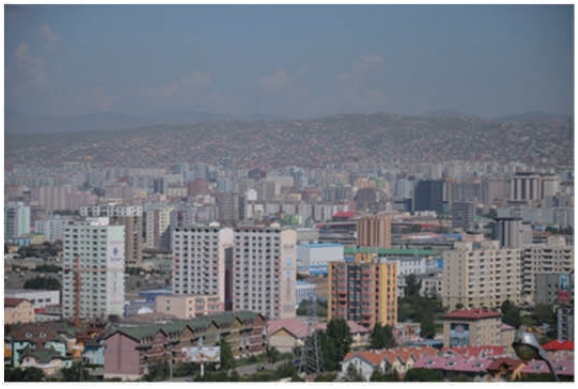

Fig.2.1.4 Urban area of UB

Fig.2.1.5 Ger area of UB

2.1.2 Water Resources in Mongolia

2.1.2.1 Overview

Mongolia receives very limited precipitation with the annual mean value ranging from <50 mm in the southern part to 400 mm in the northern area (Fig.2.1.6), and some 70-90 % of the precipitated water evaporates back into the atmosphere, and the remainder recharges groundwater and rivers. Rainfall is the principal source of water for rivers of the region, while melting snow is also important and water from this comprises 15-20 % of the annual runoff. In Mongolia, a semi-arid region of northeast Asia, more than 90 % of the total population use groundwater for daily necessities. The total water resource of Mongolia is estimated as 599 km^3, and is composed mainly from water stored in lakes (500 km^3 /year) and glaciers (62.9 km^3 /year) (Fig.2.1.7). Only 8 % of the total water resources are in groundwater and surface water except lake water and glaciers. Despite its limited amount, the surface and groundwater resources play vital roles in the country's economy, especially in agriculture, livestock production, industry and domestic water supply. For example, 31 % and 25 % of the total population of Mongolia receive water as tap water or via tank distribution, which mostly come from groundwater; 36 % directly from groundwater wells and 10 % from rivers (Batima and Dagvadorj, 2000). In 1996, 28 % of the total water from groundwater and surface water were used for municipal needs, 25.8 % for industry, 34.6 % for livestock, 7.9 % for irrigated arable land, and 6.5 % for other needs

(Myagmarjav and Davaa, 1999) (Fig.2.1.8).

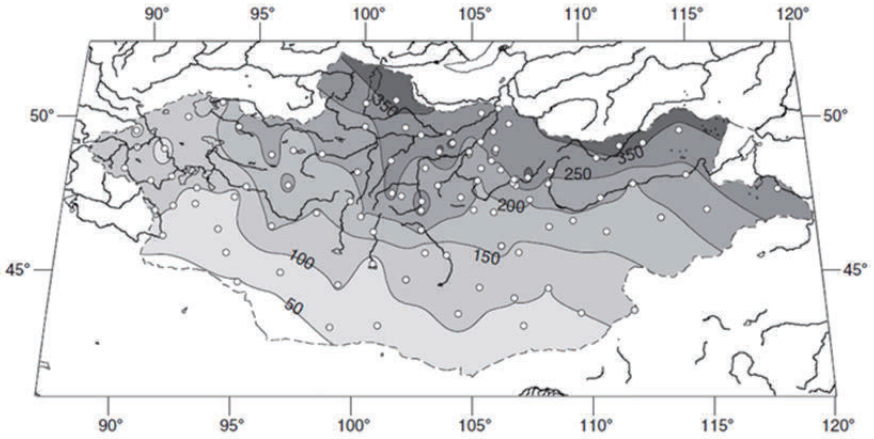

Fig.2.1.6 Annual precipitation (mm/year) in Mongolia (1993-2001)
Source: Sugita et al. (2003)

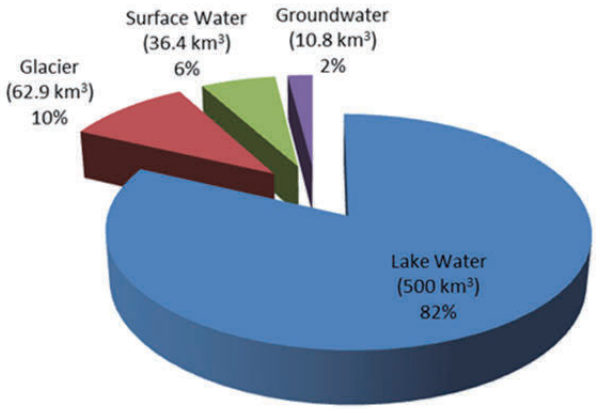

Fig.2.1.7 Ratio and amount of water resources in Mongolia
Source: Ikeda (2011)

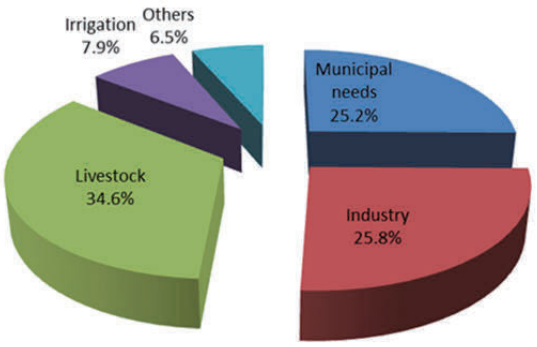

Fig.2.1.8 Ratio of water use in Mongolia

Source: Sugita (2003)

2.1.2.2 Accessibility of Water in Ulaanbaatar City

The water supply of Ulaanbaatar City falls under the responsibility of the Water Supply and Sewage Authority of Ulaanbaatar City (USUG). With the facility development program of Japan's grant aid, the water supply capacity has reached 240,000 m^3/day. However, water is supplied to Ger areas through water supply kiosks and shared by half the population, but water use is only 7.2 % /person/day.

65 % of the families in Ulaanbaatar city collect water from a water source outside of their houses. The majority (66 % of the people who collect water from outside) collect water from less than 300 m away from their home (Fig.2.1.9). 43 % of the families who collect water from outside spend less than 20 minutes on each trip to collect water. For the other 57 % water collection take longer because water sources are far from their home, time spent waiting in line or they have to navigate tricky terrain limiting the family's access to water (Fig.2.1.10). Despite the majority of residents being relatively close to water sources and spending relatively small amounts of time on water collection, there is considerably evidence that water collection poses a significant burden to many urban families. Newer families to the ger districts especially tend to have a problem because they often have to settle on higher slopes of the surrounding mountains, based on a lack of land available for settlement, and thus have a difficult journey to collect water (Batbold et al. 2004).

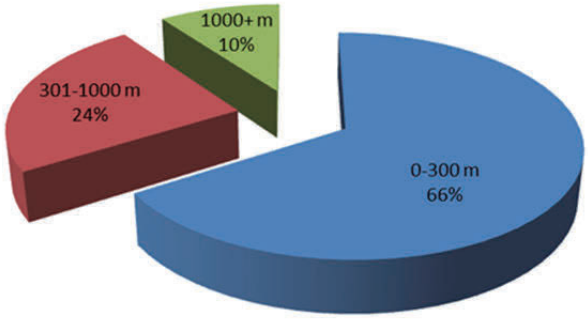

Fig.2.1.9 Distance to Water Source, for Families that Collect Water from Outside the Home
Source: Hawkins, Fieldwork

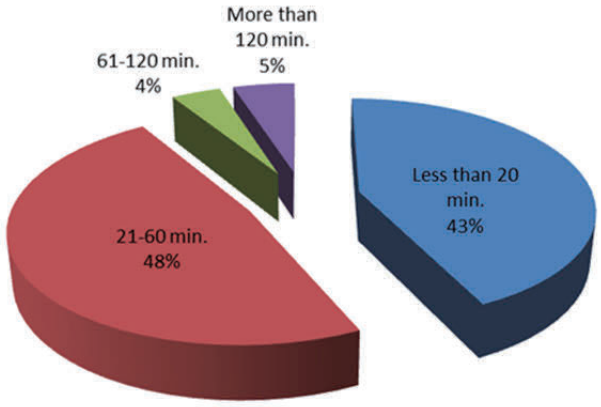

Fig.2.1.10 Time per trip (min) for Families that Collect Water from Outside the Home
Source: Hawkins, Fieldwork

2.1.2.3 Results and Discussion about Water Problem

As a result of human activities, many lakes and rivers in Mongolia are severely depleted or dry. 40 % of the total population of Mongolia lacks access to safe water resources and only 25 % has adequate access to sanitation facilities. Growing urbanization and the mining industry has significantly polluted surface and groundwater resources, which has had a significant impact on associated ecosystems. Furthermore, overuse of groundwater resources has led to lowering of the groundwater table, which has consequently caused some springs, lakes and their associated ecosystems to dry up. Increasing numbers of livestock and uncontrolled grazing practices are also affecting the balance between ecosystem and water quality. In the case of the capital city, no management of the water resources has been carried out since in 1990. Nowadays, people in Ulaanbaatar use 4 main public wells that supply

241,000 m^3/day for domestic use. However, it is predicted that water demand will exceed water supply in 2013 (Fig.2.1.11) due to increased urbanization. The urban situation has become serious particularly in regard to the water supply. The impact of water shortages, on daily lives and urban functions can be huge, so that strengthening of the water supply is an urgent issue.

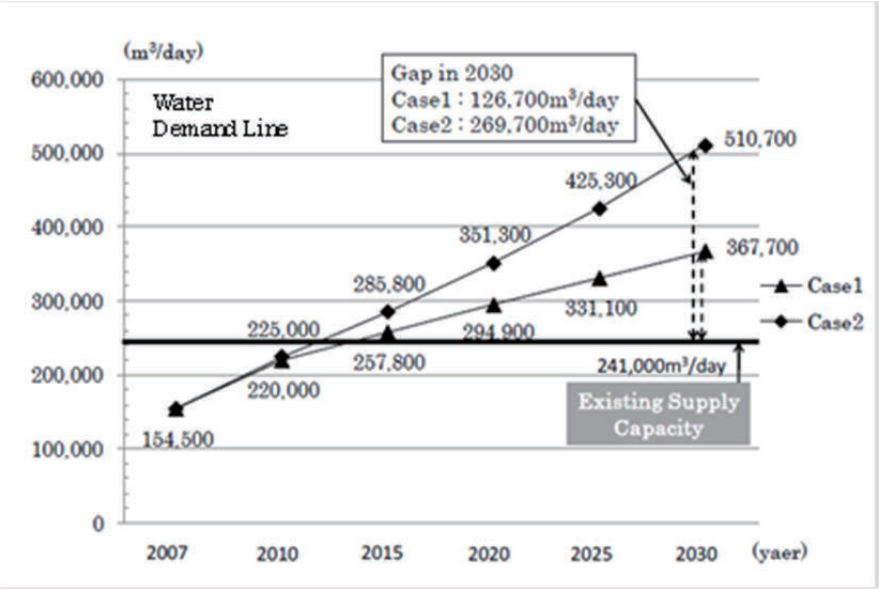

Fig.2.1.11 Changes water demand in Ulaanbaatar

Source: Ikeda (2011)

The government of Mongolia recognizes that conservation of water resource is of primary importance for the long-term development of the economy. (Fig.2.1.12)This is reflected in the terms of reference of the National Water Programme, which aims to ensure sustainable development of the country by the efficient use and protection of water resources (Fig.2.1.13-15). Therefore, in order to maintain sustainable development and meet the daily needs of the population, it is very important and necessary to legislate and regulate frameworks for the use of water resources.

Fig.2.1.12 Tuul river in UB

Fig.2.1.13 Well in UB (Ikeda 2011)

Fig.2.1.14 Spring and river in Gobi

Fig. 2.1.15 Well in Gobi

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2.2 Air and Water Pollution in Ulaanbaatar, Mongolia

WANG Wenlong

2.2.1 Background

Mongolia is landlocked country in East and Central Asia with the population of 2.75 million and aeration of 1564115 km2. About 40% of the population lives in Ulaanbaatar, and the economic activity in Mongolia has traditionally been based on herding and agriculture. In Mongolia, minerals represent more than 80% of Mongolia's exported to eventually rise to 95%. 1The country' richest resources are minerals—coal, fluorite, gold, iron ore, lead, molybdenum, oil, phosphates, tin, uranium and wolfram.

The researches showed that Ulaanbaatar has face serious environmental air and water problems as the increasing population and industrialization. Therefore, EDL program visited to Mongolia from July 28th to August 4th focusing on the environmental problem and conservation policy in Mongolia. This report elaborates the situation of air and water pollution in Ulaanbaatar, and makes some proposal to solve those problems.

2.2.2. Air Pollution in Ulaanbaatar

2.2.2.1 Condition of Air Quality in Ulaanbaatar

Air pollution is one of the serious environmental issues in Ulaanbaatar. We can see the air pollution intuitively that there several chimney discharging different color of smoke, which result in a grey lay in the air. (Fig.2.2.1)

The PM10 in Ulaanbaatar is higher than other cities. The PM10 in Ger Area is larger than which in the central city area because of the relative high combustion of coal and wood. (Figure.2.2.2) [2]During cold seasons, the air pollution increases dramatically, especially black carbon, monoxide, dust and smuts as the consumption of wood and coals.

Fig.2.2.1 The Situation of Air Pollution in Ulaanbaatar

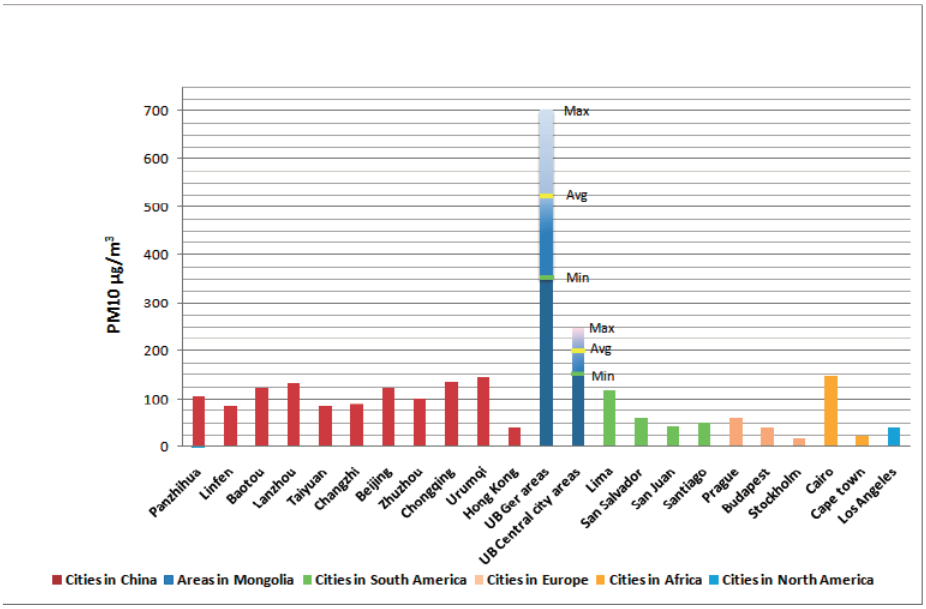

Fig.2.2.2: PM10 in UB city comparing with other cities in the world

2.2.2.2 Source of Air Pollution in Ulaanbaatar

(1) Topographic reason

Ulaanbaatar is located along the valley of Tuul River surrounded by four mountains. The average wind velocity in UB is relatively slow resulting in a difficulty to disperse the air pollution. By the way, temperature in winter is extremely low. Therefore, the air circulation decreases lead to an inverse temperature occurrence and result in the waste scattering in the air. (Fig.2.2.3)[3]

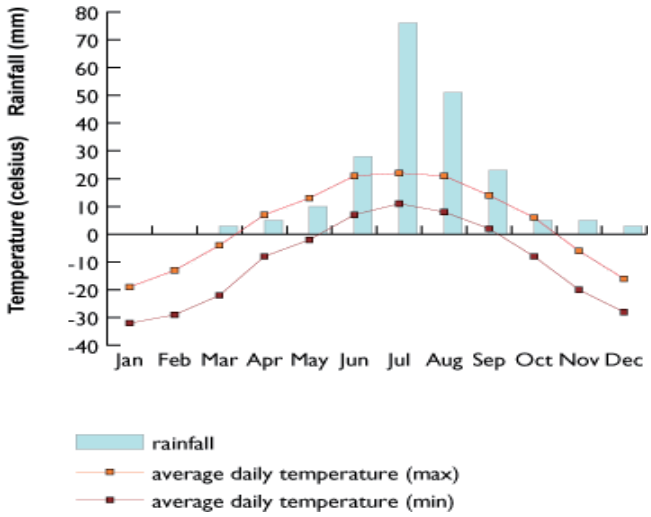

Fig.2.2.3: The weather statistic average of Ulaanbaatar

(2) Cook stove

There are sixty percent of the 220,000 registered households in Ulaanbaatar, in which more than half of the households live in Ger areas. Average usage of coal and wood in Ulaanbaatar is 5 tons and 3 m^3 (Fig.2.2.4) per year, respectively.

Fig.2.2.4: The domestic stove in Ulaanbaatar (left picture is stove in Ger and the right is stove in rural area)

(3) Power Plant

Three thermal electric power stations locate in south of Ulaanbaatar, which contribute the PM, dust, SO_x, and so on in Ulaanbaatar.(Fig.2.2.5)

Fig.2.2.5: The power plant in Ulaanbaatar

(4) Vehicular traffic

In 2007, 92706 vehicles were counted in Ulaanbaatar and 43.6% of them were 4-6 years old, 41.2% 7-10 years old and 5.9% were over 11 years old cars which are highly tend to be polluting the environment. These old cars consume more fossil fuel and discharge more waste into the air. Moreover, the vehicles would contribute more air pollution when traffic jam. (Fig.2.2.6)

Fig.2.2.6 Traffic Jam in Ulaanbaatar

(5) Dust

Many roads in Ulaanbaatar without viresence accumulate soil on it, which result in raising the dust when vehicles passed (Fig.2.2.7). This increases the PM directly and influences the urban environment.

Fig.2.2.7 Dust on the road in Ulaanbaatar

2.2.3. Water Pollution in Ulaanbaatar

2.2.3.1 Water Condition of Ulaanbaatar

River water is polluted in downstream because of discharging of wastewater from the domestic and industry. The data from monitor points in Zaisan, Songino and Altanbulag station shows that BOD and ammonium nitrate contents are not change near Zaisan station but BOD is 3 times higher and ammonium is 10 times higher than standard.

2.2.3.2 Source of Water Pollution in Ulaanbaatar

After brief investigation in Ulaanbaatar, we found some problems of urban drainage system in Ulaanbaatar.

(1) There are no wastewater discharge systems in some of villages. This may cause soil erosion after precipitation, and the pollutant may be rushed to other places resulting in water pollution. (Fig.2.2.8)

(2) Some of ditches are open-air in urban area. This may release odor influencing the air quality in urban area, the long-time smelling may cause diseases such as lungs diseases. Moreover, the solid waste in ditch may block the pipe. (Fig.2.2.9)

(3) Some of ditches are original structure without consolidation by cement. This may cause infiltration of wastewater, which may pollute the underground water. (Fig.2.2.10)

(4) Residues near the river discharge wastewater directly into river. This can increase the COD, and result in eutrophication and smelly air atmosphere. (Fig.2.2.11)


Fig.2.2.8


Fig.2.2.9


Fig.2.2.10


Fig.2.2.11

Fig.2.2.8: The village without ditch system

Fig.2.2.9: On-air ditch system

Fig.2.2.10: Original ditch system

Fig.2.2.11: The village near river

2.2.4 Result

Ulaanbaatar is facing with serious issue of air and water result from the increasing population and relatively distempered management. Air pollution in UB is mainly contributed with power plant, household stove, vehicular traffic and dust. Water pollution is inclined to domestic non- point and industrial point pollution. The Mongolian government has been taken actions to solve these problems, such as developing the technology of stove and power plant, constructing water treatment equipment and improving the water discharge system in Ulaanbaatar.

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2.3 Eldev Coal Mining Site and its Environmental Issues

DAO, Minh Khue

2.3.1 Mining Industry in Mongolia

Mongolia is a country located in East and Central Asia. It is bordered by Russia to the north and China to the south, east and west. With an area of 1,564,116 km^2, Mongolia is the 19th largest and the most sparsely populated independent country in the world, with a population of around 2.75 million people (2011).

Mining operations in Mongolia (exploiting major mineral deposits of copper, coal, molybdenum, tin, tungsten, and gold) have expanded rapidly since the country established its independence from the USSR and adopted the current Constitution in 1992. In 2010, declared mining revenues accounted for more than 80 percent of export earnings and 21.8 percent of GDP. These figures continue to rise with current strong commodity prices projected into the future and as evidenced by number of Chinese, Russian and Canadian firms opening and starting mining operations in Mongolia. The global mining boom resulting from these high commodity prices has arrived in Mongolia.

However, environmental issues affecting mining activities should be considered in order to ensure mining operations provide a base for long-term, sustainable economic development in Mongolia.

2.3.2 Eldev Mining Site

Eldev Coal Mining (ECM) site is located in Dalanjargalan sum, Dornogovi province. This mine is 21 km north from the center (Olon Ovoo railway station of the Trans-Mongolian Railway) and 300 km South East of the Mongolian capital Ulaanbaatar (Fig.2.3.1).

ECM is operated by the Mongolyn Alt Corporation LLC (MAK), the third largest domestic coal producer in Mongolia and is on the list of the annual top 100 companies listed by the Mongolian National Chamber of Commerce and Industry.

The coal reserve at Eldev Coal Mine was found in 1998 and coal production commenced in 2002. There are 120 workers working at this mine divided into 2 shifts a day (from 9 am to 6pm and from 6pm to 9 am). For every three working weeks at ECM, they receive one vacation week in Ulaanbaatar city.

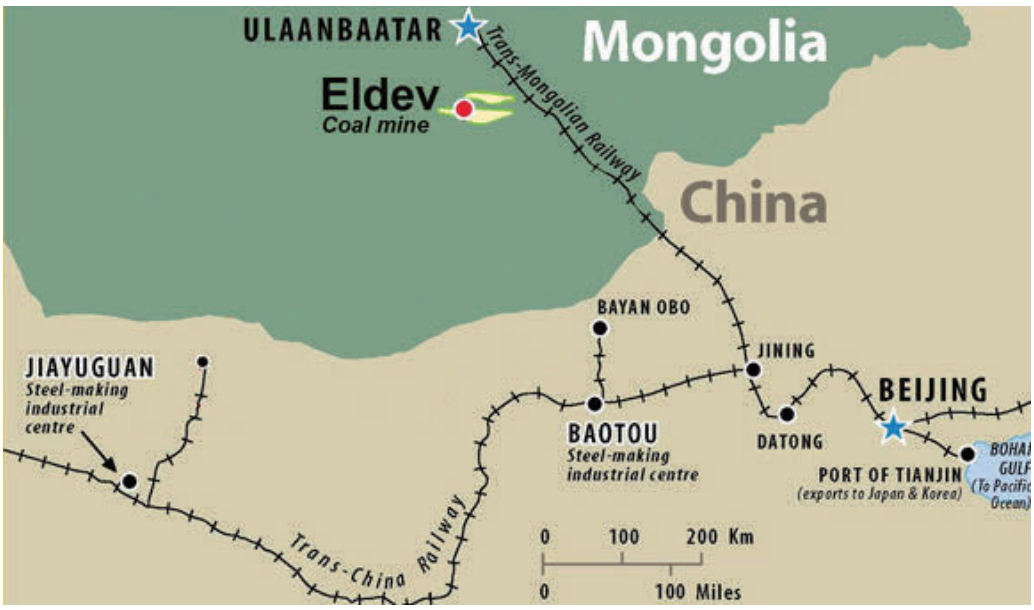

Fig.2.3.1 Map of Eldev mining site location

Source: http://mnakhas.mymgl.net/index-1.html

The mine has resources estimated at 51 million tons with an area of 180 ha, and currently exports 500,000 tons of coal per year, making it one of the largest existing operations in Southern Mongolia. The annual production rate is 0.5 million mt of bituminous coal marketed domestically and abroad to China via railroad. Coal is mined at a depth of 25 meters. Mostly the soil surface is removed to a depth of 14- 17 meters before reaching the stone coal layer (Fig.2.3.2).

Fig.2.3.2 Removed top soil and coal

According to the ECM staff, forty to fifty 120 ton trucks per day arrive at the site to transport the coal for consumption and export (Fig.2.3.3). Trains are the main transportation method to shift coal from this mine (Fig.2.3.4).

Fig.2.3.3 A 120 ton truck used for transporting coal

Fig.2.3.4 Coal transport train

A coal screening machine is used to separate high quality coal and stones before transport for export and domestic use (Fig.2.3.5).

Fig. 2.3.5 Coal screening machine

The mined products are high quality raw materials such as stone coal or bituminous coal.

Major customers of the Eldev coal mine in Mongolia are: Erdenet Mining Corporation, Khutul Cement & Lime Plant, Darkhan Metallurgical Plant, Ulaanbaatar Railway JV, an operator of the Trans-Mongolian Railway and the Darkhan City Power Plant.

2.3.3 Environmental Issues

Even though the Mongolian Government makes efforts to control mining activities to harmonize with the environment, many environmental challenges still exist. The Minerals Law of Mongolia was adopted by the Mongolian Parliament on July 1, 1997 and updated in 2001. The minerals law regime places various

environmental obligations on exploration and mining license holders. License holders are required to prepare an environment protection plan and environment impact assessment to address any adverse impacts that their operations may have on the environment. To ensure compliance with the environment protection plan, license holders must deposit an amount equal to 50% of their environmental protection budget for a particular year in a special bank account held by the Government. The Government accesses these funds if a license holder fails to fully implement its environment protection plan. Mine owners are obligated to allow officials "in charge of monitoring implementation of legislation on environmental protection" onto the site to conduct official inspections.

There are three main environmental issues at the Eldev mining site including dust pollution from coal transport, pastureland damage and landscape damage.

There are large numbers of truck movements per day in transporting the coal. The mine uses trucks to transport ore to the nearest railways. The effects of large volumes of road freight include (i) the trucks spread across the landscape, resulting in multi-tracking and huge expanses of degraded land; (ii) during summer, dust from unimproved roads causes human and animal health problems; (iii) the presence of large traffic volume disturbs and repels wildlife; (iv) higher traffic volume increases the risk of accidents with livestock, wildlife and humans; (v) higher volumes of truck traffic will also produce greater carbon dioxide emissions, nitrogen oxide and carbon monoxide. Near the mine site, there is a small pond for preventing and mitigating movement of dust from trucks containing and transporting the coal. However, according to the staff it is not enough to prevent dust arising from transportation means.

Also, it was easily recognized that many trucks of various sizes transport the coal in arbitrary routes (Fig.2.3.6). It is necessary to improve the infrastructure serving coal mining activities in this area to ensure reduction of dust and damage on pasture and landscape.

Fig 2.3.6 Arbitrary routes created by coal trucks

The most obvious and immediate impact on natural systems is conversion of land, for the mines, ancillary facilities, and regional infrastructure, resulting in loss of vegetation, wildlife habitat, and pasture. Additionally, the size and number of coal trucks, dust and noise are factors that prevent animals from crossing.

2.3.4 Discussion and Recommendations

Two types of tree and bushes were planted to facilitate land recovery in parts of the Eldev site after coal mining(Fig.2.3.7). The Mongolian Ministry of Nature and Environment organized and will monitor the replanting activities for a period of five to seven years. In addition, the mining company has to submit environmental reports every year on current conditions at the mining site.

Fig 2.3.7 Types of tree and bushes planted for land recovery after mining

Fig 2.3.8 Land conversion at the Eldev mine site

However, on the way back to UB, passing through many mining sites, mature trees or bushes were not seen (Fig.2.3.9). If these species are not suitable for planting in that area, then they should be changed to other types and the monitoring system needs to be improved to be more effective.

Fig 2.3.9 Landscape surrounding other mining sites

Other mitigation solutions to counter these threats will require detailed assessment of wildlife migration patterns, determination of crossing locations, and appropriate design of wildlife crossing paths. This has the potential to significantly raise the costs of railway construction. Construction of railways and roads will also involve land degradation at quarries, borrow pits, asphalt plants, construction camps and storage yards. Local environmental authorities must set and enforce appropriate construction standards.

Mitigation of these problems involves improving roads and requiring trucks to use the improved roads, enforcing loading and speed limits, and prohibiting road haulage during hours of the day when wildlife movements are most likely.

In order to develop the sustainable exploitation and use of coal resources, it is suggested to:

- Develop the coal processing industry to increase the value of the products and long term exploitation (Significant decreases in the prices of coal, copper, and gold in the world market would reduce the Government revenues and affect the Government's long-term development goal of improving the living standard of the Mongolian people)
- Develop and advance other energy technologies that don't use coal as input material (energy security)
- Utilize GIS for environmental reporting in the mining sector.

In addition, the organization of environmental education activities for workers and residents on mining sites is necessary.

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2.4 Solid Waste Management in Ulaanbaatar, Mongolia

DINH, Thu Hang

2.4.1 Introduction

The rapid expansion of Ulaanbaatar, the capital city of Mongolia, is one of the country's most critical development issues. Its population has been increasing constantly within the extent of the urbanization process. The population of Ulaanbaatar was 14.0% of the total Mongolian population in 1956 and this percentage reached 22.3% in 1969 and 43.6% in 2010 [(1)]. According to the statistics as of 01 January 2012, Mongolia has a total population of 1,206,610 people and 45.8% of the total population lives in Ulaanbaatar. The total administrative area of the city is now 30 times larger than the original built – up areas.

During past years, Mongolia has experienced trends towards increasing solid waste output, mainly due to concentration of the population in urban areas, increased consumption and changes in economic structure. Consequently, issues related to solid waste management (SWM) have become severe. Illegal dumping has become a serious issue, especially in the Ger area where many nomadic people have settled, due to a shortage of waste collection services. There was no proper solid waste management practice existing in Mongolia until 2007. Therefore, an inadequate waste disposal system created huge problems for the environment and human health. (Table 2.4.1)

Table 2.4.1: The amount of solid waste

Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
The total amount of waste for the city thousand/m^3	550	580	600	650	700	770
The amount of waste for the city is increasing by 5-10 percent year to year.						

Source: The current status and management of solid waste treatment in Ulaanbaatar city, Mongolia

2.4.2 The Current Status of Municipal Solid Waste Management in Ulaanbaatar, Mongolia

2.4.2.1 Current Situation of Municipal Solid Waste Management

According to a JICA research team, 150 thousand tons of solid waste is produced annually in Ulaanbaatar city. In the meantime research carried out by the capital city mayor's office concludes that 700 – 750 tons daily and 260 – 280 thousand tons of solid waste are produced annually in Ulaanbaatar city. The statistics also show that 590 grams per day/person solid waste are produced during winter and 216 grams per day/person are produced in warmer seasons. In particular, waste produced in the Ger district is almost 4 times higher than in the apartment district due to the production of ash from coal burning. (Table 2.4.2)

Table 2.4.2 Solid waste production in Ulaanbaatar (2006)

Solid waste sources		Total production (ton/day)	
		Winter seasons	Summer seasons
Household	Apartment	127.0	113.0
	Ger	391.8	85.2
	Total	518.8	198.2
Restaurants		11.4	12.3
Shops		3.9	5.4
Organization offices		14.9	20.6
Markets		4.0	8.1
Schools		0.9	0.4
Hotels		1.6	1.4
Total: Business waste		36.7	48.2
Clean up waste of streets and square		10.3	17.5
Total		565.8	263.9

Source: Field survey done by JICA funded research team

All types of solid waste generated by households and industry are transported to the waste disposal area. Solid waste treatment has 3 main stages: collection,

transportation, and disposal. The General Maintenance Company of each district is responsible for solid waste collection, transportation, and disposal however solid waste is usually delivered to the disposal areas without any basic sorting.

A company owned by the city is responsible for transporting the solid waste to the disposal area. There are some central disposal points in Ulaanbaatar City. Two of these process almost 90-95% of the solid waste and they are located on the upper side of the city. However, their operation causes soil and soil waste pollution, smoke, ash and dust during the processing of waste and pollution of the environment. Only at the Ulaanchuluut site is the waste sorted for landfill.

2.4.2.2 Regulatory Aspects

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. The following legislative acts have been approved and are being implemented (Table 2.4.3):

Table 2.4.3 Law and Plan in Mongolia

Year	Law and Plan
1995	The Law on Environmental Protection
1999	The Government National Plan on Waste Reduction Management
2002	The Mongolian Action Plan for "Improvement of solid waste management"
2003	Improvement of Health Care Waste Management
	Law on household and industrial waste
2006	Law on hazardous and toxic chemicals

Furthermore, some rules and regulations were developed for implementation of the Law on household and industrials waste (Table 2.4.4):

Table 2.4.4 Regulation and Rule in Mongolia

Year	Regulation and Rule
2002	Regulations regarding "Removal and disposal of hazardous waste
2006	Guideline on calculation of waste fee
	Joint order of the ministers for environment, health and education, science and culture on hazardous waste classification
2007	Rule on registration of hazardous waste
2008	Rule on waste registration and reporting

However, there is a lack of national coordination for waste management policies and the technical and human resources for solid waste management in the country are inconsistent.

2.4.2.3 Institutional Arrangement

The bulk of responsibility for solid waste management is decentralized at the district level, while the city government is responsible for landfill operations. Until 2007, the City waste management department directly managed the collection and disposal of solid waste in Ulaanbaatar. In 2007, a new regulation on waste management was introduced to minimize the city government's involvement, while increasing management efficiency. Under the current institutional arrangement, each district government is responsible for collection and transportation of waste from homes, business entities, and all other locations except for public, spaces. The waste management department of each district collects fees, manages contracting services with a privately run waste collection and transportation company, and provides street cleaning services to citizens. The Waste Management Department of UB operates waste landfills and collects and transports waste in public places by contracting-out to the state-owned enterprise, UB Tuk.

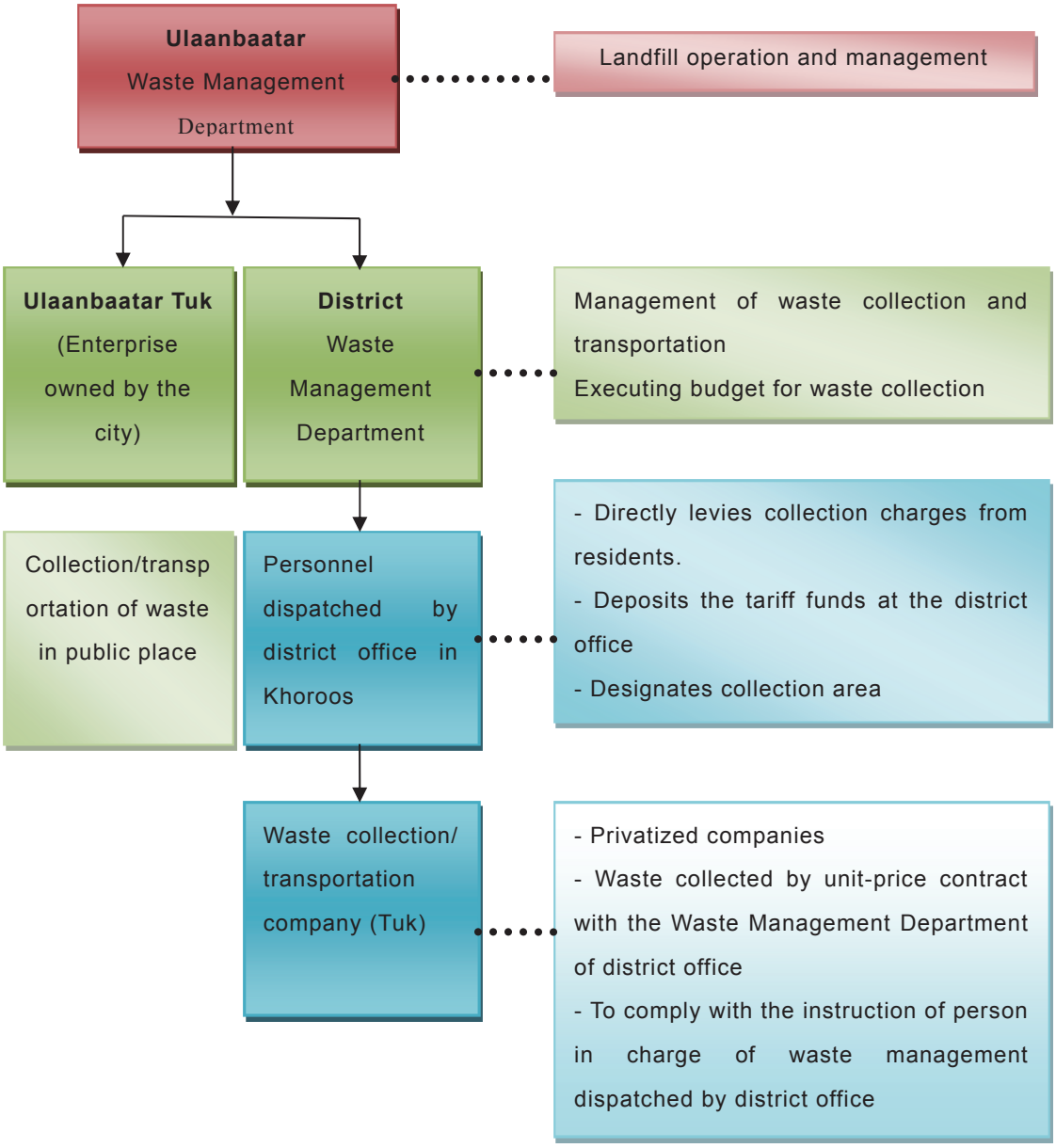


Figure 2.4.1 Institutional arrangement and responsibilities for Solid waste management in Ulaanbaatar

Source: The World Bank, Enhancing policies and practices for Ger Area Development in Ulaanbaatar

2.4.2.4 Current Garbage Collection System

Formal garbage collection is infrequent and unpredictable; residents dispose of most household waste themselves – usually by dumping it outside their houses, on

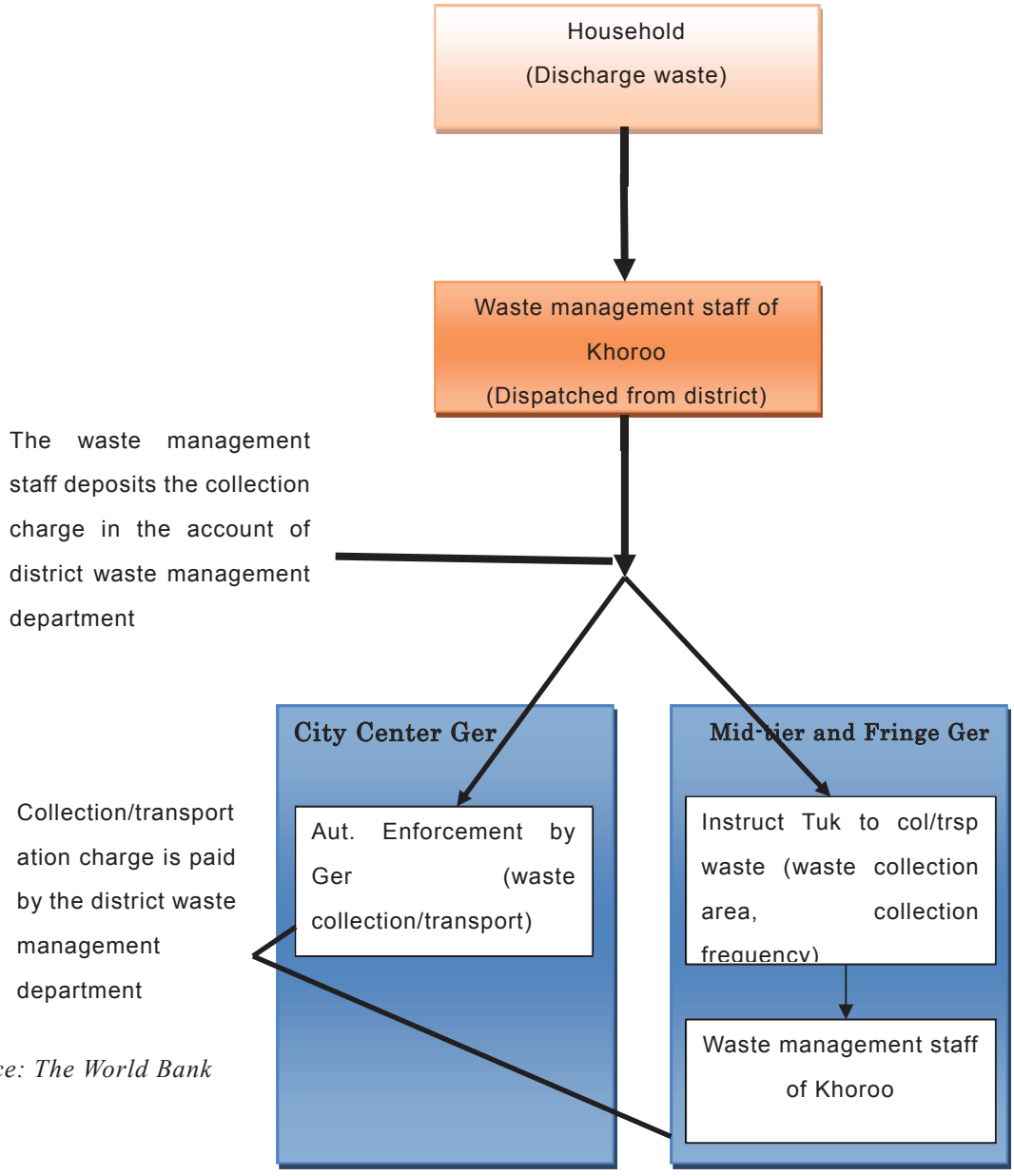
hills, in yards, and alongside roads and waterways. (Fig.2.4.2)

Figure 2.4.2 Waste dumped along the river and road

In contrast, apartment areas run a relatively efficient and clean 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. (Fig.2.4.3)

Figure 2.4.3: Waste truck in Ulaanbaatar city

The waste from three Ger areas is collected by vehicles from the local municipality that visits each household, door-to-door, and collects fees onsite. In the city center ger, an autonomous collection system within the Khoroo has been put in place. The Khorooowns collection vehicles and operates a few driver crews and support staff. District staff and vehicles go around to households to collect garbage and to levy the waste collection charge. The district government, in turn, pays a community – owned system for collection and transportation to landfill sites. (Fig.2.4.4) In the case of the Midtier and Fringe gers the arrangement is the same.



Source: The World Bank

Figure 2.4.4: Solid waste collection in three Ger areas

The quantity of waste produced in ger areas varies significantly by season. (Table2.4.5) The waste quantity during winter is three times that of summer: 0.9 – 1.0 Kg per person per day in winter in comparison with 0.2 – 0.3 kg per person per day in summer. This quantity is because heating fuel is consumed in large volumes during the cold winters.

Table 2.4.5 Solid waste management in three Ger areas (2010)

Classification	City Center Ger	Mid-Tier Ger	Fringe Ger
Households/Population	3.000/12.245	1.677/7.979	2.500/11.130
% of HH paying customs	30%	Less than 20%	30%
Frequency of waste collection	2 times/day 1time/3 months per household	3 times/day 1time/month per household	2 times/day 1 time/month per household
Form and number of pieces of collection equipment	1 open truck	1 open truck	1 open truck
Number of collectors	1 driver, 2 assistant workers	1 driver, 2 assistant workers	1 driver, 2 assistant workers

Source: The World Bank

The frequency of waste collection in the ger areas is very low, from once a month in the case of the Midtier and Fringe gers, to once every three months in the City Center ger. Furthermore, only one open truck, one driver, and two assistant workers are assigned in each ger area to cover 1,677 to 3000 households.

There is no waste recycling activities in Mongolia. However, some types of waste such as plastic, can, bone, etc are collected for export. (Fig.2.4.5)

Figure 2.4.5 Waste is collected for export

2.4.2.5 Solid Waste Tariff Structure

The waste collection tariff for households in Ulaanbaatar was set by the Municipal Council in 2006 at Tg 2,500 (US$1.79) per month for ger areas and Tg 2,000 (US$1.43) per month for apartment residents. However, the district can adjust the tariff level to some extent to reflect revenue requirements and socio-economic conditions of ger residents. In the City Center ger (Naran), the monthly tariff is Tg 3,000 (US$2.14); in the Fringe ger (Sharhad), Tg 2,500 (US$1.79); and in the Midtierger (Bayankhoshuu), Tg 1,500 (US$1.07).

About 30 percent of households actually pay a waste collection tariff. One reason obviously is the socioeconomic condition of poor households. Another important factor is the lack of awareness of the need for environmental protection and public goods. Residents do not seem to have strong confidence in the government's ability to manage waste. Some long-term residents believe that the garbage problem is created by new migrants and are reluctant to pay the collection fee. [(2)]

2.4.3 Some Research on Solid Waste Management in Mongolia

There are some research projects being implemented in Mongolia. JICA undertook a development study “The Study on Solid Waste Management Plan for Ulaanbaatar City in Mongolia” for2 years from 2004 and a Master Plan (M/P) for Ulaanbaatar City (Target Year 2020) was formulated with the aim to establish an environmentally sound SWM system in Municipality of UB (MUB) by the target year 2020.

Figure 2.4.6 The landfill in Ulaanbaatar city was built by the project for improvement of waste management in Ulaanbaatar.

In addition to MUB’s own efforts to achieve some aspects of the M/P, Japanese Grand Aid “The Project for Improvement of Waste Management in UB City” was implemented in 2008, through the construction of the new Narangiin Enger Disposal Site and equipment such as waste collection vehicles and heavy machinery were procured. As a result, the SWM system in MUB has been improving rapidly after the Development Study. However, challenges in actual operation of SWM still lie ahead in order to achieve the goals of the M/P. Furthermore, due to the rapid changes in organizations and SWM system as well as the introduction of new concepts such as 3Rs, development of capacities of human resources and organizations for SWM are urgently required. Due to the situations above, MUB requested JICA to implement a technical cooperation project for strengthening the capacity for SWM in Ulaanbaatar

City.

Therefore, a Japanese Expect Team was selected by JICA as consultants to implement the project together with their Mongolian counterparts in order to "Strengthen the Capacity for Solid waste management in Ulaanbaatar city in Mongolia". The project started at the beginning of October 2009.

2.4.4 Conclusion

In conclusion, despite the efforts being made with respect to the management of solid waste, the current system of waste management in the capital city of Mongolia is not adequate and is in dire need of immediate attention and improvement. There are fundamental problems with respect to waste management, such as a lack of a comprehensive policy and strategy, the absence of proper infrastructure, inadequate knowledge and skills. Consequently, there is a need to strengthen the policies and regulations and to provide substantial and environmentally sound technological/financial investment to improve the situation in Mongolia.

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2.5 Eco-tourism and Nature Conservation in Mongolia

DANG, Nguyet Anh

2.5.1 Nature and Biodiversity Status in Mongolia

Figure 2.5.1: View of endless grassland taken from a high point

Mongolia is a beautiful country with tremendous landscapes and huge ecosystems. With a total area of 1.6 million square kilometers and an extreme climate, the country still includes a variety of unique ecosystems such as the Siberian taiga forest, the Gobi desert, the Altay Mountains, and the Central Asian steppe which is the site of a number of rare and threatened plant and animal species. Mongolia's ecosystems are said to be globally unique (Chimed-Ochir et al 2010).

Mongolia's biological uniqueness stems from its distinct nomadic traditions and limited industrial development; therefore, Mongolia's nature and ecosystems are still relatively untouched. However, these ecosystems are sensitive to human impacts and slow to recover. The number of species in Mongolia is low compared with that of tropical countries but these species are also particularly unique. Therefore Mongolia is a significant place for research and conservation of precious gene sources.

Mongolia’s Fourth National Report on implementation of the Convention on Biological Diversity indicates that the country was home to more than 13,000 species of insect, almost 3,000 species of vascular plants, 76 species of fish, six

species of amphibians, 21 species of reptiles, 472 species of birds, and 138 species of mammals (MNET 2009).

2.5.2 Special Protected Areas and Nature Conservation in Mongolia

2.5.2.1 Special Protected Areas

According to the Mongolian Law on Special Protected Areas (1994), the State special protected areas are classified into: (1) national conservation park; (2) natural complex area; (3) natural reserve; (4) national monument area based on specific purpose (see Table 2.5.1). In addition the capital city, soum (county) and district may take specific areas of its territory under special local protection. From the definitions of the areas under the state protection in Mongolia, we realized the different conservation purposes of protected areas that require special measures for protection. Assets for financing protection of the above special protected areas may come from (1) state investment and local budget; (2) income from tourism and other activities; (3) donations; (4) reimbursement of damages or compensation.

Table 2.5.1: Special Protected Areas

Type	**National conservation park**	**Natural complex area**	**Natural reserve**	**National monument area**
Purpose	Ensure the ecological balance for particular features of natural zone and belt, its state of originality and outstanding scientific significance	Keep its natural original state and importance for historical, cultural and scientific knowledge, ecological education	Protect certain types of nature, to protect and conserve any resource and to facilitate reclamation	Preserve the unique natural formations, historical and cultural traces in their original condition

The figure 2.5.2 below indicates the proportion of Strict Nature Reserve, National Park, Natural Monument in Mongolia. Strict Nature Reserves and National Parks account for 48% and 43% respectively. The figures show the government's concern about the nature conservation with strictly protected areas.

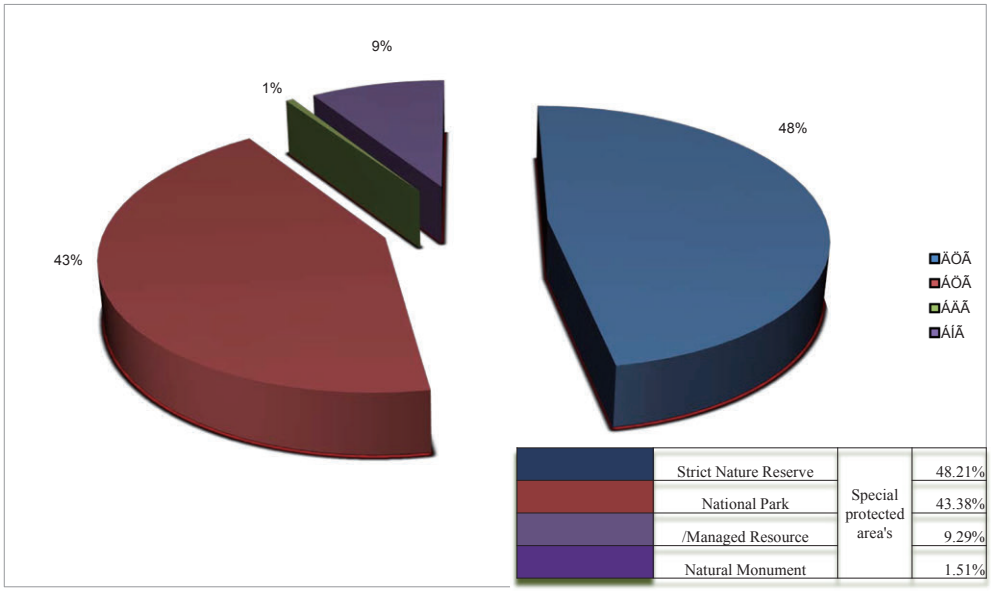

Figure 2.5.2: Mongolian Special Protected area rank

In 35 years, Special protected areas increased their area over 4 times from 5mil. ha (1975) to 22 mil. ha (2010) (see Figure 2.5.3).

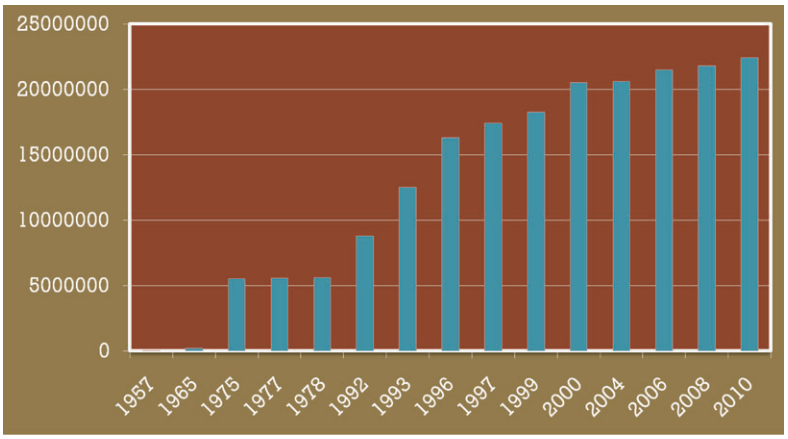

Figure 2.5.3: Increase of special protected area (million/hectare)

2.5.2.2 Nature Conservation

Nomadic culture and Buddhism encourage Mongolian people to live in harmony with nature and protect nature within their own living arrangements. In ancient times, there were many legends and stories in Mongolia about humanity's relationship with nature. Environmental education and conservation management training were even provided to monastic communities to raise Mongolian awareness about nature conservation. Taboos and prohibitions on protecting plants are aimed at sustainable use of natural yields and conservation of natural conditions. The Dalai Lama said. "Monks should go and teach conservation to those who are living in polluted lands, and to those who are living in untouched and unpolluted lands.

Buddhist talks have a more powerful impact than rulings from the state." (Chimedsengee, et al. 2009).

However, the steppes of Mongolia are under threat of transformation into desert due to overgrazing. Mongolia stands at the crossroads between conservation and development. The World Bank states that "Mongolian herds will be at greater risk of severe weather conditions if growing livestock populations and deteriorating pastureland is not reversed." Moreover, a mining boom threatens Mongolia's wilderness with huge mining sites established in different parts of the country. If there is no detailed plan for the construction and operation of these mining sites, the wildlife and steppes are easily damaged.

The Mongolian government has shown a strong commitment to biodiversity conservation by setting up a system of national parks and nature reserves. However, information on species biology, distribution and abundance, which are vital for conservation planning, is lacking. Moreover the skills to carry out scientific ecological studies and environmental problems are still lacking in Mongolia.

2.5.3 The Ikh Nartiin Chuluu Nature Reserve (Ikh Nart NR)

"Ikh Nart is a nature reserve established in 1996 and located in East Gobi Province of Mongolia with total area of about 66,000 hectares of grassland and semi-desert steppe environments and houses endangered populations including Argali Sheep and Ibex. The purpose of a Nature Reserve (NR), is to protect certain types of nature, to protect and conserve resources. Therefore, one major purpose of the NR is to protect endangered Argali and Ibex. Ikh Nart harbors a wide diversity of flora and fauna species, including 33 mammals, 6 reptiles, 125 birds, particularly migratory species and over 200 plants.

The NR covers part of 3 provinces; therefore its management requires close cooperation of local authorities. There are 20 rangers assigned to monitor and protect the NR from poachers and other threats. They use cellphones for communication and receive allowances from the government. 10 people are responsible for daily monitoring within a radius of 10 km. Poaching incidents are solved firstly by discussion between the rangers and the poachers. Only serious poaching will be reported to the police station. However, cases of illegal hunting are said to be limited to 3 or 4 per year. This number shows that poaching is not such a serious problem in the NR. Thus,20 rangers are in charge of monitoring the number of species in the NR to keep the numbers sustainable.

In the late 1990s, a group of international biologists in collaboration with the

Mongolian Academy of Sciences and local authorities began studying the species of Ikh Nart in order to understand the community ecology of the region and improve conservation management in the reserve. A research campsite in the north of Ikh Nart was set up through a join effort between the Mongolian government and a group of international biologists. Three projects are on going: the Argali Sheep and Ibex project, the Carnivore project and the Vulture project. Ikh Nart harbors one of the last groups of the globally threatened Argali Sheep - the largest mountain sheep in the world. Populations of argali are thought to be declining due to poaching for meat and horns and to competition with livestock. The red rock camping site manager indicated during a talk that the cases of poaching are few and there are not many livestock living inside the NR.

Figure 2.5.4: A baby vulture in the Ikh Nart NR

Moreover, Ikh Nart is also home to one of the world's largest vultures (see Figure 2.5.4). This large vulture ranges from Western Europe, where they are endangered, through Eurasia to Mongolia. Ikh Nart contains one of the largest concentrated breeding sites for this species. Therefore, the vulture project is aimed at understanding the breeding ecology and demography of vultures in the reserve. They should be well studied and protected for sustainable development of the species.

In the NR, apart from natural species, there are also cultural sites that have value such as the historical sites of old temples or tombs. Many sections of these sites are ruined due to weather and war. There are two tombs (Fig 2.5.5) of the King and the Queen of Mongolia from ancient times in the NR. Different belongings and clothes were buried in circles around the tombs. However, there are no notice boards providing basic information about the place such as name, history or cultural value. This reflects one weak point in the management of the sites of historical significance. In the future, some practical management measures should be applied for better conservation of these places.

Figures 2.5.5: Historical sites in the NR including the site of an ancient temple

2.5.4 Conservation & Development of Eco-tourism

Mongolia has high potential for the development of eco-tourism in nature reserves because 11.6% of the whole country has been reserved as protected areas by the government. Foreign visitors to Mongolia's designated protected areas total around 15,000 people/year generating revenue of US$30 000. The "wild nature" is a tourism attraction for many foreign tourists. (Mongolia Destination Guide, 2008).

Figure 2.5.6: Red Rock Camping Site

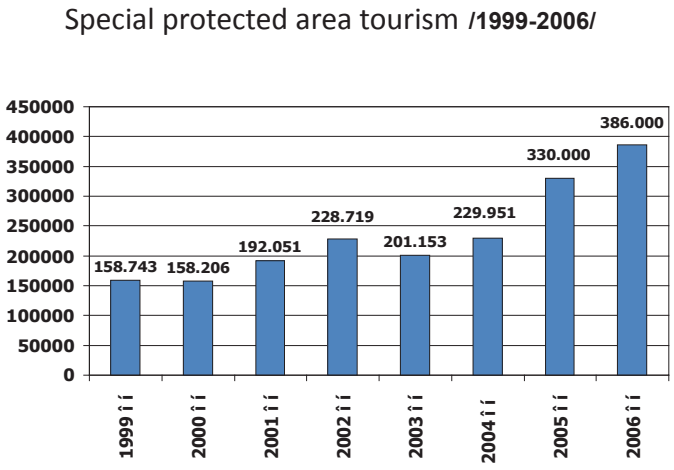

Figure 2.5.7: Number of tourists visiting Special protected area (1999-2006)

The figure describes the increasing number of tourists to the Special protected area in Mongolia. In 7 years, the number of tourists rose 60% that may create pressure on the natural environment. (Fig 2.5.7)

From the example of the Red Rock Camping site in Ikh Nart NR, we can envisage the development of eco-tourism in Mongolia. The camping site only operates from spring to autumn, the best seasons in Mongolia. It welcomes around 1500 guests every year and the number fluctuates year to year. Currently many private and foreign companies are participating in the development of eco-tourism in Mongolia. The Red Rock camping site belongs to Nomadic Journeys Ltd., an experienced Swedish tourism company. They know the true value of eco-tourism and that it attracts many tourists who have a high awareness of nature protection and conservation.

The operation of the camping site is comfortable but environmentally friendly. Firstly, electricity for lighting was developed and supplied by solar energy through consultation with a Swedish engineer. Water is taken from a 25 dug wells to supply

the washing demands of tourists. Animal dung is collected and dried for heating in Gers when it is cold. Particularly, waste is collected twice per week and brought to the nearby railway station for processing. There are 10 staff working at the camping site and the services provided are equivalent to the amount of money paid by tourists for their tours. There is one local villager working at the camping site and his school tuition fees used to be paid by the manager of the camping site. Moreover, there is a small library with many English books on the history of the Ikh Nart NR and nature conservation. These contribute to enriching their knowledge and raise tourists' awareness of nature protection. The manager also helps to monitor the wildlife species in the NR. Sometimes, he organizes training in conservation for tourists and new rangers. It is truly a sustainable way to develop eco-tourism in Mongolia. This eco-tourism model partly proves their success by the stable number of tourists visiting the NR every year.

However, a bad side of tourism development is that there is no limitation on the number of tourists visiting the NR and staying at the camping site. In peak time, there are 120 people staying in the camping site per night. The huge number of tourists may result in negative impacts on the nature and the surrounding environment through production of too much waste or threatening natural species. This reveals that there is almost no state management of ecotourism in Mongolia, even though it is very important for long-term economic development and natural conservation in Mongolia. Tourism development is currently driven by private companies and NGOs because the government does not assert its role in tourism management. In addition, Mongolian government has strategies to develop tourism and attract tourists. However, this tourism development focuses mainly on economic benefits rather than conservation. This explains why there are no ecotourism officers working in the tourism development department.

Tourism related pollution is also a newly emerging problem. Uncontrolled tourism may generate negative externalities as a result of pollution, congestion and depletion of natural resources. Lack of adequate systems for treatment of wastewater in tourism ger camps around lakes causes water pollution influencing aquatic habitats and the wildlife living in surrounding areas. Moreover, lack of paved roads on the grassland makes travelling by cars detrimental to nature. Infrastructure transportation should be improved to limit the destruction of pastureland which is the main food source of livestock in Mongolia.

2.5.5 Conclusion

Mongolia is now at the crossroads of conservation and development. To ensure

a sustainable future for nature and people in Mongolia, the government should formulate long-term strategies to protect biodiversity and conserve the locally and globally endangered species as well as historical sites of great cultural value. International cooperation for scientific research on natural species is also of great significance for Mongolia. Eco-tourism is a good way to develop the country's economy sustainably. However, it should be well managed by the government. Especially, the state and private companies should collaborate more closely when camping sites are located in nature reserves or protected areas as eco tours are becoming more and more popular and attracting many foreign tourists.

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Chapter 3

Presentations at the National University of Monglia (3 August)

(Order of presentation)

3.1 Water Resources in Mongolia

SAKAKIBARA, Koichi

3.2 Nature Conservation and Ecotourism in Mongolia

DANG, Nguyet Anh

3.3 Mining Activities in Mongolia and Environmental Issues

DAO, Minh Khue

3.4 Waste Management in Ulaanbaatar, Mongolia

DINH, Thu Hang

3.5 Air and Water Pollution in Ulaanbaatar, Mongolia

WANG, Wenlong

Natural Water Resources in Mongolia

International Internship 2012

Koichi Sakakibara

1

My research Topic in Japan

Hydrological Cycle (Water circulation)

→ focusing on Groundwater

- water resource for many people in the world
- basically invisible

We have to understand the hydrological process correctly, otherwise we cannot use water resources in a sustainable way.

2

Important factors from the view point of the Hydrological Cycle

- Source : What is the Source of groundwater?
- Path : How does groundwater flow?
- Time : How long does it take groundwater to reach its present point?

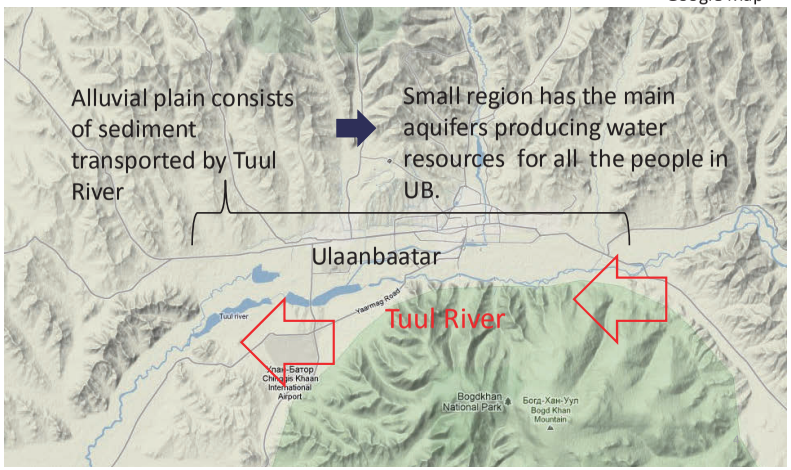
<These three factors are very important>

This is my research topic. My fieldwork area is the North China Plain (semi-arid region similar to UB).

3

Ulaanbaatar

Google Map



How to get the water

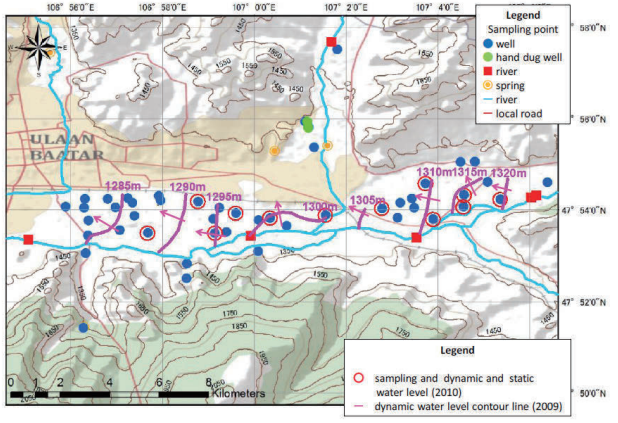
① Urban area in UB
Each building has a water distribution system, so water is taken directly from wells
②Suburban area in UB (people living in their Ger)
People cannot get directly water from wells.
Well → water distribution point →Local people (suburban area)

Tuul River recharge groundwater

Survey depth of GW level

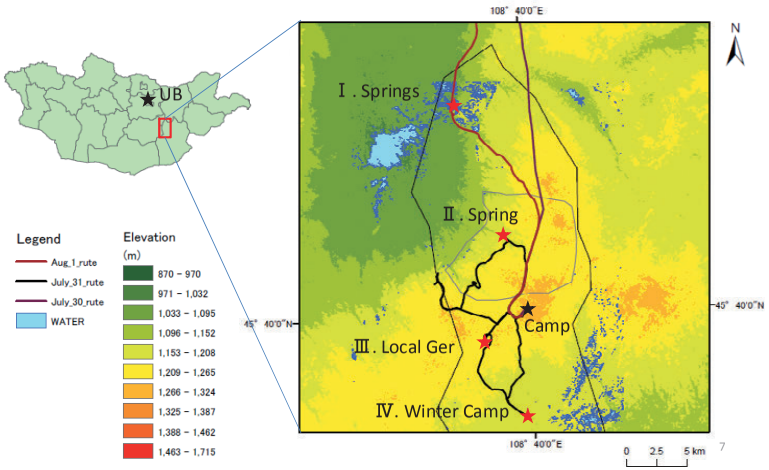
Draw contour map of the GW level

Allows us to see GW flow direction



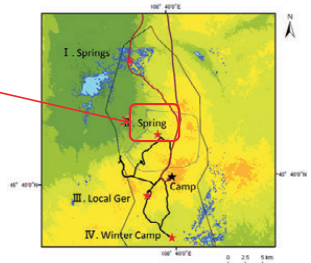
Ikeda (2011) 6

Map of Ikh Nart



7

Spring Point



・A lot of water comes from springs

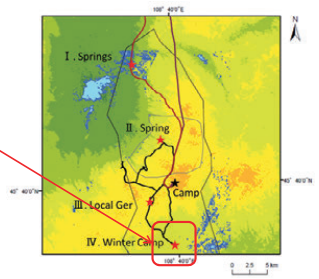
・Due to relatively low lying land many springs run intermittently

・Springs like this are very important for wild animals and nomadic people as a water resource

Winter Camp

・Nomadic people use this as a winter camp site during the winter season

・This is the well for livestock, and there are wells for drinking water nearby.

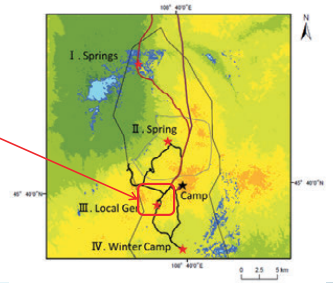


9

Local Ger

・A Ger is usually erected near water resources

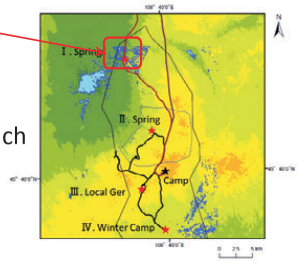
・Lake water for livestock and groundwater(well) for drinking water



10

Spring for Medical Treatment

3 wells
▶right : head
▶center : stomach
▶left : heart



・Many people come here and drink the 3 types of water.

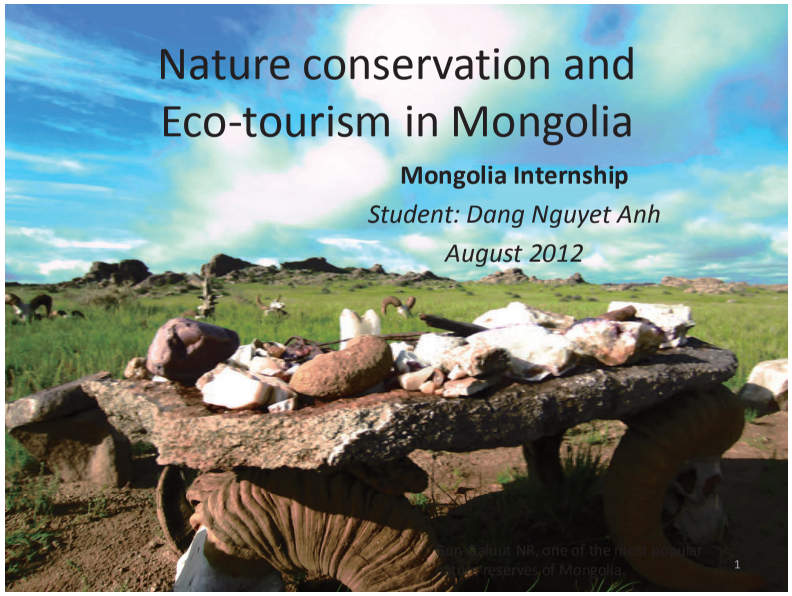
・Water quality is different from each well.

11

Notes

- Water resources (especially groundwater) are very important in Mongolia.
- Tuul river is the main recharge for groundwater
- In Ulaanbaattar city, water issues such as declining water levels or decreasing water quality will occur in the near feature because of overconcentration of population.
- In rural area, human impact is very low.

12



Outline

- Introduction of the research topic
- Preparation before the internship
- Learning from the internship
- Questions for discussion

2

Research topic

- **"Economic valuation of the Nha Trang Bay Marine Protected Area (MPA), Vietnam to suggest a sustainable financing mechanism"**

- Using *contingent valuation method* to estimate the *economic value* of the MPA by proposing hypothetical conservation fee and asking the *willingness of tourists visiting the bay to pay*
- Marine conservation >< Tourism development

→ Conservation issues and tourism development in the nature reserves of Mongolia?

3

What does Mongolia have?

- Chinggis Khan- the conqueror
- Unlaanbaatar city : population: over 1/2.64 mil., density: 1.7 persons/km2
- Mining sites
- Pasture land
- Gobi Desert
- Rich cultural heritage: Nomadic culture
- Dinosaur fossils
- ***Untouched large scale ecosystems, undisturbed nature***

4

Nature conservation

- Mongolia stands at the crossroads between conservation and development
- Rare and endangered species: snow leopard, Argali and Ibex…

- According to the Mongolian Law on Special Protected Areas (1994), areas under protection (special protected areas) are to be classified as:

- Strictly Protected Areas (12)
eg: Great Gobi SPA
- National Conservation Park (9)
eg: Gorkhi-Terelj NP
- Natural Reserve (16)
eg: Ikh Nart Nature reserve
- Monument (6)
eg: Khuisyn Naiman Lakes

Source: http://www.parks.it/world/MN/Eindex.html
http://www.wipo.int/wipolex/en/text.jsp?file_id=204024#LinkTarget_31

5

Eco-tourism potential

- 11.6% of the whole country has been reserved as protected areas by the Govt.
- Foreign visitors to Mongolia's designated protected areas: 15 000/year
- Total revenue: US$30 000.
- "Wild nature" → tourist attraction
- Mongolia is ideal for horse trekking, camel riding, long distance cycling, hiking, fishing, and yak carting

Source: Mongolia Destination Guide, 2008

6

Problems facing nature conservation

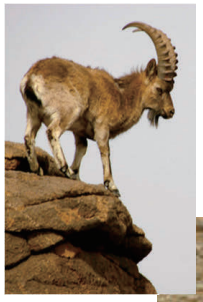
- Lack of finance and know-how concerning management of protected areas.
- Dirty water, air, pollution, firewood collection and electric generators
- Illegal hunting (poaching)
- Illegal mining

- 1992: Department for Protected Areas Management and Ecotourism, **Ministry of Nature and Environment**
- 1995: Tourism Policy Department within the **Ministry of Trade and Industry**
- 1996: Tourism Policy Department, **Ministry of Infrastructure** (Economic focus and no ecotourism officer)

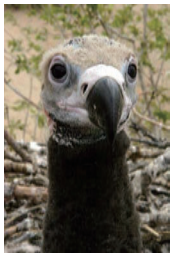
7

Ikh Nart Nature Reserve (NR)

- Located East Gobi Province of Mongolia
- Established in 1996
- Area: 66,000 ha
- Grassland and semi-desert steppe environments
- Rare wild species: Argali, Ibex… are threatened by poaching for their meat and horn



Siberian Ibex (200)



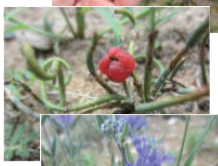
Cinereous Vulture chick

Argali Sheep (600)

Source: www.ikhnart.com

Useful flora of the NR

Different plants for food and medicine



9

Cultural and historical values

10

Management of the NR

- The NR covers part of 3 provinces → collaboration
- No entrance fee
- No clear boundary
- 20 government pays rangers monitoring the NR → 3-4 poaching/year (low)
- Red rock camping site: contributes to the conservation of the NR
- Joint research by Mongolian scientists on the community ecology of the region and improvement of conservation management

11

Eco-tourism at the Red Rock Camping Site

- Green energy: solar panels and wind mill supply the basic lighting demand of tourists
- Animal dung is collected for heating the Gers
- Waste is collected twice a week to take to the station for disposal
- Library with information about the NR and conservation for tourists (many English books) to raise awareness of conservation
- Tourists learn how to live in harmony with the nature and live an eco-life

12

Questions raised?

- The participation of local people in conservation?
- Few instances of poaching are reported. Is the monitoring process truly effective or it is a waste of resources?
- What are the detailed conservation measures for rare wild animals and historical sites?
- Is use of an entrance fee applicable?
- What happens if the number of visitors to the Red Rock Camping site and the NR increase steadily?

13

14

Environmental Diplomatic Leader Education Program
University of Tsukuba, Japan
Master's Program in Environmental Sciences

Mining activities in Mongolia and Environmental Issues

International Internship in Mongolia (28 July - 4 August, 2012)

Dao Minh Khue - 201125024

1

CONTENTS

2

Introduction

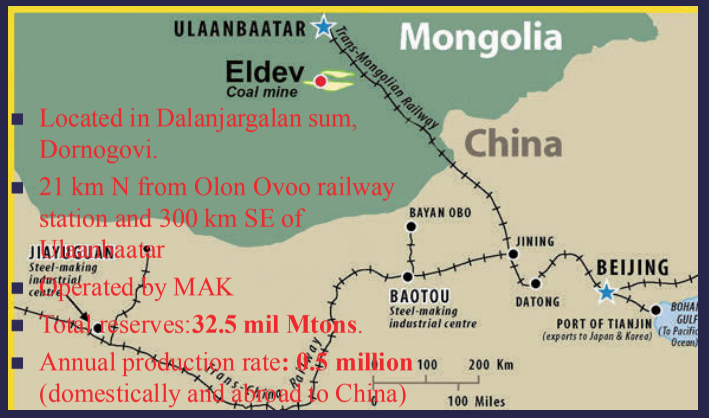
Thesis topic: Sustainable Wastewater Management from Paper Producing Activities in Vietnam: Case Study in Phong Khe Craft Village, Bac Ninh province.

Main idea: Increasing development of industrial production (at household level in producing non-agricultural products) brings economic value and maintains traditional cultural values; but causes environmental and social impacts.

Q: How to manage those problems within industrial production?

3

Eldev Coal Mine



- Located in Dalanjargalan sum, Dornogovi.
- 21 km N from Olon Ovoo railway station and 300 km SE of Ulaanbaatar
- Operated by MAK
- Total reserves:**32.5 mil Mtons**.
- Annual production rate: **0.5 million** (domestically and abroad to China)

Source: http://mnakhas.mymgl.net/index-1.html

4

Eldev Coal Mine (con't)

1. Establishment
- 1998: discovery of a coal reserve at Eldev Coal Mine
- 2002: began coal mining
- Duration: 2-3 years

2. Structure
- 120 workers
- Work rotation: 2 periods (9 am~6pm; 6pm~9am)
- 3 weeks at ECM, 1 week at Ulaanbaatar

3. Facilites
- 40-50 trucks/day (capacity: 120 tons)
- Coal screening machine (before export and domestic use)

4. Products: High quality, raw materials (stone coal - bituminous coal)

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Eldev Coal Mine (con't)

5. Environmental Problems

• Dust Pollution (mostly in winter) during coal transportation

• Pasture land

• Water

8

Government Regulation of Mining

• Minerals Law of Mongolia (adopted by the Mongolian Parliament on July 1, 1997 and updated in 2001)
• Mining owner: exploration and mining licenses
• Submit Environmental Impact Assessment and Environmental Protection Plans

Approval of these documents is left to the state central administrative body in charge of the environment. Mine owners are obligated to allow officials "in charge of monitoring implementation of legislation on environmental protection" onto the site to conduct official duties

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Discussion and Recomendation

1. No illegal mining

Case in Quang Ninh, Vietnam: illegal mining by the private sector

Good Governance of Mongolia Authorities in mining management or other factors?

Discussion and Recomendation

2. Planted trees and land rehabilitation

- 2 types of trees
- Re-planted trees are monitored for a period of 5-7 years by the Mongolian Ministry of Nature and Environment
- Annual submission of environmental reports

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Are the tree species suitable for planting in that area?

Is the monitoring system effective?

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Discussion and Recomendations

3. Sustainable Exploitation and Use of Coal Resources

- Develop the coal processing industry to increase the value of products and long term exploitation (Significant decreases in the prices of coal, copper, and gold in the world market reduces government revenue and affects the Government's long-term development goal of improving the living standard of the Mongolian people)
- Develop and cooperate with other energy technology fields not using coal as input materials (energy security)
- Application of GIS for environmental reporting in the mining sector.

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Discussion and Recomendation

4. Organize more environmental education activities for workers and residents at the mining site

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University of Tsukuba
Graduate School of Life and Environmental Sciences

EDL International Internship in Mongolia

Title: Municipal solid waste management in Ulaanbaatar city, Mongolia

Presenter: Dinh Thu Hang
Student ID No.: 201221198

1

CONTENTS

http://mongolianeconomy.mn/en/p/1811

http://mongolia.usembassy.gov/news_061112.html

1. INTRODUCTION

- The rapid expansion of Ulaanbaatar, the capital city of Mongolia, is one of the country's most critical development issues
  - Population: has increased by 70% in the past 20 years.
  - 40% of the total population live in Ulaanbaatar (562.3 thousand in 1990 and increased by more than 1.0 million in 2008).
  - The total area of the city is 30 times larger.
- Over the past few years, Mongolia has experienced a trend towards increased solid waste output.
- There is no proper solid waste management practice existing in Mongolia.

⇒ Therefore, an inadequate waste disposal system creates huge problems for the environment and human health.

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2. The current status of municipal solid waste management in Ulaanbaatar, Mongolia

2.1. The current status

* Solid waste generation
- Total generation: 1500 – 1800 m3 (465 – 774 ton/day)
- Waste generation per capita: 0.52 – 2.15 kg/person/day
- Waste source: 50% households, 30% industries, 20% other
- Waste composition: 25.2% paper, 21.4% ash (in summer) and 60% ash (in winter).

* Solid waste management:
- Collection rate: 71.4% private sector carries out collection and transport.
- Recycling: scavengers (1.1 – 5.6kg/person/day)
- Final treatment: Landfill, 2 sites
- Expenditure: user fee of MNT 50/month (USD 0.04/month)

Source: JICA funded research team (2006)

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2.2. Regulatory aspects

The following legislative acts have been approved and are being implemented:

- Waste reduction management (1999)
- Law on prohibition and export of hazardous waste (2000).
- The Mongolian Action Plan for "Improvement of solid waste management" (2002)
- Regulations regarding "Removal and disposal of hazardous waste" (2002)
- Improvement of Health Care Waste Management (2003)
- Law on household and industrial waste (2003)
- Law on hazardous and toxic chemicals (2006)

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2.3. Relevant regulations

- ***Rules and regulations developed for the implementation of law on household and industrial waste:***
- Guidelines on calculation of waste fee (2006)
- Joint order of the ministers for environment, health, and education, science and culture on hazardous waste classification and … (2006)
- Rule on registration of hazardous waste (2007)
- Regulation on waste management (2007).
- Rule on waste registration and reporting (2008).

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2.4. Institutional arrangement

- The bulk of responsibility for solid waste management is decentralized at the district level, while the City waste management department is responsible for landfill operations.
- Until 2007, the City waste management department directly managed the collection and disposal of solid waste in Ulaanbaatar.
- In 2007, a new regulation on waste management was introduced to minimize the City waste management department's involvement, while increasing the efficiency of management (Figure 1)

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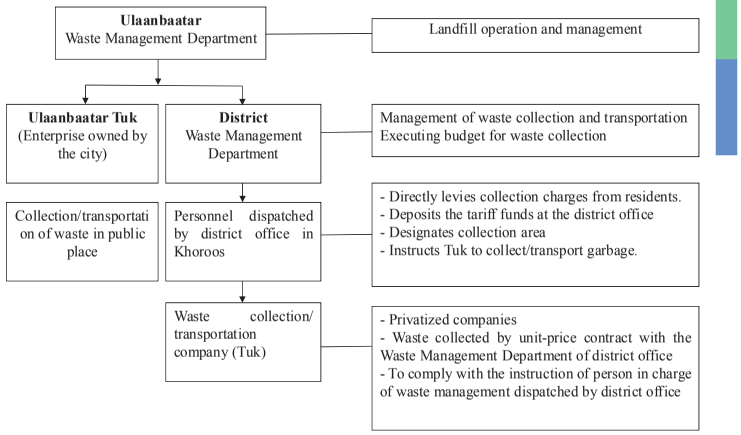
Figure 1: Institutional Arrangement and Responsibilities for Solid Waste Management in Ulaanbaatar

(Source: The World Bank, Enhancing policies and practices for Ger area development in Ulaanbaatar)



2.5. Current municipal household waste collection system

- Formal waste collection in the Ger area is infrequent and unpredictable, residents dispose of most household waste themselves – usually by dumping it outside their houses, on hills, in yards, and alongside roads and waterways.
- In contrast, apartment areas run a relatively efficient and clean 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

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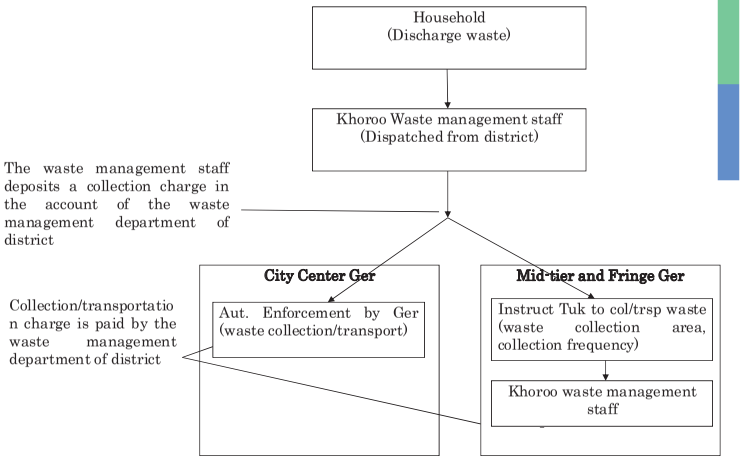
Solid waste collection in three Ger Areas



2.5. Current solid waste collection system

Classification	City Center Ger	Mid-Tier Ger	Fringe Ger
Households/Population	3.000/12.245	1.677/7.979	2.500/11.130
% of HH paying customs	30%	Less than 20%	30%
Frequency of waste collection	2 times/day 1time/3 months per household	3 times/day 1time/month per household	2 times/day 1 time/month per household
Form and numbers of collection equipment	1 open truck	1 open truck	1 open truck
Number of collectors	1 driver, 2 assistant workers	1 driver, 2 assistant workers	1 driver, 2 assistant workers

2.6. Solid waste fee structure

- The waste collection fee for households in UB was set by the Municipal Council:
  - In 2006 at Tg 2,500 (US$1.79) per month for ger areas
    Tg 2,000 (US$1.43) per month for apartment residents.
  - However, the district can adjust the fee level to some extent reflecting the revenue requirements and socioeconomic conditions of ger residents. The monthly fee:
  - In the City Center ger: Tg 3,000
  - In the Fringe ger: Tg 2,500
  - In the Midtier ger: Tg 1,500
- Only about 30 percent of households actually pay a waste collection fee.

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2.6. Some research studies on solid waste management in Mongolia

- The pilot research study on existing solid waste management in Darkhan city (2010)
- - The study for the solid waste management plan in Ulaanbaatar city (November 2004 – September 2012) – Financed by: JICA, Japan Grant Aid.
- - A technical assistance project started aiming at human resources development of waste management authorities in Ulaanbaatar (2009).

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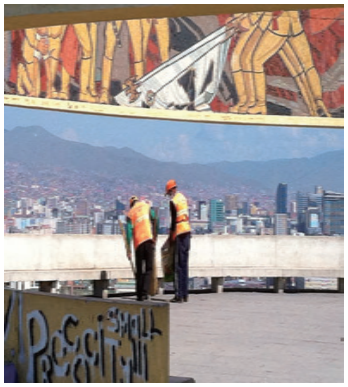
Waste at Zaisan Memorial

14

Zaisan Memorial



15

Waste at yurts area in UB city

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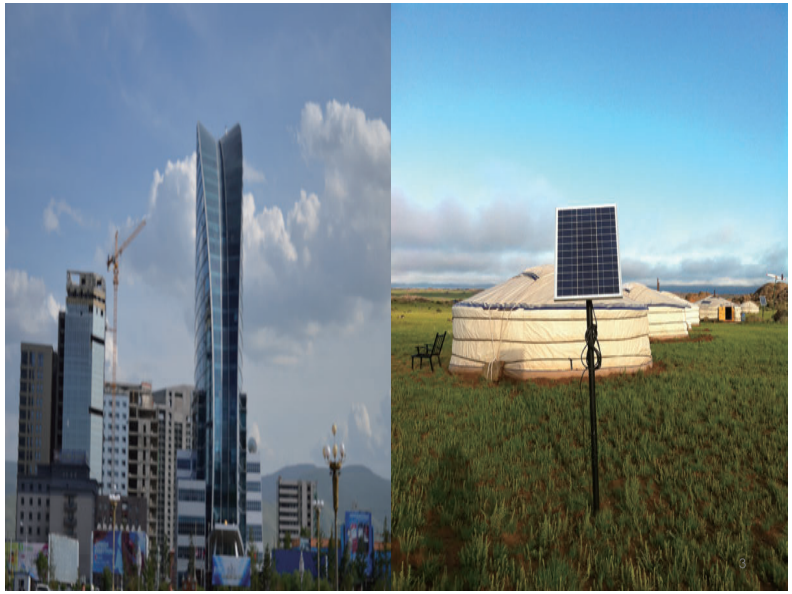
Municipality's truck and illegal dumping near Tuul river in UB city

17

AIR AND WATER POLLUTION IN ULAANBAATAR

UNIVERSITY OF TSUKUBA, JAPAN
WANG WENLONG(M1)



1. Research in University of Tsukuba

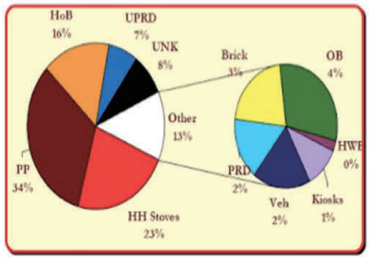
Rapid Startup of Aerobic Granulation with Biogas slurry in Sequencing Batch Reactor

Surface area	80% ↓
Investment and operational cost	
Energy requirement	30% ↑
Treatment efficiency	

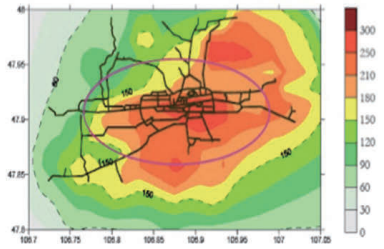
2. Air Pollution in Ulaanbaatar

2.1 Air Quality in Ulaanbaatar

Percent Emissions



Total PM_{10} Concentrations ($\mu g/m^3$)



Annual Total PM_{10} = 98.5 ktons
Annual Total $PM_{2.5}$ = 43.5 ktons
Annual Total SO_2 = 23.3 ktons
Annual Total NO_x = 53.2 ktons

Daily Standard = 150 $\mu g/m^3$
Annual average = 200 $\mu g/m^3$
Winter average = 265 $\mu g/m^3$
Summer average = 125 $\mu g/m^3$

> 20

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2.2 Source of Air Pollution in Ulaanbaatar

- Source of Air pollution
  - Cooking Stove
  - Power Plant
  - Vehicular traffic
  - Dust

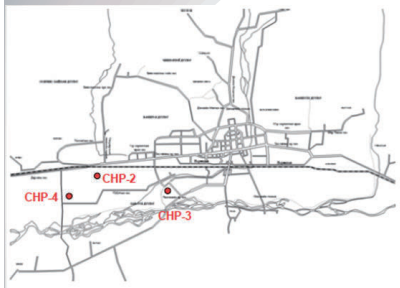
7

Stove

- sixty percent of the 220,000 registered households, approximately 130,000 households live in the Ger areas.
- Each household is estimated to use 5 tons of raw coal and 3.0 m3 of wood for fuel per year.

8

Power Plant



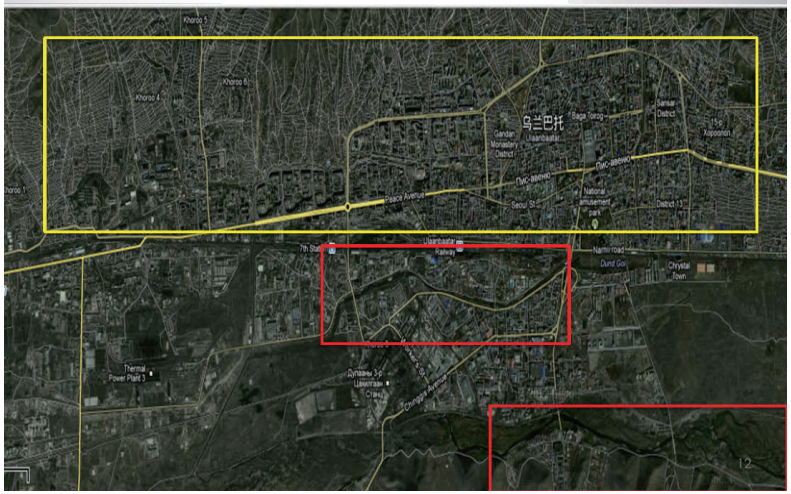
Consumption ~3.5 millon tons of coal per year which emits 33.3 ktons of PM, 35.7 ktons of NOx and 19.8 ktons of SO2 (2005)

Vehicular traffic

137 thousand Vehicles (20%)

Dust

3. Water Pollution in Ulaanbaatar




3
4


4. Government measures


Thanks for your attention!!
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Chapter 4

Appendices

4.1 Schedule

Day	Time	Schedule	Hotel
July 28 Sat	10:40	Tsukuba center →Narita International Airport (by bus)	Flower hotel Bayanzurkh District Khukh Tengeriin 12 Ulaanbaatar 49, Tel: 976-11-458330
	14:40-18:50	Narita International Airport →Chinggis Khaan International Airport (by OM 502) (5 hours and 10 minitues)	
	evening	Chinggis Khaan International Airport →Flower Hotel, UB (by car)	
July 29 Sun	morning	Zaisan Memorial The Tuul River, UB (by car)	Flower hotel Bayanzurkh District Khukh Tengeriin 12 Ulaanbaatar 49, Tel: 976-11-458330
	noon	Head office of Nomadic Journeys Museum of Natural History Sukhbaatar Square Gandantegchenling Monastery, UB (by car)	
July 30 Mon	6:30	Leave from Flower Hotel	Red Rock Ger Camp Ikh Nartiin Chuluu Nature Reserve, Dornogovi
	noon	Eldev coal mining site (Mongolyn Alt Corporation LLC), Dalanjargalan district, Dornogovi (by car)	
	evening	Arrive at Red Rock Ger Camp, Ikh Nartiin Chuluu Nature Reserve, Dornogovi (by car)	
July 31 Tue	morning	Field survey inside Ikh Nartiin Chuluu Nature Reserve	Red Rock Ger Camp Ikh Nartiin Chuluu Nature Reserve, Dornogovi
	noon		
August 1 Wed	morning	Interview at Red Rock Ger Camp, Ikh Nartiin Chuluu Nature Reserve	Flower hotel Bayanzurkh District Khukh Tengeriin 12 Ulaanbaatar 49, Tel: 976-11-458330
	noon	Stop at nomadic ger and drinking water wells for sanatorium), Dornogovi (by car) →return to UB	
	midnight	Arrive at Flower Hotel, UB (by car)	
August 2 Thu	morning	Prepare for international workshop (research presentation) at hotel	Flower hotel Bayanzurkh District Khukh Tengeriin 12 Ulaanbaatar 49, Tel: 976-11-458330
	noon	Narangiin Enger Landfill site, UB (by car)	
August 3 Fri	morning	International workshop at National University of Mongolia, UB	Flower hotel Bayanzurkh District Khukh Tengeriin 12 Ulaanbaatar 49, Tel: 976-11-458330
	noon	Shoppipng at Nomin Department Store, UB	
August 4 Sat	6:00	Flower hotel →Chinggis Khaan International Airport (by car)	
	8:05-13:40	Chinggis Khaan International Airport →Narita International Airport (by OM501) (4 hours and 35 minitues)	
		Dissolution at Narita International Airport	

4.2 Route and aerial photographs

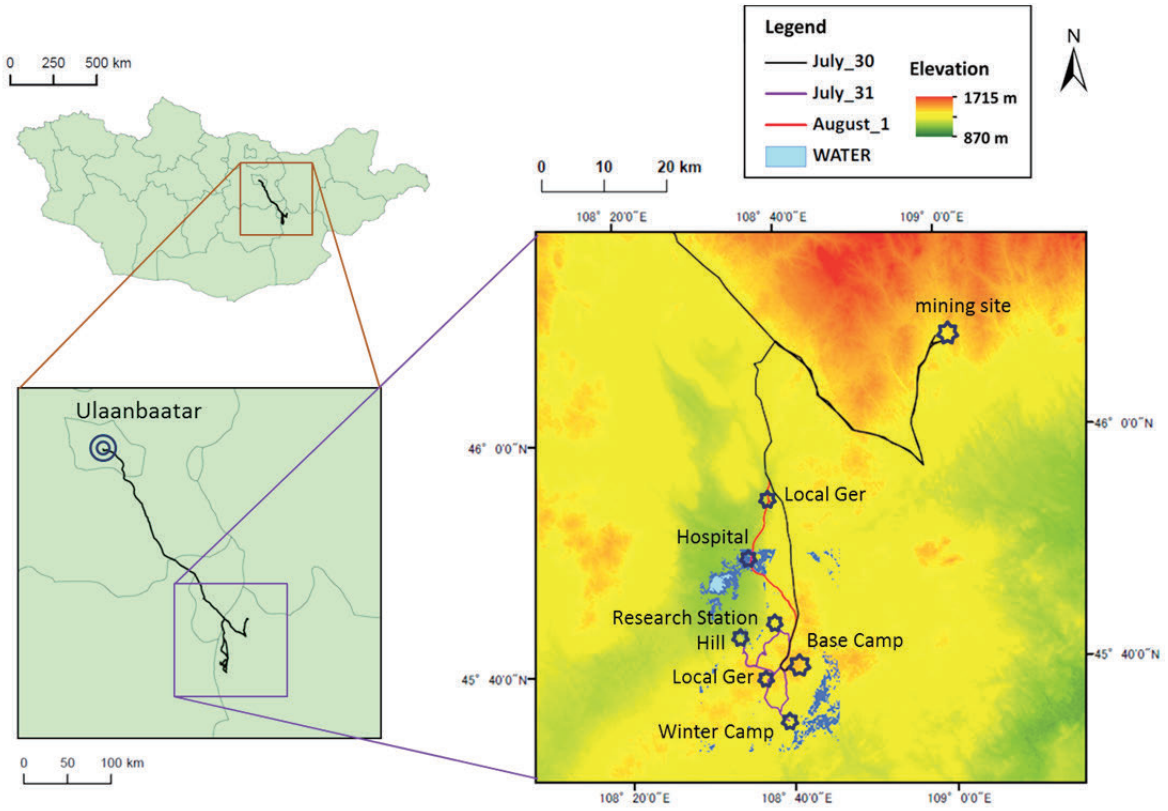

Fig.4.2.1 Route map of our excursion

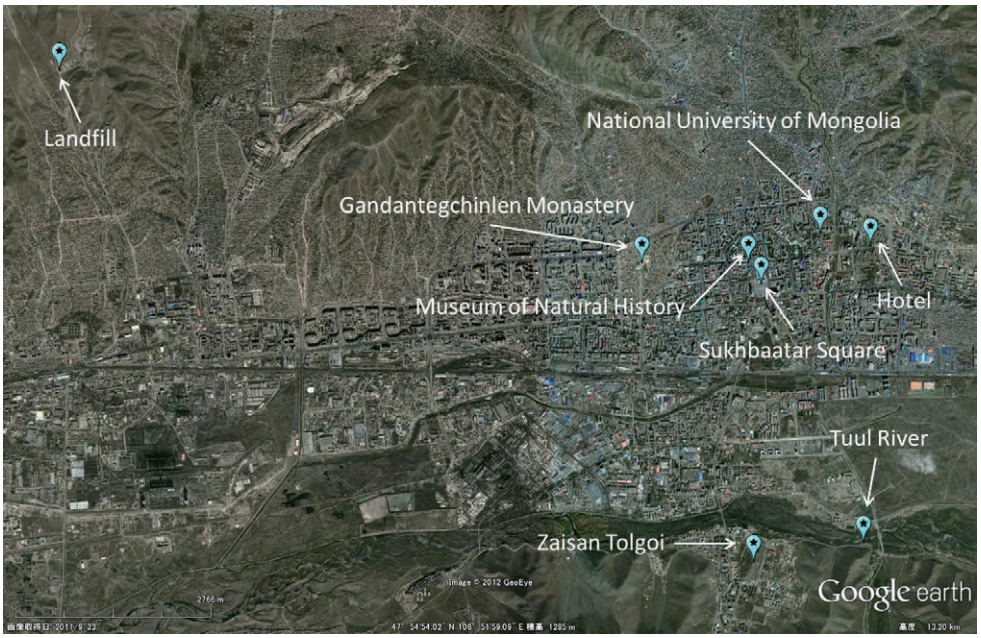

Fig.4.2.2 Ulaanbaatar city

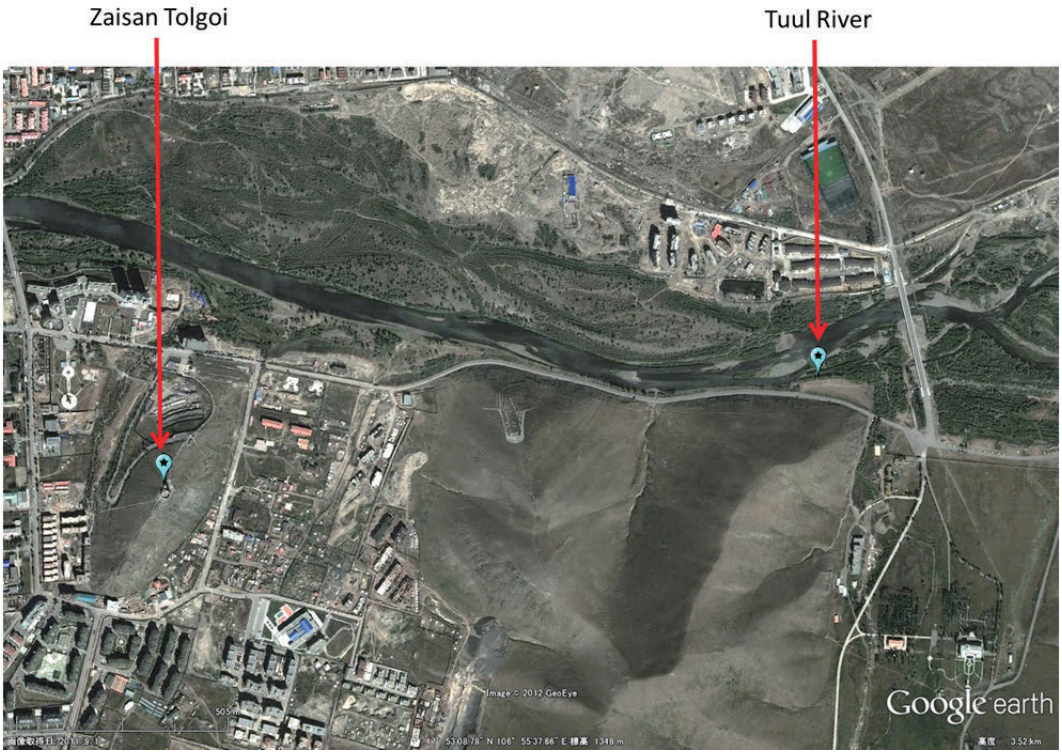

Fig.4.2.3 Zaisan Tolgoi and Tuul River

Fig.4.2.4 Northwestern area of UB city

Fig. 4.2.5 Eastern area of UB city

Fig.4.2.6 Landfill site located on the suburbs of UB city

4.3 Documents

Fig.4.3.1 Zaisan Memorial and UB city

Fig. 4.3.2 Ikh Nart