

5 Public Relations and Educational Materials

5.1 Public Relations Materials

5.1.1 JICA Study Newsletter

The newsletter both in English and Mongolian was issues every 2-3 months in order to introduce the Study on Solid Waste Management Plan and to report the progress of the study. To provide basic knowledge on SWM is also a main purpose of the newsletter. The team put together the feature story on the final disposal of waste and waste collection system.

The newsletter was distributed to organizations concerned, including NGOs. On the other hand, it was distributed to target people of specific pilot projects as part of educational materials.

All the issues of newsletter can be downloaded from the website of the JICA study.
<http://www.kkcub.mn/>

All the issues of the newsletter in English are shown below.

jica **News Letter Vol. 1**

The Study on Solid Waste Management Plan for Ulaanbaatar City in Mongolia

Content

1. Introduction
 2. Outline of the JICA study
 3. What kinds of problems are there in Ulaanbaatar now?
 4. Report on First Workshop
 5. About us and how to contact us
- Additional Topic: What is Solid Waste Management (Part 1)

1. Introduction

At present, Ulaanbaatar faces various problems caused by improper solid waste management. Therefore, the Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of technical cooperation programs in Japan, decided to conduct the Study in close cooperation with the Mongolian authorities concerned.

Why the JICA study team were selected by JICA as a consultant to conduct the study on solid waste management plan for Ulaanbaatar city in Mongolia.

The study started in the beginning of December 2004 and the first group of our team arrived in Ulaanbaatar on the 1st of December. This study will last for 16 months.

During the study period, we will issue News Letters regularly to inform you of the progress of the study. This is the first volume of the news letter.

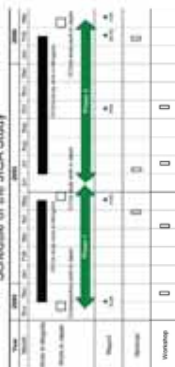
2. Outline of the JICA Study

The outline of the JICA study is briefly introduced.

Objective

The main object of the study is to formulate a Master Plan (Target Year 2020) of Solid Waste Management in Ulaanbaatar City (UBC) and to conduct a Feasibility Study for the priority projects proposed in the Master Plan. In the latter half of the study, a few pilot projects will be conducted to examine the practicability and applicability of the Master Plan.

Schedule of the JICA Study



- Factory and Medical Institution Survey (we will examine how much and what types of waste are generated from factories and hospitals every day in Ulaanbaatar).
- Underground water survey (we will investigate the effect of the current disposal site on the ground water), and so on.

We will introduce the result of these surveys in the News Letter in the near future.

At the end of the first phase, we will select pilot projects, which will be implemented in the second phase, and priority projects, for which we will conduct feasibility studies in the second phase. In cooperation with UBC, we will also inform you on these issues later in the news letter.

3. What kinds of problems are there in Ulaanbaatar now?

- Report on First Workshop

Waste issues are everybody's issues. Without the cooperation and understanding of all the stakeholders (organizations and individuals concerned), it is impossible to solve problems. We will conduct the JICA study in cooperation with various organizations: Ulaanbaatar City Government, Ministry of Nature and Environment, Ministry of Industry and Trade, Ministry of Health, Districts and Khoroons of Ulaanbaatar, District Renovation Companies (collection service companies), and NGOs.

Before the start of the Study, it was very important for us to have a common awareness of current problems in Ulaanbaatar with other stakeholders. It is also critical that each group and individual realize its own roles and responsibilities to solve problems. Based on these ideas, we organized the first workshop on the 8th and 10th of December at the Ulaanbaatar Hotel, inviting 50 people from the above mentioned organizations. In order to exchange opinions and share the common goals of the project.

Objective

The objectives of the Workshop were to:

- share experience and problems;
- increase awareness of and links to problems elsewhere in the sector; and
- begin to build consensus through cooperation in improving solid waste management in Ulaanbaatar

Participants

50 people were invited from a broad spectrum of interested parties including Ministries, Municipality and District Offices, waste collection companies and NGOs. In addition

Program

The program of the workshop is shown below.

Day 1

| Time | Event |
|-------|--|
| 9:00 | 1. Opening Address by Mongolian Side |
| 9:10 | 2. Opening Address by the Japanese Side |
| 9:30 | 3. Explanation of the Study and Introduction |
| 9:40 | 4. Present Status of Solid Waste |
| 10:00 | 5. Break |
| 10:10 | 6. Discussion: Solid waste in urban areas |
| 10:40 | 7. Discussion: Solid waste in rural areas |
| 11:10 | 8. Lunch |
| 11:20 | 9. Discussion: Solid waste in rural areas |
| 11:50 | 10. Discussion: Solid waste in rural areas |
| 12:20 | 11. Discussion: Solid waste in rural areas |
| 12:50 | 12. Discussion: Solid waste in rural areas |
| 13:20 | 13. Discussion: Solid waste in rural areas |

Day 2

| Time | Event |
|-------|--|
| 9:00 | 1. Explanation of the Workshop |
| 9:10 | 2. Present status of solid waste |
| 9:30 | 3. Discussion: Solid waste in urban areas |
| 9:40 | 4. Discussion: Solid waste in rural areas |
| 10:00 | 5. Break |
| 10:10 | 6. Discussion: Solid waste in urban areas |
| 10:40 | 7. Discussion: Solid waste in rural areas |
| 11:10 | 8. Lunch |
| 11:20 | 9. Discussion: Solid waste in urban areas |
| 11:50 | 10. Discussion: Solid waste in rural areas |
| 12:20 | 11. Discussion: Solid waste in urban areas |
| 12:50 | 12. Discussion: Solid waste in rural areas |
| 13:20 | 13. Discussion: Solid waste in urban areas |

The Workshop was attended by several representatives from JICA and advisors to JICA.

Result of the Workshop

The participants worked very successfully in Groups deliberately composed of members from a mixture of organizations. They identified a comprehensive set of problems and a number of key problems. They then went on to elaborate the key problems in terms of their causes and effects, and finally converted problems into objectives and the means of achieving them. Participants also took advantage of the opportunity to express their views, as both official representatives and citizens, on their future role in solid waste management and on advice for the Study. This generated important input to the development of the Management Plan by the Study.

Pictures of First Workshop



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Newsletter Vol. 2

2006.03

The Study on Solid Waste Management Plan for Ulaanbaatar City in Mongolia

Content

1. Prompt Report of Waste Amount and Composition Survey
2. Start of the Web Site
3. Post Script

1. Prompt Report of Waste Amount and Composition Survey

(1) Introduction

General waste (MSW: Municipal Solid Waste) is generated every day in various places such as households, shops, restaurants, offices, and schools. General waste consists of various types of waste: kitchen waste, paper, metals, glass and so on. Some types of waste such as kitchen waste are degradable, while other types of waste such as glass and metals are stable.

Data on the generation amount of waste in the Study Area (7 districts of UBC) and the composition of waste is essential for establishing integrated solid waste management systems. Without the data on the volume and density of waste, it is impossible to decide the method and capacity of storage, the types and collection vehicles, the frequency of collection service. Without the data on the volume and its composition, it is impossible to examine the disposal method and the possibility of recycling.

The waste generation amount can be estimated to some extent from the collected waste amount (data from collection vehicles) or disposed waste amount (data from the final disposal site), but the estimated data lacks accuracy because of many uncertain factors such as illegal dumping and recycling activities in the informal sectors. Therefore, the study team decided to conduct the Waste Amount and Composition Survey (WACS) in order to grasp the generation amount of waste and its constituent.

Since the data on the generation amount of waste and its composition is the most fundamental one, the WACS was conducted soon after the first phase started in December, 2004. The conditions of solid waste management in Ulaanbaatar are different in winter and summer, so the same survey will be conducted again in summer.

In this newsletter, a brief result of the survey in winter is shown.

(2) Main purpose of the survey

The main purpose of the WACS is to estimate the waste generation amount in Ulaanbaatar. Based on the result of the WACS, the total waste generation amount is calculated and the current waste flow and future projections are examined.

The survey also aims at grasping the composition of waste. The possibility of recycling is examined based on the result.

(3) Outline of the survey

1) Sampling survey

Due to the limited budget and time available for the survey, it is impossible to investigate all the waste generation sources in order to obtain the data on the generation amount in Ulaanbaatar. A sampling survey was applied in order to estimate the generation amount. A sampling method is a technique to estimate the total generation amount based on the waste generation rate obtained from a small group which belongs to the population. (The daily generation amount from households in the study area can be calculated by multiplying the waste generation rate per person by the whole population.) The obtained result is just an estimation, not a measured figure, and will be modified based on other data such as collected waste amount and disposed waste amount.

2) Samples

The samples were categorized as shown in the table below in the first place. The survey aims at obtaining the waste generation rate in each category.

Table 1: Category and the unit of waste generation rate

| Category | Waste Generation Rate |
|-----------------------|-----------------------|
| Household | g/person/day |
| commercial | g/shop/day |
| Restaurants | g/person/day |
| Other shops | g/shop/day |
| Institution (offices) | g/employee/day |
| Markets | g/person/day |
| Hotels | g/person/day |
| Schools | g/student/day |
| Road cleaning | g/m ² /day |

Example: The generation rate of other shops was the average waste amount of 5 shops. In general, the average weight of waste per employee is used as the generation rate, but the data on the number of employees in Ulaanbaatar is not available. As a result, we decided to use the average generation amount per shop as the waste generation rate for other shops.

| <p>Sampling was conducted through consultation with the counterparts in order to reflect the present situation of the Study Area in the survey. The number of samples and their locations are shown below.</p> <p>Table 2: Number of samples</p> <table border="1"> <thead> <tr> <th>Generation Source</th> <th>Number of Samples</th> </tr> </thead> <tbody> <tr> <td>Ger area with collection service</td> <td>15</td> </tr> <tr> <td>Ger area without collection service</td> <td>15</td> </tr> <tr> <td>Summer houses</td> <td>5</td> </tr> <tr> <td>Apartment with garbage chute</td> <td>20</td> </tr> <tr> <td>Apartment without garbage chute</td> <td>20</td> </tr> <tr> <td>Restaurants</td> <td>5</td> </tr> <tr> <td>Other Shops</td> <td>5</td> </tr> <tr> <td>Institution (offices)</td> <td>5</td> </tr> <tr> <td>Markets</td> <td>5</td> </tr> <tr> <td>Schools</td> <td>5</td> </tr> <tr> <td>Road cleaning</td> <td>2</td> </tr> <tr> <td>Total</td> <td>105</td> </tr> </tbody> </table> | Generation Source | Number of Samples | Ger area with collection service | 15 | Ger area without collection service | 15 | Summer houses | 5 | Apartment with garbage chute | 20 | Apartment without garbage chute | 20 | Restaurants | 5 | Other Shops | 5 | Institution (offices) | 5 | Markets | 5 | Schools | 5 | Road cleaning | 2 | Total | 105 | <p>Picture 1: Collection of waste from samples</p> <p>In Ger area In Apartment area Market School Hotel</p> <p>as the number of family member and household income, the number of employees in offices, the number of rooms in hotels, and so on.</p> <p>4) Survey schedule</p> <p>The WACS was conducted for one week from December 22 to December 30, 2004, including an extra day for trial and elimination of stocked waste.</p> <p>5) Analysis of waste</p> <p>The following analyses were conducted in order to grasp the amount and the composition of waste.</p> <ul style="list-style-type: none"> Weight of waste (g) to obtain the waste generation rate Measuring weight Apparent Specific Gravity (ton/m³) (Apparent specific gravity is the weight of a given volume of waste, making no allowance for voids or air spaces in the volume of waste measured). The volume of waste after this is used to examine the necessary capacity of storage containers. Physical composition (wet base) collected samples were classified by such categories as kitchen waste, paper, cloth, wood & grass, plastic, rubber & leather, metal, glass, ceramic/stoneware, and others and measured their weights. <p>3) Survey methods</p> <p>Selected households, shops, restaurants and so on stored the whole generated waste for one week, and waste was collected by the research team every day. (The sampling survey has to continue for one week because of the cycle of the domestic activities.) In Ger area, coalwood ash is the main element of the waste in winter, and the ash was collected separately from other waste. In the survey, survey was also conducted to obtain information such</p> |
|--|-------------------|-------------------|----------------------------------|----|-------------------------------------|----|---------------|---|------------------------------|----|---------------------------------|----|-------------|---|-------------|---|-----------------------|---|---------|---|---------|---|---------------|---|-------|-----|--|
| Generation Source | Number of Samples | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ger area with collection service | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ger area without collection service | 15 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Summer houses | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apartment with garbage chute | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apartment without garbage chute | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Restaurants | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other Shops | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Institution (offices) | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Markets | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Schools | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road cleaning | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 105 | | | | | | | | | | | | | | | | | | | | | | | | | | |



• Three component analysis

The water content, combustible matter and ash of waste from households (with and without garbage chute) was measured to grasp the ratio of these three components.

• Laboratory

Chemical analysis of kitchen waste

The weight percent of Carbon and Nitrogen was measured only for the kitchen waste. From households, market and restaurants. The data will be utilized for examining the possibility of compost production from kitchen waste.

(4) Brief Result

The waste generation rate in each category was obtained. The results are shown in Table 4 (households) and Table 5 (other sources).

With other data such as the population census and registration data of shops and restaurants, it is possible to estimate the total generation amount of waste in each category.

In order to help you have a clear image about waste generation in Ulaanbaatar, examples of other cities are shown for comparison in Table 6. It can be said that the generation amount of waste in households here is very small.

(5) Final Result

As mentioned above, based on the result of the WACS, the elaborated waste stream and future projection will be examined, and they are reflected in the proposed master plan.

Table 4: Waste Generation Rate of Household

| Category | Unit | Average | Maximum | Minimum |
|----------------|--|--|--|---|
| City area | Coal ash with collection | 830 g/person/day | 1,370 g/person/day | 320 g/person/day |
| | General | 105 | 410 | 70 |
| | All | 990 g/person/day | 1,780 g/person/day | 280 g/person/day |
| | Coal ash General | 700 g/person/day | 1,330 g/person/day | 300 g/person/day |
| Apartment area | With out collection | 170 g/person/day | 490 g/person/day | 50 g/person/day |
| | General | 870 g/person/day | 1,820 g/person/day | 350 g/person/day |
| | Summer house | 920 g/person/day | 1,480 g/person/day | 540 g/person/day |
| | High rise building with garbage chute Low rise building without garbage chute | 138 g/person/day 240 g/person/day | 200 g/person/day 400 g/person/day | 100 g/person/day 90 g/person/day |

Table 5: Waste Generation Rate of Other Generation Source (Winter season)

| Classification | Unit | Average | Maximum | Minimum |
|----------------|------------|------------------------------|------------------------------|------------------------------|
| Commercial | Restaurant | 250 g/chair/day | 300 g/chair/day | 180 g/chair/day |
| | Other shop | 140 g/employee/day | 260 g/employee/day | 50 g/employee/day |
| Institution | | 130 g/employee/day | 280 g/employee/day | 70 g/employee/day |
| Market | | 1,600 g/store/day | 7,100 g/store/day | 100 g/store/day |
| Hotel | | 130 g/guest/day | 190 g/guest/day | 70 g/guest/day |
| School | | 3.0 g/student/day | 5.3 g/student/day | 1.5 g/student/day |
| Road cleaning | | 3.0 g/m ² /day | 3.4 g/m ² /day | 2.6 g/m ² /day |

Table 6: Comparison of Generation of Household Waste in the Study Area and Other Study

| Country | City | Year | Population | Household waste (g/person/day) 210 (without ash) 600 (with ash) * Weight average |
|--------------------------|---------------|------|------------|---|
| Mongolia | Ulaanbaatar | 2004 | 869,912 | 467 |
| Cambodia ¹⁾ | Phnom Penh | 2003 | 1,189,414 | 467 |
| Azerbaijan ²⁾ | Baku | 1999 | 2,025,300 | 246 |
| Turkey ³⁾ | Adana | 1999 | 1,196,820 | 473 |
| Turkey ³⁾ | Mardin | 1999 | 634,850 | 439 |
| Tanzania ⁴⁾ | Dar es Salaam | 1996 | 2,030,230 | 688 |
| Nicaragua ⁵⁾ | Managua | 1994 | 834,427 | 664 |
| Paraguay ⁶⁾ | Asuncion | 1993 | 506,445 | 961 |
| Poland ⁷⁾ | Poznan | 1992 | 690,500 | 654 |
| Laos ⁸⁾ | Vientiane | 1991 | 142,700 | 753 |
| Malaysia | Pulau Pinang | 1988 | 589,300 | 504 |

Source :

- *1 The Study on Solid Waste Management in the Municipality of Phnom Penh in the Kingdom of Cambodia, Final Report, March 2005
- *2 The Master Plan Study on Integrated Environmental Management in Baku City in Azerbaijan Republic, Final Report, March 2001
- *3 The Study on Regional Solid Waste Management for Adana-Mardin in the Republic of Turkey, Final Report, January 2000
- *4 The Study on Solid Waste Management for Dar es Salaam City in the United Republic of Tanzania, Progress Report (2), August 1996
- *5 The Study on the Solid Waste Management System of the City of Managua, Final Report, May 1995.
- *6 The Study on the Solid Waste Management for Poznan City, the Republic of Poland, Final Report, May 1993.
- *7 The Study on the Solid Waste Management System Improvement Project in Vientiane, Lao People's Democratic Republic, Progress Report, October 1991
- *8 The figure is not generation ratio but disposal amount from "Solid Waste Management Study for Pulau Pinang and

2. Start of the Web Site

As mentioned in the previous newsletter, we have been preparing for the web site since the start of the JICA study. The web site finally started last month. At present, there is only an English language site, but the Mongolian site will be ready soon.

Please take a look at our web site. The URL address of our web site is <http://www.mn.mn>.

We will try to update the web site as frequently as possible in order to show the prompt reports on our survey and provide information on events such as seminars and workshops. In addition, the soft copy of the newsletter in PDF format can be downloaded from the web site.

Mutual communication is also a feature of the Internet. We always welcome your comments and opinions about our web site by e-mail. We hope that many of you check our web site regularly.

3. Post Script

As introduced in the previous survey, various baseline surveys are conducted under the JICA study. As of the end of February, field surveys of the Waste Amount and Composition Survey, Time & Motion Survey, and Public

Opinion Survey were finished. Now we are analyzing the obtained data.

Since the WACS provides us with one of the most critical data for establishing a proper solid waste management system, the prompt report on the survey is introduced in the newsletter Vol. 2.

The brief results of other field surveys will be introduced on the web site after these surveys are completed. At present, you can get the prompt report on the Time & Motion Survey as well as the WACS from the web site (About JICA Study).



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| <div data-bbox="300 1120 319 1164" data-label="Text"> <p>2005.05</p> </div> <div data-bbox="325 1133 392 1196" data-label="Image"> </div> <div data-bbox="343 1373 370 1541" data-label="Text"> <p>Newsletter Vol. 3</p> </div> <div data-bbox="394 1223 443 1691" data-label="Section-Header"> <h2>The Study on Solid Waste Management Plan for Ulaanbaatar City in Mongolia</h2> </div> <div data-bbox="469 1431 486 1487" data-label="Section-Header"> <h3>Content</h3> </div> <div data-bbox="485 1317 569 1644" data-label="List-Group"> <ol style="list-style-type: none"> 1. Plan of the New Final Disposal Site in Ulaanbaatar <ol style="list-style-type: none"> 1-1 Current Situation 1-2 Selection of a site for the new disposal site 2. Present and Future Waste Stream in Ulaanbaatar 3. Post Script </div> | <div data-bbox="587 1377 608 1789" data-label="Section-Header"> <h3>1. Plan of the New Final Disposal Site in Ulaanbaatar</h3> </div> <div data-bbox="617 1603 649 1796" data-label="Section-Header"> <h4>1-1 Current situation of disposal sites</h4> </div> <div data-bbox="654 1612 675 1789" data-label="Section-Header"> <h5>(1) Environmental Problems</h5> </div> <div data-bbox="678 1574 884 1796" data-label="Text"> <p>At present there are several final disposal sites in Ulaanbaatar (UB). The largest disposal site is located in Ulaan Chuluut (Khoroo 4 of Songkhonkhon).</p> <p>The operation system of these sites is open dumping, as shown in Figure 1, and this causes serious environmental problems such as odor (bad smell), flies (refer to Figure 2), scattered plastic bags, ash and dust, and breeding of vermin (flies and mosquitoes).</p> </div> <div data-bbox="620 1350 769 1599" data-label="Image"> </div> <div data-bbox="774 1350 820 1568" data-label="Caption"> <p>Figure 1. Waste is just dumped, and degraded waste causes odor and breeds flies and mosquitoes.</p> </div> <div data-bbox="820 1350 858 1568" data-label="Text"> <p>Further environmental degradation can be prevented.</p> </div> <div data-bbox="861 1350 898 1568" data-label="Section-Header"> <h4>(2) Pilot Project at the Ulaan Chuluut Disposal Site</h4> </div> <div data-bbox="901 1350 994 1568" data-label="Text"> <p>MUB decided to conduct a pilot project at the Ulaan Chuluut disposal site during the phase 2, starting in July, 2005, aiming at improving its operation in cooperation with us (the JICA study team).</p> </div> <div data-bbox="914 1568 1062 1827" data-label="Image"> </div> <div data-bbox="1062 1565 1101 1834" data-label="Caption"> <p>Figure 2. Final waste generates serious gas, mainly methane gas, as it is degraded. The gas causes spontaneous combustion of waste.</p> </div> <div data-bbox="1114 1574 1177 1796" data-label="Text"> <p>In addition, these disposal sites create another problem, illegal dumping near the sites by some collection vehicles, as shown in Figure 3.</p> </div> <div data-bbox="1181 1574 1303 1796" data-label="Text"> <p>As a result, disposal sites in UB considerably affect their surrounding areas. Particularly in Ulaan Chuluut, the situation was very serious, and it is urgent for the Municipality of Ulaanbaatar (MUB) to take necessary measures to improve the operation of the disposal site, so that</p> </div> <div data-bbox="617 1120 788 1341" data-label="Text"> <p>poor sites in Ulaan Chuluut is improved, there is another serious problem left, we estimate that the disposal site will be full in three years time. Since all the waste generated in 6 districts in the center of the city is disposed at the Ulaan Chuluut disposal site, it is urgent for MUB to make a plan for the new disposal site. Considering a preparatory period, MUB has to start a site selection procedure as soon as possible.</p> </div> <div data-bbox="791 1120 845 1341" data-label="Text"> <p>Under the JICA study, we support MUB to make a plan for the final disposal site, including the site selection procedure.</p> </div> <div data-bbox="845 1120 970 1341" data-label="Text"> <p>One of the most critical issues for the construction of the new disposal site is site selection, and its procedure. It is important to make a consensus with various stakeholders including local residents, as well as considering environmental, social and economic aspects.</p> </div> <div data-bbox="970 1120 1035 1341" data-label="Text"> <p>During the first phase, MUB and the study team tried to select the most appropriate site for the new disposal site while seeking for a consensus with a wide range of people/organizations through various opportunities such as workshop, seminars and local meetings. We have just organized the second workshop and the first seminar in</p> </div> <div data-bbox="1123 1120 1302 1341" data-label="Image"> </div> <div data-bbox="1302 1187 1321 1341" data-label="Caption"> <p>Figure 3. Illegal dumping on the way to the disposal site.</p> </div> |
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| <div data-bbox="312 752 331 969" data-label="Text"> <p>order to decide the location of the new disposal site.</p> </div> <div data-bbox="335 752 427 969" data-label="Text"> <p>In the following section, the result of the second workshop, which was held on April 11, and the first seminar, which was organized on April 26, will be introduced.</p> </div> <div data-bbox="430 752 467 969" data-label="Section-Header"> <h3>2.2 Selection of a site for a new disposal site</h3> </div> <div data-bbox="470 819 489 969" data-label="Section-Header"> <h4>(1) Selection Procedure</h4> </div> <div data-bbox="493 752 558 969" data-label="Text"> <p>MUB and the study team tried to select the most appropriate site, according to the following steps (Figure 1). At first, we selected 6 candidate sites.</p> </div> <div data-bbox="331 521 513 721" data-label="List-Group"> <ul style="list-style-type: none"> ■ Ministers, MOE, MOH, MOI, MOIT ■ MUB: Mayor's office, Governor's office ■ During District office ■ Nurts company and TUKs ■ Khoroos governors ■ and residents near the candidate sites ■ NGOs </div> <div data-bbox="316 282 456 573" data-label="Image"> </div> <div data-bbox="456 304 644 573" data-label="Image"> </div> <div data-bbox="644 293 663 510" data-label="Caption"> <p>Figure 4. Second Workshop</p> </div> <div data-bbox="667 293 703 510" data-label="Caption"> <p>Figure 5. Life span of the site</p> </div> <div data-bbox="707 293 799 510" data-label="Text"> <p>In such criteria as general site conditions, social impacts, and pollution impacts, participants gave a point ranging from 0 to 5, so that they could comparatively compare the candidate sites later.</p> </div> <div data-bbox="802 293 914 510" data-label="Text"> <p>As for the cost, the total annual cost in 2010, which was estimated by the study team, was utilized as an indicator. In addition, participants referred to the result of the observation survey of the candidate sites by the study team in order to evaluate the life span of the site.</p> </div> <div data-bbox="917 293 967 510" data-label="Text"> <p>At the end of the discussion, each group selected the most appropriate site from 6 candidates.</p> </div> <div data-bbox="970 293 1007 510" data-label="Text"> <p>All four groups selected the same site, Narangan Enger, as their first choice.</p> </div> <div data-bbox="576 593 858 940" data-label="Diagram"> </div> <div data-bbox="823 669 839 866" data-label="Caption"> <p>Figure 1. Procedure of the Site Selection</p> </div> <div data-bbox="868 521 967 969" data-label="Text"> <p>The 6 candidate sites are:</p> <ul style="list-style-type: none"> ■ Narangan Enger site located to the north of current Ulaan Chuluut disposal site; ■ XMK site of the former borrow pit for building material; ■ Southern site of current Mervin Davaa disposal site; ■ Bayanjin Khonhor site in the south of Nulaan; ■ Tsagaan Davaa site located north of former Elhi disposal site; and ■ Bagatur site of former coal mining pit. </div> <div data-bbox="970 521 1007 969" data-label="Text"> <p>The locations of some of the candidate sites are shown in the map right.</p> </div> <div data-bbox="1010 521 1046 969" data-label="Section-Header"> <h3>(2) Result of the Second Workshop</h3> </div> <div data-bbox="1050 521 1279 969" data-label="Text"> <p>The purpose of the second workshop was to examine the 6 candidate sites containing environment, economic and social elements.</p> <p>The participants were from the following organizations or groups.</p> </div> <div data-bbox="1018 277 1292 748" data-label="Image"> </div> <div data-bbox="1292 448 1310 642" data-label="Caption"> <p>Figure 2. Location of Candidate Sites</p> </div> | <div data-bbox="1321 624 1337 636" data-label="Page-Footer"> <p>2</p> </div> |
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Thagan Davaa was also regarded as an appropriate site, three groups selected it as the second choice.

As a conclusion, the second workshop selected Narangin Enger and Thagan Davaa as the most appropriate alternatives for the site of the new disposal site among the 6 candidates sites.

The details of the second workshop will be available on the web site of the JICA.

(3) Result of the Third Steering Committee

Based on the result of the second workshop, members of the steering committee visited two candidate sites before reaching the final conclusion.

At the third Steering Committee, Narangin Enger was selected as the new disposal site.

(4) Narangin Enger Site

Narangin Enger is located north of the current Ulaan Chuluut disposal site in Songkhroaithan.

The feature of the site is a large and deep valley, as shown in Picture 5. This site could be used in the longer term. Its location, relatively near the center of the city, has also an advantage over other candidate sites, there is no need to construct a transfer station and it is possible to save the site cost considerably.

(5) Result of First Seminar

In order to inform of the result of the site selection, a seminar was organized on April 26, 2005.

The participants were invited from the following organizations or groups.

- members of the Steering Committee
- Members of the Technical Working Committee
- Representatives of Dauring and Khoroog governments near the proposed site (Narangin Enger)
- Representatives of residents near Narangin Enger (711 people)
- Representatives of NGOs
- The Press

At the seminar, before the result of the selection procedure, the plot project background of the site selection and the objectives of the seminar were introduced. Then details of the selection procedure and the result of the selection were explained.

At the Q&A session, a few participants made critical comments on the selection procedures; discussed notes should not be included in the candidate sites, the location of Narangin Enger will be close to the urban area after the urban district will be expanded according to the City Development Plan, it is necessary to listen to local residents more, and so on.

On the other hand, local authority and residents from Khoroog 4, of the Songkhroaithan District, which is located near Narangin Enger, were more positive about the result of the selection result. Some of them insisted on the importance of job creation and a pavement of the main road.

In order to make the agreement between the MUB and local residents firm, it is important to improve the current operation of the disposal site in Ulaan Chuluut, so

that MUB can persuade local residents that it is possible to prevent or mitigate the negative impacts of the new disposal site on the surrounding areas.

In fact, in Khoroog 4, a social survey, targeting both the local residents and waste pickers at the Ulaan Chuluut disposal site, was conducted under the scheme of the JICA study.

The survey result revealed that local residents in Khoroog 4 were seriously concerned about environmental degradation caused by the improper operation of the disposal site and illegal dumping. Some local residents already considered possible measures.

Based on the result of the survey, we proposed to establish a monitoring committee in Khoroog 4, consisting of local authority, representatives of local residents, environmental authority, NGOs, and citizens. The regular monitoring of the disposal site, MUB and Khoroog 4 agreed with the proposal.

We hope that the regular monitoring could bring about the sustainable operation at the Ulaan Chuluut disposal site, and that the experience of the regular monitoring by local authority and residents could deepen their knowledge on solid waste management and enhance their ability to conduct the operation of the new disposal site.



Picture 5. Narangin Enger

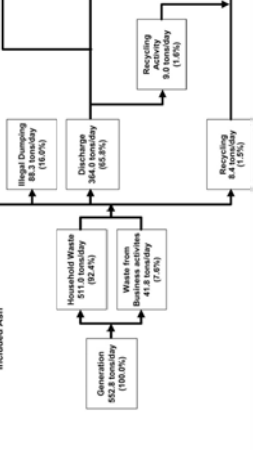
2. Present and Future Waste Stream in Ulaanbaatar

In the previous newsletter, the outline of the Waste Amount and Composition Survey (WACS) was introduced.

The WACS made it possible for us to estimate the total amount of waste generated in the Ulaanbaatar City area. Together with the result of other surveys such as a factory survey, a recycling survey, a public opinion survey, and an interview survey with waste pickers at the Ulaan Chuluut disposal site, and information from waste collection providers and disposal sites, we obtained the current waste flow in Ulaanbaatar.

As reported in the previous newsletter, we estimate that 552.8 tons of waste is generated everyday here. Among them, 157.2 tons of waste is generated in the Apartment area and 395.6 tons of waste is generated in the Ger area. Waste in the Ger area contains a large portion of ash, and this makes the waste generation amount three times larger. Without ash, the daily generation amount is only 137.8 tons.

At present, 321.6 tons of waste (58.2% of the total amount) is brought to the final disposal site, and we estimate that 21.4% of waste is dumped illegally.



3. Post Script

The first phase of the JICA study will finish in the middle of May, and we are now very busy making the interim report, which will be submitted to MUB before the end of the first phase.

In the current newsletter, we tried to inform you of the selection procedure of the site for the new final disposal site and the result of the selection procedure.

Since a final disposal site potentially has a large negative social and environmental impact on its surrounding areas, MUB will conduct an Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA), before finalizing the construction plan in order to prevent or mitigate possible impacts. MUB will also organize several local meetings near the site.

It is important to promote public participation from the early stage of the planning. Soon after the plan of the environmental impact survey is made, the survey will be open to the public. Opinions and comments on the survey plan will be reflected in the final plan of the EIA.

In the second phase, starting next July, we will conduct several pilot projects in order to examine the appropriateness and applicability of the proposed Master Plan.

One of them is the improvement project of the Ulaan Chuluut disposal site. Another is an experiment to introduce new equipment to make the collection work in the Ger area effective. We will make a report on the progress of these pilot project projects, as well as the site.

as the plan of the new final disposal site and its Environmental Assessment Survey through newsletter, website, workshop and seminar. Your opinions and comments on our project are always welcome.

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The Study on Solid Waste Management Plan for Ulaanbaatar City in Mongolia

Content

1. Plan of Pilot Projects
 - 1-1 Proposed SVMM Master Plan
 - 1-2 Selection of Pilot Projects
 - 1-3 Schedule
 - 1-4 Pilot Projects
2. Post Script

1. Plan of Pilot Projects

The first phase of the study ended in the middle of May. At the end of the first phase, we proposed the draft of the Master Plan. We also presented the draft to the Ulaanbaatar City Government (Ulaanbaatar City People's Khural) in May 2006. In the interim report, which was submitted to Municipality of Ulaanbaatar, MUB.

In the second phase, starting in the second half of June, we will conduct several pilot projects in order to examine the appropriateness and validity of the proposed Master Plan. Based on the result of pilot projects, we will finalize the Master Plan. In this newsletter, the plan of pilot projects is introduced.

1-1 Proposed Master Plan

In the previous newsletter, the current waste flow in Ulaanbaatar was shown. We, the JICA study team, estimate that the daily generation amount of waste in the whole city is 552.8 tons, and that 180.4 tons of waste (more than 30% of the total amount) is not collected. The amount of waste collected or illegal dumping, in addition, 30.0 tons (amount) is dumped illegally on the way to the final disposal sites. As a result, 58.2% of the total amount (321.6 tons) is brought to three disposal sites for final disposal.

On the other hand, the disposal method at final disposal sites in Ulaanbaatar is open dumping, and this causes serious environmental problems. In order to improve the operation and management of these disposal sites.

The SVMM Master Plan, therefore, proposes to establish an environmentally sound SVMM system in MUB by 2020 through the following steps.

- To restrain waste generation and

reduce disposal amount of waste by promoting 3Rs (Reduce, Reuse, and Recycling).

- To provide collection service to all the businesses and residences in MUB by 2010
- To adopt the sanitary landfill method at the new disposal site in Naranjin Erger by 2010 and at other small scale disposal sites by 2015

1-2 Selection of Pilot Projects

In order to realize an environmentally sound SVMM system, it is critical to take the following aspects into consideration.

- Institutional aspect: how to strengthen the capacity of waste resources and to establish a sustainable financial system
- Technical aspect: how to select and adopt appropriate technologies
- Social aspect: how to increase public awareness and to promote public participation

Through conducting pilot projects, we will try to form concrete measures on how to achieve the goal of the Master Plan.

Based on these basic aspects, five pilot projects were selected, as shown below.

- (1) Urgent improvement of the Ulaan Chuluut disposal site
- (2) Thermal recycling "RDF"
- (3) Movable recyclable collection system "Chigam Kokee" sweeping recyclables for toilet paper
- (4) Examination of the leading device for heavy waste
- (5) Raising public consciousness on

1-4 Pilot Projects

(1) Urgent Improvement of Ulaan Chuluut Disposal Site (UCDS)

There are three final disposal sites in MUB, and at these sites waste is just dumped openly. In order to achieve a green and a clean city, we need to improve the sanitary landfill operation at existing disposal sites.

Under the above situation MUB has requested the study team to assist the conduct of the pilot project on the Urgent Improvement of UCDS in order to mitigate the current environmental problems and to conduct sanitary landfill operation.

1) Objectives

The objectives of the Pilot Project (PP) are:

- a) To establish a control and management system of collected waste in order to avoid illegal dumping, i.e. to dispose of all collected waste at UCDS.
- b) To dispose of the wastes to be hauled at the designated area of the UCDS, that is the first step of the sanitary landfill operation, and
- c) To improve the UCDS and conduct a sanitary landfill operation as much as possible.

2) Outline of the project

The urgent improvement mainly consists of two elements: (1) construction of the pilot project, and (2) improvement of the plan of the UCDS. The construction is summarized in Figure 1.

Table 1: Improvement Works

| Work Item | Area/Item |
|---|-----------|
| Control and management of collected waste | |
| 1.1 Preparation of collection system | MUB |
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Under the pilot project, the Mongolian side, Nuts Co. and the City Maintenance and Public Utilities Department of MUB, will be responsible for the improvement of the sanitary landfill, while we provide timely technical assistance. Financial assistance is also provided from JICA for the pilot investment. On the other hand, the Mongolian side takes the responsibility for the improvement of the sanitary landfill operation at existing disposal sites.

Under the above situation MUB has requested the study team to assist the conduct of the pilot project on the Urgent Improvement of UCDS in order to mitigate the current environmental problems and to conduct sanitary landfill operation.

After the weightbridge starts its operation, MUB will be able to acquire the actual data on the amount of waste brought to the disposal sites. This data will be crucial for the appropriate SVMM for MUB. Therefore, the weightbridge database management system will be established by MUB with the support from the JICA study team.

After the pilot project comes to an end, the Mongolian side will continue to improve its operation by itself. In order to make sure of the appropriate operation, the study team will continue to provide technical assistance to local authorities and residents could make the regular monitoring work better.

Therefore, we will establish a monitoring committee, consisting of the chief of Khoro and representatives of local residents along with environmental authority is indispensable.

In addition, the increase in awareness of local authorities and residents could make the regular monitoring work better.

Therefore, we will establish a monitoring committee, consisting of the chief of Khoro and representatives of local



Figure 1: Facility Construction

residents along with environmental authority. The details will be shown later (Raising public consciousness on waste issues).

(2) Thermal Recycling "RDF"

According to the result of the waste amount and composition survey in the pilot period, the contents of paper, plastic and kitchen waste with 13.1%, 18.5% and 31.4% respectively (total 63.0%) are high.

There are two main approaches to deal with the amount of waste. One is to increase the amount of waste by recycling organic waste and inorganic mixed waste. Neither of these approaches, however, is appropriate in Ulaanbaatar, since there is little demand for compost and organic waste. The other is to recycle waste to apply.

Refuse Derived Fuel (RDF) produced from waste of paper, plastic and kitchen waste is a good recycling method in Ulaanbaatar, since RDF could be used as a substitute for coal at steam generating boilers or thermal power plants.

Therefore, we decided to examine the possibility of

utilizing mixed waste of paper and plastic as RDF under the scheme of a pilot project.

1) Objectives

The main objectives are:

- To demonstrate the production and combustion of RDF.
- To examine the possibility of production of RDF and production cost by using locally available technologies.
- To analyze the properties of RDF such as energy value, emission gas, forms.
- To measure the reduction amount of coal consumption by using RDF.
- To find out the optimum proportion of RDF and coal
- To collect data for the cost estimation

2) Outline of the project

The outline of the project is summarized below.

Procedure of the project

- a) Collection of low quality papers and plastics, which are currently not recycled at all
- b) Production of RDF by using these things as raw materials.
- c) Transportation of RDF to the heating plant.
- d) Burning of RDF at the heating plant and data collection

Environmental Consideration

The following environmental consideration measures are proposed to be taken, regarding the combustion of RDF.

- a) To check the generation of dusts with the support from Prof. Kanno Yoshiaki of the Mongolian University of Science and Technology.
- b) To minimize the amount of RDF to be combusted for the test.
- c) To select the most appropriate plant with less environmental impact. The desirable conditions of the test plant are described below.
 - Sited staff for the operation of furnaces.
 - Wide area for stock yard.
 - The plant has a few furnaces.
 - Few neighborhoods.
 - If possible, the plant has the advantage of semi-mechanical system of feeding coal and removing ash.
 - The furnace has a monitor thermometer and a thermometer of combustion and hot water.



Figure 1: Samples of RDF

- Furnaces have blower to supply air.
- Enough stack height. Exhaust gas treatment system.
- 24 hours continuous operation.

(3) Movable Recyclable Collection System "Chirigami Kokan": Swapping Recyclables for Toilet Paper

The activities to recover recyclables at the generation sources are not active in the study area, although people in the planned area discharge considerable amounts of recyclables. Most of the recovered materials are collected by waste pickers either at the disposal sites or on the streets. Considering the working condition of waste pickers and the large amount of scattered waste, there is greater need to establish a more-systematic resource recovery method.

In order to enhance the resource recovery activities at the generation sources, the most effective way is to provide residents with easy access to a buy-back system. The draft MP, therefore, has proposed a few recyclable collection system, which commonly worked all over Japan in Chirigami Kokan, which is the movable collection system of recyclables, the collector sometimes comes to residential and commercial areas and swaps recyclables from residents for toilet paper.

1) Objectives

The main objectives of the project are:

- To demonstrate this system in the study area and examine the viability of the Chirigami Kokan system.
- To collect low quality of paper and plastics, which are to be used as raw material for RDF.

2) Outline of the Project

The project will be implemented in the following steps.

- To select a project site from the residential areas in the alignment area
- To distribute leaflets requesting people to separate recyclables for Chirigami Kokan in advance.
- To arrange a truck on Saturday or

Sunday for a few months and ask residents to exchange recyclables for toilet paper.

- To set high quality recyclables to middle men
- To produce RDF from low quality paper and plastic collected.
- To promote this system to private recyclers.

(4) Examination of the Loading Device for Heavy Waste

In the Gar area, the main component of generated waste in the winter period is ash. Since ash is heavy, the collection work there is very slow and hard.

The draft MP has proposed the dump truck as the waste collection equipment for the winter period because the compaction can function well for such heavy waste. There is still a serious problem with the dump truck, however, that it is difficult to load. It is necessary to take some measures in order to improve the collection efficiency.

1) Objectives

The main objective of the project is to develop a simple loading device to make the loading work easier.

2) Outline of the Project

The project will be implemented in the following steps.

- To design a few loading devices
 - To fabricate a device onto the trucks used by TUK. TUK will use the device to practice to examine its applicability.
 - To select the most appropriate device
- A sample of potential lifting devices is shown in Figure 2.

(5) Raising Public Consciousness on Waste Issues

The Ulaan Chirad area faces various environmental problems caused by improper solid waste management. The disposal site there is one of the main sources of the problems, and local residents are certainly aware of it. They are very much concerned about this.

Another main factor to deteriorate its environment is illegal dumping, some of the private collection vehicles dump waste on the way to the disposal site. To solve these problems, it is necessary to raise the awareness of local residents also dump waste in an open space, instead of receiving the collec-



Figure 2: Sample of Loading Device

tion service.

The improvement of operation and management of the UCCG is selected as one of the pilot projects and this could mitigate environmental degradation around the disposal site. This could be a good opportunity to increase people's awareness further and to promote public participation in order to improve the conditions in Ulaan Chirad.

1) Objectives

The pilot project has two main objectives.

- To ensure the proper operation of the disposal site by introducing the participatory monitoring system
- To reduce illegal dumping through public participation

2) Outline of the Project

The project is divided into two parts: (1) participatory monitoring system of the disposal site and (2) campaign to stop illegal dumping.

Establishment of Regular Participatory Monitoring System

According to the result of the environmental survey in Ulaan Chirad, local residents are well aware of problems caused by waste, and some of them already consider necessary measures. However, their knowledge of solid waste management is still limited. It is necessary to deepen their knowledge to improve the solid waste management. Therefore, the first half of the project will pay more attention to educational activities.

The project will be implemented in the following steps.

- To establish the Monitoring Committee, a committee of local residents, under the guidance of GLAUB in one of environmental issues, an environmental inspector, a staffer of MOE, a staffer of the health center, a school teacher, a representative of local residents, and a staffer of

local NGO.

- To prepare educational materials and PR goods
 - To arrange local meetings and provide necessary information on SWM
 - To start the regular monitoring
 - To establish a system to open the result of the monitoring
- The frequency of the monitoring is once every three months.

The proposed items of the regular monitoring are:

- **Environmental Effects:** Fire & Smoke, Noise, Vibration, Odor, Waste, Scattering Animals (dogs, birds, etc.), Vermin (flies, worms, etc.), View
- **Operational Conditions:** Working situations of waste pickers, Heated vehicles, collection vehicles and bulldozers, Piles of waste
- **Facilities of facilities:** Weigh-bridge, On-site road (Main road, On-site road (Secondary road), Working area, Tertiary road, Movable type of fence for preventing waste scattering, Gas removal facilities, Security facilities, Fence (fixed type), Gate, Bank, Road, etc.
- **Removal facilities:** Landscaping treatment facilities, Drainage systems

Participatory Evaluation of Pilot Project (Phase 2)

In order to raise the interest of local residents further, around 20 local residents will be selected to participate in the first monitoring activity, which will be conducted before the pilot project starts. After the pilot project is complete, these local residents and the press will participate in the second monitoring again along with the monitoring committee members in order to evaluate the pilot project.

The result of the participatory evaluation will be introduced to local residents by Newsletters and the project web site.

Conclusion to Pilot Project

Illegal dumping in Ulaan Chirad can be divided into two groups: illegal dumping by collection vehicles on their way to a disposal site and illegal dumping by private collection vehicles. There are different approaches to deal with the two issues.

In order to prevent illegal dumping by private collection vehicles, MOE will set up a waste management station near the disposal site, one of the main illegal dumping places. It is important to incorporate this initiative in

the plan. Since keeping an eye on illegal dumping by local residents is critical, active involvement of local residents in the monitoring activity is indispensable.

An event, such as a cleanup activity at a large-scale illegal dumping place, will be organized in order to raise awareness of local residents about illegal dumping and to prevent illegal dumping.

Illegal dumping by local residents can be attributed to the poor collection service. Local residents are not aware of it as well as low awareness. In order to prevent local residents from dumping waste in open space, it is necessary to improve the collection service. Under the pilot project, however, it is impossible to cover the improvement of the collection service. Therefore, as a pilot project, tentative measures will be sought in cooperation with local residents, local authorities and a collection service provider.

The project will be implemented in the following steps.

- To establish a working group including GLAUB, MOE, local residents, local NGOs, and JICA study team.
- To organize community meetings
- To prepare educational and campaign materials
- To conduct a clean-up activity

2. Post Script

We started the second phase at the end of June. Some pilot projects have already started, while others are under preparation. We will inform you of the progress and the result of these pilot projects as they occur.

We will also conduct a feasibility study of the new disposal site. GLAUB will conduct the EIA survey. Regarding the EIA survey, public hearings will be organized. We will inform you of these public hearings later through the newsletter or website.

JICA Study Team for the Study on Solid Waste Management for Ulaanbaatar City in Mongolia

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The Study on Solid Waste Management Plan for Ulaanbaatar City in Mongolia

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1. Progress of the Pilot Project "Urgent Improvement of Ulaan Chuluut Disposal Site"

As explained in the previous newsletter, we started a pilot project. In this newsletter, we show the progress of the project at the Ulaan Chuluut Disposal Site (UCDS).

1-1 Outline of the Project

First of all, the outline of the project is briefly shown again.

The main purpose of the project is to mitigate such problems as fire, scattered waste and odor by improving the UCDS. The project is divided into two parts. Facility improvement and landfill operation improvement. After the completion of the facility improvement, the trial of the landfill operation improvement will start.

1-2 Progress of the Facility Construction

The facility construction started in the middle of August.

(1) Construction of enclosing bank and on-site road

Before the pilot project, there was not a clear boundary of the disposal site, and collection vehicles could enter the disposal site from various routes.

The construction of the enclosing bank makes the boundary clear. After the construction is completed, we will go through the gate, where the weighbridge will be installed, in order to enter the disposal site.

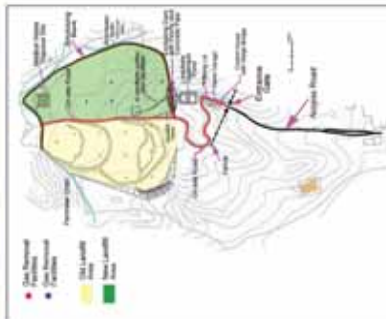


Figure 1: Ulaan Chuluut Disposal Site



Picture 2 Weighbridge Control Building & Entrance Gate (Left side of the picture is the entrance gate)



Picture 1: Construction of Enclosing Bank



Before the pilot project



Current conditions (at the end of August)

Picture 3 & 4: Disposal site seen from the north side (Old Landfill Area)

(2) Old landfill area
The landfill operation is moved to the east side, and the old landfill area is covered by soil.

Due to the methane gas generated from the decomposition process of the organic waste, there were frequent outbreaks of fires at the disposal site. In addition, gas removal pipes will soon be installed. Soil covering along with the installation of gas removal pipes could prevent fires.

1-3 Progress of Landfill Operation Improvement (Preparation)

It is important to make sure that Nuts Co. will maintain an appropriate operation in order to prevent or mitigate environmental problems.

Under the pilot project, Nuts Co. will conduct a sanitary landfill operation, after the facility construction is completed. The existence of waste pickers, how-

ever, would cause a problem in order to conduct a sanitary landfill operation. Therefore, it is critical to make a consensus with waste pickers about the new operation system.

Nuts Co. started the registration of waste pickers in the middle of August. As of the end of September, 148 families and 329 individuals are registered.

And then two meetings were arranged at the disposal site in order to explain the pilot project and the new landfill operation method.

The existence of waste pickers, how-



Before the pilot project



Current conditions (at the end of August)

Picture 5 & 6: Disposal site seen from the east side (the gate and on-site road)

1-4 Result of the First Participatory Evaluation

People in Khoro 4 have been concerned about the disposal site for a long time. It is important that more local residents are interviewed in and monitor the operation at the disposal site in order to make sure of the appropriate landfill operation.

As introduced in the previous newsletter, we organized the first participatory evaluation of the pilot project on the 28th of July, inviting 20 local residents and NGO.

(1) Evaluation method

The idea of the evaluation is simple. Participants join the site tour of the disposal site twice, before and after the pilot project, and evaluate the operation and conditions of the disposal site according to the check-sheet. Based on the result of the check-sheet, the effect of the pilot project will be examined. The second evaluation activity will be organized at the end of the pilot project.

Check-sheet

The check-sheet is divided into two parts. (1) Environment effect and operational conditions and (2) Functions of facilities.

At the first evaluation, facilities were not constructed yet, so the latter part was excerpted from the list.

The check items of the Environment effect and operational conditions are shown below.

In each item, there are three choices. (1), (2), and (3). (1) is the best, (2) is the middle (1), or (3) is the worst. Participants are required to choose one during the site tour.

Three choices are given a score, ranging from 1 to 3 as shown in parentheses, and the average score of each item is calculated. Its highest and lowest point is 3 and 1 respectively. This makes observation surveys.

(2) Participants

The participants were divided into 2

groups as shown below.

- members of the monitoring committee (Khoro 4 Governor, a staffer of MUB in charge of environmental issues, an environmental inspector, a representative of local residents, a representative of local residents, and a staffer of local NGO)
- 20 local residents

Since some of the monitoring committee members could not join the activity, the total number of participants was 26.

(3) Program

The first evaluation was organized according to the program shown in the table below.

Table 2: Program

| No. | Time | Item |
|-----|---------------|--|
| 1 | 9:30 - 10:00 | Registration |
| 2 | 10:00 - 10:05 | Opening Remarks |
| 3 | 10:05 - 10:15 | Background and Outline of Pilot Project |
| 4 | 10:15 - 10:25 | Outline of Regular Monitoring System and Introduction of the Monitoring Committee |
| 5 | 10:25 - 10:30 | Introduction of Regular Monitoring System and Introduction of the Monitoring Committee |
| 6 | 10:30 - 11:15 | Improvement Plan of LCOR |
| 7 | 11:15 - 11:30 | Moving to the Disposal site |
| 8 | 11:30 - 12:20 | Site tour and to fill in the check-sheet |
| 9 | 12:20 - 12:30 | Moving back to a meeting place |
| 10 | 12:30 - 12:45 | Lunch and Laid |
| 11 | 12:45 - 1:30 | Closing Remarks |



Explanation at a meeting room



Site Tour

Table 1: Check items and the result (average score)

| No. | Environment Effect | No. | Operational Conditions | Average Score |
|-----|--------------------|-----|-----------------------------|---------------|
| A1 | Pre & Source | A1 | Whole system | 1.3 |
| A2 | Effective site | A2 | Working conditions of staff | 1.1 |
| A3 | Waste center | A3 | Waste collection | 1.2 |
| A4 | Waste sorting | A4 | Waste sorting | 1.1 |
| A5 | Waste sorting | A5 | Waste sorting | 1.1 |
| A6 | Waste sorting | A6 | Waste sorting | 1.1 |
| A7 | Waste sorting | A7 | Waste sorting | 1.1 |

Picture 7 & 8: First Participatory Evaluation

2. First Public Hearing for Development of Narangin Enger Disposal Site and Recycling Complex (Scoping of the EIA Survey)

2-1 First Public Hearing

As informed in the newsletter No. 3, Municipality of Ulaanbaatar (MUB) decided to construct a new disposal site in Narangin Enger. In order to get the approval of the development plan from the Ministry of Environment and Conservation, the EIA survey is now conducting the EIA survey according to the law related to the EIA procedures.

Before the EIA survey started, MUB organized a public hearing on the 9th of August in order to explain the survey plan of the EIA survey (scoping) to local residents and NGOs.

The outline of the first public hearing is introduced.

(1) Date and Venue

Date: August 9, 2005

Place: Meeting Hall of 3rd Khoro in the Songkhokhkhon District

(2) Participants

■ Local residents from Khoro 3 & 4, Songkhokhkhon District (in total 111 participants)

■ NGOs (4 participants)

■ Municipality of Ulaanbaatar

■ Khoro 3 & 4

■ JICA study team

(3) Program

The program at the hearing is shown below

Table 3: Program

| No. | Item | Type |
|-----|--|---------------------|
| 1 | Registration | Registration |
| 2 | Opening Address by MUB | Opening Address |
| 3 | Background of the Public Hearing Meeting | Background |
| 4 | Reasons for necessity of a new disposal site | Reasons |
| 5 | Outline of the EIA Survey Plan | Outline |
| 6 | Question and Answer | Question and Answer |
| 7 | Closing Speech by MUB | Closing Speech |

(4) Follow-up Survey

The study team will conduct the follow-up survey in order to understand the opinion of the hearing and what they thought about the development plan. The result of the survey will be reflected in



Picture 9 & 10: First Public Hearing



Picture 11: Solid plastic exchanged for glass and plastic bottles

In general, most of Gar areas face such problems as scattered waste and bad smell caused by dumped waste.

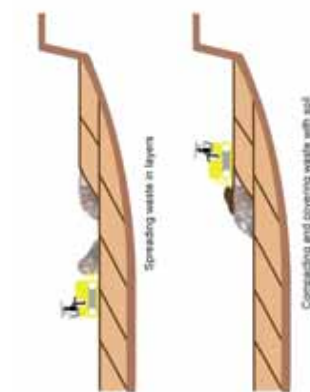
Under the pilot project, various activities will be arranged in Khoro 4 of the Songkhokhkhon District in order to raise public awareness on solid waste management issues. The first community meeting will be organized in the middle of September.

You will be able to get the progress or result of other pilot projects either in the newsletter or on the website later.

In addition to the second public hearing, we will organize the first workshop in October. The main topic is the assessment of pilot projects. Its result will be also reported in the newsletter or on the website.

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(2) Raising Public Awareness on Waste Issues



(7) Reduce/Reuse/Recycling
3R is one of the most important key words in solid waste management and indicates the following three terms starting with R: Reduce, Reuse and Recycling.

Reduce (Saracraz): To use less of a product, package or an energy source. This results in the decrease in waste generation amount.

Reuse (Daxuu Aumax): The return of a commodity into a second use for use in the same kind of application as before without change in its identity. Example 1: refilling a glass bottle that has been returned many times. Example 2: reusing a plastic bag.

Recycling (material recycling): A process where recyclable materials (e.g. paper, plastic, glass, metal, aluminum, steel etc.) are converted into new products, which are sold to the market. Example 1: manufacturing office paper and bath paper from used paper. Example 2: manufacturing new aluminum cans from used aluminum cans.

Collecting, sorting and transporting of the waste materials are important steps in recycling. Materials such as aluminum, steel, paper, glass and plastic can be recycled.

There is another type of recycling: thermal recycling which converts waste into energy. Such as incineration of RDF (Refuse Derived Fuel). RDF is one of the methods of thermal recycling. Priority of recycling is given to the Material recycling. The reason is that the conversion of natural resources is less than thermal recycling.

Mottainai (Morrahai): originally a Japanese term, which can be defined as 'A regrettable situation in which something is wasted without its value being fully recognized'. It is a concept that has been adopted by environmental and political activists and a Nobel Peace Prize winner for efforts to contribute to environmental conservation, was impressed with this word and promotes it all over the world.

(8) Others
Environmental Impact Assessment (EIA) (Gairaxa coomoo weesaxa Balghuu Hapdaawaduu Yaaxax): A n environmental analysis prepared to determine the potential impacts of a proposed development (EIA) and the mitigation measures to reduce the impacts to acceptable level.
Migration measures (Cepur Haxaawaduu Gairaxa apu uweaxa): Measures taken to reduce adverse impacts on the environment.
Refuse Derived Fuel (RDF) (Xor Haxaawaduu Gairaxa apu uweaxa): A certain waste processing system in which certain recyclable and non-combustible materials are removed, with the remaining combustible material converted for use as a fuel to create energy.

In the pilot project, only some types of waste materials, which are difficult to be recycled, are used as raw materials of RDF.
Intermediate Treatment (Jingaxa Soomaxaxax): an operation conducted between collection and final disposal. There are various processes such as sorting, incineration, composting, and so on. Priority of recycling is given to the purpose and economic and social conditions.

Intermediate treatment has three main purposes: 1. To reduce the volume of waste to be disposed of. 2. To reduce the risk of pollution. 3. To reduce the risk of disease.

- objectives.
1. volume reduction of waste (especially before final disposal)
 2. stabilization
 3. recycling of waste.

In many industrialized countries, land for final disposal sites is getting scarce, and this has led to the development of new technologies for waste management. In Japan, where the tipping fee of landfill is more than 300 US\$, incineration of waste aiming at reducing the volume is a primary concern in order to save landfill and transportation cost.

On the other hand, it is not important in Ulaanbaatar to reduce the volume of waste, since the land for disposal site is still abundant in the suburbs. Moreover, immediate treatment with the purpose of reducing the volume is not important to cause the operation and management cost of the disposal site is only about 3 US\$/ton.

As the M/P aims at promotion of 3Rs, the objective 3 is the main target of the introduction of an intermediate treatment system in Ulaanbaatar.

2. Appropriate storage and discharge manners in the Gar Area

Request from TUK to people in the Gar area:

We are now conducting a pilot project in khuzoo 4 of the Songkhushan district, aiming to raise public consciousness of waste issues.

Under the pilot project, we organized a community meeting in order to exchange opinions among local residents and TUK of the Songkhushan district.

At present, there are various problems regarding collection systems in Ulaanbaatar. One of the main problems is the service in the Gar area results in illegal dumping, and this causes waste scattering in the whole Gar area.

In order to make the situation better, it is necessary that TUKs of all the Dorjgal improve their collection systems, while the residents of the Gar area should be encouraged to discharge waste in appropriate manners. Discharge rules are critical in order to improve discharge manners, but discharge rules do not work without fixed collection schedule.

On the other hand, the schedule of collection services in UB is not fixed at present due to the old and deteriorated equipment. In the future, when the M/P plan, a priority will be given to the improvement of the collection system in the Apartment area. This could strengthen the franchise of TUKs and make it possible for them to provide a better service in the Gar area.

Gar area later on. Therefore, it takes at least a few years before TUKs can fix their collection schedule in the Gar area. Nevertheless, there are several things we can do now in order to improve storage and discharge manners.

Here are requests from TUK of the Songkhushan district to local residents in the Gar Area. You can do it to lighten the burden of collection workers and increase the collection efficiency.



JICA study team is now examining the possibility of introducing a new device for waste collection in the Gar area under one of 6 pilot projects.

In the Gar area, one of the main obstacles for the collection work is heavy load of waste which mainly consists of livestock manure. Local residents help collection workers, this is one of main reasons for low collection efficiency.

This loading device could reduce the burden of collection workers and local residents to load waste. If you live in a selected Khuzoo, where a collection device is being introduced, you might have a change to see it soon. Your comment and opinions about the new device will be welcomed!

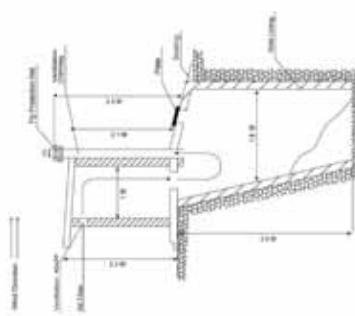


Figure 1: Design of toilet in the Gar area

In winter, waste water discharged to an alley is frozen quickly and the surface of the alley becomes very slippery. This causes a serious problem for collection workers. Therefore, we ask you not to discharge waste water to outside the fence in winter.

The Ministry of Health has a manual on how to construct a toilet and drainage hole. World Vision also provides information on how to construct a toilet. A hygiene training program in cooperation with Public Health Institute and UNICEF. Recently various techniques and measures to mitigate odor and keep the collection workers and residents safe. The design of a toilet within Wood Vision introduces in a booklet is shown in Figure 1.

3. Post Script

There are many technical terms in the field of Solid Waste Management. It is important for all the stakeholders to understand the meaning of these terms in order to increase their awareness and promote public participation in the development of these terms were introduced in Mongolian.

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2. "Use an Environmental Impact Assessment" Author: EIA is a joint study, identifying, preventing, and mitigating any possible adverse effect of pollution to service by individuals and right within to the human health and the environment.



TAM Survey in summer



TAM Survey in winter

(6) Findings from the Survey

As already mentioned, the collection efficiency is determined by various elements such as the type of waste collected, characteristics of community, discharge method, technology, and so on. In this survey, our survey group could not collect all the needed important elements.

Various findings obtained during the survey are summarized by type of area.

Ger Area

- The waste generated in the Ger area is collected by very heavy trucks and trucks with large containers (mostly construction waste) and difficult to load onto trucks.



- The waste collection work is accompanied by the collection of garbage. The collection work is inefficient, and the efficiency of the collection work and the options of waste collection systems.



Apartment Area

- In the Apartment area, there are various types of discharging methods, but the loading work always requires a large amount of labor. The collection system is applied. This reduces the collection efficiency.



Table 3: Summary of TAM Record

| In Winter | In Summer | | | | | | | | | |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Survey Date | 2013/01/10 | 2013/01/11 | 2013/01/12 | 2013/01/13 | 2013/01/14 | 2013/01/15 | 2013/01/16 | 2013/01/17 | 2013/01/18 | 2013/01/19 |
| Survey Area | Ger Area | Ger Area | Ger Area | Ger Area | Ger Area | Ger Area | Ger Area | Ger Area | Ger Area | Ger Area |
| Survey Method | Visual | Visual | Visual | Visual | Visual | Visual | Visual | Visual | Visual | Visual |
| Survey Time | 10:00-12:00 | 10:00-12:00 | 10:00-12:00 | 10:00-12:00 | 10:00-12:00 | 10:00-12:00 | 10:00-12:00 | 10:00-12:00 | 10:00-12:00 | 10:00-12:00 |
| Survey Result | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Note | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Average | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Standard Deviation | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Variance | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Coefficient of Variation | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Skewness | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Kurtosis | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Total Count | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Average Count | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Standard Deviation Count | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Variance Count | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Coefficient of Variation Count | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Skewness Count | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Kurtosis Count | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Total Count (Continued) | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Average Count (Continued) | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Standard Deviation Count (Continued) | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Variance Count (Continued) | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Coefficient of Variation Count (Continued) | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Skewness Count (Continued) | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| Survey Kurtosis Count (Continued) | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

Table 4: Distribution of Time for Each Activity by Type of Location

| Activity | In Winter | | In Summer | |
|----------------|-------------|----------|-------------|----------|
| | Time | Area | Time | Area |
| Collection | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Discharge | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Loading | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Unloading | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Transportation | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Storage | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Disposal | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Recycling | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Composting | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Incineration | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Landfill | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Other | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |
| Total | 10:00-12:00 | Ger Area | 10:00-12:00 | Ger Area |



- The communal container system does not function well due mainly to lack of management, and it causes collecting waste around the container and even fire.



- The conditions of trucks are bad, and tires often require repair work during the collection work.

TUK

We also found problems regarding the management of TUKs. Here are our findings.

- TUK doesn't properly control the amount of waste. It causes the disorder of waste.
- TUKs (garbage collectors) especially residents TUKs drivers collect waste when they want to collect it. Their own convenience comes first.
- Collection work is very labor intensive.
- Drivers do not always follow the existing road, but drive on grassland or even cross streams in order to take short cut.
- Most trucks of TUKs are in bad condition. During the survey in summer, five trucks out of 12 had tire puncture.
- TUK doesn't have any future plans or marketing plans. They lack a business oriented mind. It can be said that changing TUKs can be said to be a good idea to improve the collection and transportation system in UB.

Other Findings

Finally, other findings are summarized below.

- Even though the discharge system is convenient for residents and prevents contamination, this system is generally invisible, there are

actually many problems such as unsanitary conditions and difficult loading work. The dust cause problems and it is a big problem on waste problems.



- Public cooperation is very good in some areas.
- People who discharged waste in Ger area help load their heavy waste.



- In some apartment areas, people carry waste to the truck when it arrives.



- The collection of waste from households in some areas and schools is inefficient. This is the whole city is inefficient.

because the waste collection work is accompanied by the inefficient fee collection. To improve the efficiency of waste collection and to solve the problem, the waste should be separated from the waste collection work.

2. Post Script

Many people in UB complain about the waste collection service. Main problems they cited are the irregularity of the collection service and scattered waste left around containers. Another complaint was that the collection fee is too high. Some people think that the collection fee is expensive.

We have one thing we want to emphasize: the collection and transportation of waste in general costs considerable money. As mentioned in the article, the collection and transportation account for the large portion of the total SWM cost. The increase in the collection frequency will increase the cost of collection and transportation. Therefore, when the city authority makes a plan to improve the collection system in UB, it is important for them to discuss with local people on an appropriate level of the collection service, the frequency of the collection service, and the type of waste collection, considering the cost and benefit.

Public Participation could save the collection cost. In the survey in some countries, public participation is indispensable for sustainable solid waste management, in particular promotion of reuse and recycling of waste. In UB, public participation could be one of key elements for the improvement of collection service, too.

In the next newsletter, examples of public participation will be introduced. Public participation will be one of the main topics.

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5.1.2 JICA Study Website

As mentioned above, the study team created a website in order to introduce the JICA study, to report its progress, to open some documents such as reports on the workshop, and so on. The HTTP URL is <http://www.kkcub.mn/>.

The index page of the website is shown below.



5.2 Educational Materials

5.2.1 Pilot Project "Raising Public Awareness of waste issues"

a. Leaflets

In order to notify local residents of the pilot project, to report its progress and result, and to given them an instruction on how to handle waste, leaflets were issues 4 times.



Leaflet No. 1



Leaflet No.2



5-20