

- b. It is recommended that a task force or working group to improve the solid waste management in Vientiane should be immediately established, involving senior-level officials from the Departments of Public Health, and Communication, Transport and Construction, Municipality of Vientiane, and the Ministries of Health, and Communication, Transport, Post and Construction. Where appropriate, other agencies may be invited to join the task force or working group. The objectives of such team efforts are to coordinate and facilitate the activities carried out by various agencies involved for improvement of solid waste management in Vientiane and to establish a foundation for solid waste management in the country.
- c. The task force or working group should review the existing legislation, regulations and programmes implemented by the agencies involved, identify discrepancy and needs for modification and enhancement of their programmes; re-define their functions, responsibilities and authorities for solid waste management; and if necessary, draft new legislation and regulations or revise existing ones.
- d. The task force or working group should undertake a Master Plan study for solid waste management in Vientiane. The Urban Development Programme can contribute significantly to the task, and its cooperation should be sought. The Master Plan study should include at least generation rate, composition and density survey; questionnaire or interview survey on public awareness and opinions; design and feasibility of collection system with pilot-scale experiment; design of public participation and education programmes; siting and design of a sanitary landfill; feasibilities of recycling and composting ; and analysis of economic and financial feasibilities.

- e. The task force or working group should plan and conduct a national workshop on solid waste management to disseminate the experience and information obtained during the Master Plan study to other major urban centers in the country and to discuss the general approach and technical methodology which can be used for solid waste management in the country.
- f. The task force or working group may wish to request technical collaboration or financial assistance in recommended actions (c) through (e) above from various international agencies and donors.

2) Discussions

In response to the recommendations of the report, a national workshop on solid waste management was held in Vientiane on 27th August to 1st September 1990 under the auspices of the PEPAS, WHO. In addition, a Master Plan study for solid waste management in Vientiane is being carried out by JICA as "The Study on the Solid Waste Management System Improvement Project in Vientiane, Lao P.D.R." in order to carry out the recommended actions (c) and (d) above-stated.

G.1.4 Mission Report on Workshop and Field Visit on Solid Waste Management

1) Contents of the Report

The report was prepared by Dr. H. Ogawa, WHO (PEPAS) staff, and by Mr. D.J.V. Campbell, WHO consultant, Environmental Safety Center, Harewell Laboratory, United Kingdom.

The report includes the activities and contents of the workshop, and the findings of the field trip to the Pakse and Savannakhet provinces. The conclusions and recommendations of the report were as follows;

a. For workshop

- i. A group of government officials responsible for solid waste management should be formed in the Ministry of Health to develop action-oriented programmes for improvement of solid waste management systems in the country. This group should seek advice of relevant ministries on various aspects of solid waste management for which these ministries have shared responsibilities.
- ii. In order to improve environmental health in urban areas, higher priority and more funds should be allocated to solid waste management sector.
- iii. For any solid waste management programme, the public participation is essential. The Government should develop public education programmes to improve public cooperation in solid waste management.
- iv. Every effort should be made to provide training opportunities on solid waste management for concerned government officials, whenever possible, through existing training programmes both in this country and overseas.
- v. The Municipality of Vientiane, with the support from the national government, should upgrade the current landfill practice to a more hygienic method. The solid waste collection system should also be reorganized with an objective to ensure coordination between various groups currently undertaking collection services. The government should assess current allocation of resources and future needs for collection and disposal equipment and facilities.

b. For field visit

- i. Basic information such as the quantity of solid waste generated in the area, the population covered by the collection service, maps showing collection zones, locations of communal containers and collection routes, etc. should be collected and kept by the management staff.
- ii. A solid waste collection system, including collection zones, routes, frequency and time table, should be established particularly for household waste. The residents in the collection zones should be requested to provide a refuse container, made of locally available material, which can be easily lifted when being emptied. These actions should improve collection efficiency without much additional resources.
- iii. Disposal sites should be clearly designated, a fence and gate be provided, solid waste deposited be covered by soil to reduce problems associated with the breeding of flies. These should be considered as minimum requirements for proper landfill management.

2) Discussions

Although the recommendation of the report are very important and indispensable measures for the improvement of the present solid waste management in Vientiane and in the country, the implementation or realization of the recommendation seems to be very slow and poor.

G.1.5 The Study of Compost in Vientiane

The study was done by the Ministry of Agriculture and Forestry in Lao P.D.R..

The Study report is written in Lao and seems to be a pamphlet for the introduction of compost from wastes. The report includes only the method and benefit of compost from various wastes; i.e. garden wastes, garbage (food wastes), human wastes, animal wastes, etc.. However, the important studies regarding decision making of the introduction of compost such as a market study and a waste amount and composition study, are not included in the report.

G.2 Identification of Problems

There are some aspects in the present SWM in Vientiane which should be appreciated such as recycling system and beneficiary-pay-principal on collection of wastes, etc.. However, virtually all aspects of solid waste management in Vientiane need to be improved, including strengthening the institutional setting; developing human resource; enhancing refuse collection services; upgrading final disposal to sanitary landfill; securing funds for capital and recurrent expenditure; and encouraging public participation through development of public education programmes.

G.2.1 Technical System

1) Discharge and Storage

a. Source separation

First of all, it should be appreciated that the recycling at the generation sources of domestic and commercial waste is well-established and wastes are segregated into waste for discharge, food waste for feeding domestic animals mainly livestock, reusable materials for recycling and waste for self-disposal mainly for open burning at the backyards. The Vientiane Municipality should encourage source separation and recycling activities. However, it should also take necessary measures to stop open burning of wastes in order to improve air quality in Vientiane.

b. Bamboo basket

Although the use of bamboo baskets involve problems like scattering of wastes, smell, etc., they are being widely used in the present discharge and storage system for domestic and commercial wastes. Further, their use helps in the effective execution of collection work, especially waste loading work. Since the amount of garbage is very small, only limited scavenging by animals, even in baskets without lids, is observed. These baskets are locally made and are very cheap only 500 kips a piece.

c. Institutional wastes

Although a discharge and storage system for domestic and commercial wastes is established, the system for institutional wastes, that is, wastes from markets, hospitals and government offices, is not. For example, waste collected from each market shop is discharged into open heaps. These wastes do not only uglify the surrounding area, but also make loading work difficult (the loading of 1 ton of waste takes about an hour and requires 4 workers). Moreover, source separation is not implemented. Even though infectious wastes are segregated at the source, they are still discharged into open heaps, a trailer on a container, along with the other wastes.

2) Collection and Haulage

a. Collection points

In view of collection efficiency, the present collection points described below are deemed to be appropriate.

i. for residential and commercial areas

- curb collection;
- door to door collection; or
- bell collection.

ii. for institutions (markets, hospitals and offices)

- station collection

b. Service coverage

Present ratio of service coverage in the residential area is very limited at only 4.8%. As a result, in most residential areas, self-disposal by means of open burning is commonly done, creating air pollution problems.

c. Lack of collection capability

According to the CCS, more than 90% of the residents in the non-collection area wish to receive collection services and more than 60% of them agreed to pay. However, due to the very limited collection capability of both DCTC and private companies, the collection service area is not expanded. In addition, due to frequent vehicular troubles, the collection service is not stable.

d. Poor condition of equipment

In addition to the lack of collection capability, the present equipment (vehicles and others) are old and dilapidated, and even some seems to be out of order.

e. Improper transfer system

As for institutional wastes, the transfer system is adopted. This system entails the transferring of wastes primarily collected and placed in open heaps to the disposal site. However, due to the lack of equipment such as trailers and containers, this system is not efficiently conducted as compared with the direct collection system.

3) Road Sweeping, Drain Cleansing and Grass Cutting

a. Limited budget

Since road sweeping, drain cleansing and grass cutting services are conducted in public areas, DCTC finds fee collection hard to implement. However, even with very limited budget, these services are carried out on the main roads, covering a total length of 15 km (refer to Table 4.9-4.).

b. Public cooperation

Regardless of a very limited budget, this system would have survived with public cooperation. However, there is very poor cooperation from the public, in spite of the Cleansing Day activity every Saturday. Littering, scattering, and illegal dumping of wastes on roads and drains are commonly scene in the study area.

c. Poor equipment

Present equipment for road sweeping, drain cleansing and grass cutting is very poor, therefore, resulting in inefficient services. Due to the lack of equipment, drain cleansing and cleaning of litters or illegally dumped waste could not be carried out. This contributes to the further in sanitation of the environment of the city of Vientiane.

4) Processing

There is no processing facility in the Study area. In view of the very limited financial resources, the introduction of a processing facility including a composting plant seems to be little necessity. However, as recommended in the "Report on Disposal of Solid Wastes in Urban Vientiane" by UNDP, the introduction of an incinerator for infectious waste or other safe disposal method shall be examined.

5) Recycling

At present, the total amount of waste recycled is estimated at 23.8 tons/day. Since a self-sustaining system in the society or community still exists and is well organized, the existing recycling system is considered to be much more efficient than that of the other countries. Therefore, the Vientiane Municipality should maintain and encourage these existing recycling activities.

6) Final Disposal

a. Tipping fee

The present KM 18-DS should be thoroughly improved. It is, however, appreciated that DCTC have already commenced to collect tipping fee from the incoming vehicles and reserved a large land for final disposal; i.e. KM 18-DS although the land is not secured. The onset of the collection of tipping fees from incoming vehicles and the reservation of large land as disposal sites (KM 18-DS) by DCTC is, however, being appreciated.

b. Lack of environmental protection measures

In the existing disposal site, no environmental protection measures are provided. Scattering of solid waste, canal contamination by leachate and fire due to open burning by scavengers are observed in the disposal sites.

c. Lack of a unit responsible for final disposal

Although the Cleansing Section of DCTC, in principle, is responsible for planning, management and operation of disposal sites, there is no unit or personnel responsible for such work. In fact, there is no person in charge of the inspection and recording of incoming vehicles at the KM 18 disposal site until November 1991 since its opening 20 years ago.

d. Strict enforcement of the prohibition of illegal dumping

Small scale illegal dumping and littering of waste are commonly seen in many places. In order to reduce illegal dumping, it is necessary to enforce anti-littering regulations strictly. In addition, the education of local residents and improved waste collection services are required.

7) Equipment Operation and Maintenance

The present operation and maintenance system of equipment should be thoroughly improved, especially with regard to the following:

- preparation of daily, weekly and monthly inspection sheet;
- preparation of one year operational record;
- preparation of numbering system;
- establishment of a proper operation and maintenance system by obtaining preventive maintenance and repairing tools.

G.2.2 Institutional System

According to the results of the survey on the institutional system done, two main problems were identified regarding solid waste management. These problems were uncertain policies and limited budget. Furthermore, the institutional structure, which shall supposedly enable the reduction of problems without the use of any money, is not well established.

1) Organization and Management

a. Unclear responsibility of concerned agencies

There are various organizations concerned in solid waste management. However, the responsibilities and roles of these agencies are not clearly defined.

b. Poor cooperation between concerned agencies

Cooperation is one of the key issues which can facilitate smooth and effective works. Unfortunately, communication and cooperation among the agencies concerned in solid waste management are not sufficient giving way to the occurrence of a lot of trouble and the inefficient execution of the works.

c. Lack of planning

Neither a long term nor a short term plan regarding SWM has been set up by the responsible agencies. It seems that make shift measures without a plan have been taken when troubles occurred.

d. Lack of qualified personnel

The lack of numerous and capable staff for the solid waste management is also another serious problem.

In addition, responsible personnel are often changed without apparent reason.

e. Poor data management

Poor data management causes poor operation and maintenance. Data management is not properly done.

The data management and monitoring system of various aspects including number of personnel, job description, budget and financial situation, is indispensable for proper planning, study, implementation, operation and maintenance of the solid waste management.

2) Legislation and Enforcement

a. Weakness of regulation

The existing regulation issued by Vientiane Municipality is not sufficient and effective. It is necessary to revise this regulation, therefore, in accordance with the present situation and to strengthen it for effective enforcement.

b. Lack of a basic law

There is no basic law regarding solid waste management in Lao P.D.R.. Although the Ministry of Health has drafted a law on solid waste management, it is somehow only used as a guideline and is not legally valid.

A basic law is indispensable for setting up a standard guideline, code of practice, etc., regarding solid waste management.

c. Lack of enforcement system

Although the regulation of Vientiane Municipality on punishment imposed on violators is legally valid, it is actually very weak because of a poorly established enforcement system.

3) Finance

a. Findings

i. revenue

The Ministry of Health and other ministries do not allocate budget to solid waste management.

The budget for solid waste management in Vientiane Municipality is insufficient, and the budget for maintenance is not particularly secured. This is one of the reasons why the service level is low and why increase in revenue is difficult to achieve.

Although fee collection is executed, the management of the fees is not clear.

ii. expenditure

The accounting system for solid waste management is not fully well established. Only personnel expenditure is reported to DPF, VM, in accordance with the budget. The collected fees and their uses are not being checked. Customs and system of settlement of accounts and an auditing system are not established.

The documents and receipts of bills are only secured in a file and are not analyzed.

b. Major problems

The budget for solid waste management, especially for maintenance of vehicles is insufficient.

The flow of collected fees intended for the improvement of solid waste collection services is not clear.

4) Public Cooperation

For any solid waste management programme, public cooperation is essential. One of the major differences between solid waste management (SWM) and other public services such as water supply and electricity supply is that SWM requires public cooperation for its successful and efficient operation, while other public services do not require public cooperation in such aspects as:

- Waste storage and discharge manner
- Non-littering at public places

Public cooperation is inadequate in Vientiane urban area. Major reasons behind this are;

- a. Vientiane Municipality has not clearly and strongly specified the role of the public to the public.
- b. The Municipality does not strongly exercise the laws and regulations.
- c. Inadequate public education for children at home and in schools.

G.3 Improvement Measures

G.3.1 Stepwise Improvement Plan

The problems mentioned in the former section are classified into two categories; those which may be possibly improved immediately and those which may only be solved in a certain term due to financial and social constraints.

Improvement plans which do not require large initial investment can be implemented immediately, while those that require a large initial investment may have to be implemented in a longer term.

In view of the present defective SWM, especially with regards to its very limited financial resources, it is necessary to make considerable efforts of improvement in order to achieve the target of the Basic Plan. Therefore, a stepwise improvement plan until 2000 is proposed in the following manner;

Category of Plan	Target Year
- Basic Plan	1992 ~ 2000
- Immediate Improvement Plan	Present to 1994
- Short Term Improvement Plan for Feasibility Study	1995 ~ 1997
- Medium Term Improvement Plan	1998 ~ 2000

Execution of immediate improvement plans including pilot projects will be useful to examine the feasibility of short and medium term plans.

G.3.2 Improvement Measures

In order to solve the present problems identified and to realize the goal proposed for the year 2000, the improvement measures in accordance with the stepwise improvement are identified and tabulated in Table G.3-1. The most important measure is, however, for national and local governments to give high priority to Solid Waste Management especially with regard to the following;

- i. legal and organizational set-up; and
- ii. allocation of more funds.

Table G. 3-1 Improvement Measures (1)

..... 1

ITEMS	IMMEDIATE IMPROVEMENT MEASURES	SHORT & MEDIUM TERM IMPROVEMENT
<u>TECHNICAL SYSTEM</u>		
1) Discharge & Storage	① Execution of separate discharge for infectious waste in the hospital.	① Abolition of the open heap in the institutions (markets, hospitals, offices). ② Encouragement of source separation. ③ Discouragement of open burning for self-disposal. ④ Introduction of an appropriate disposal system for the infectious waste.
2) Collection & Haulage	① Preparation of weekly and monthly working schedule. ② Collection of data regarding amount of waste collected.	① Extension of collection service area. ② Improvement of collection frequency. ③ Establishment of appropriate transfer system for the institutional waste. ④ Establishment of efficient collection system.
3) Road Sweeping, Drain Cleansing & Grass Cutting	① Stimulation of community cooperation for the cleaning up of its surroundings.	① Establishment of public cooperation for cleaning up roads and drains. ② Strengthening of cleaning capability.
4) Processing	-	① Examination of a proper treatment system for infectious wastes.
5) Recycling	-	① Encouragement of recycling activities.
6) Final Disposal	① Securing land for the KM 18-DS. ② Authorization of the KM18-DS as a disposal site ③ Control of scavenging activities ④ Provision of records of incoming vehicles. ⑤ Improvement of tipping fee collection system.	① Execution of sanitary landfill. ② Establishment of an organization for final disposal.

Table G. 3-1 Improvement Measures (2)

.....2

ITEMS	IMMEDIATE IMPROVEMENT MEASURES	SHORT & MEDIUM TERM IMPROVEMENT
7) Equipment O&M System	<ul style="list-style-type: none"> ① Preparation of repair and specification record. ② Execution of regular maintenance 	<ul style="list-style-type: none"> ① Establishment of proper operation and maintenance system.
<u>INSTITUTIONAL SYSTEM</u>		
1) Organization & Management	<ul style="list-style-type: none"> ① Clarification of the roles of each organization. ② Assignment of person (s) in charge of planning and management. 	<ul style="list-style-type: none"> ① Establishment of a definite organization. ② Establishment of a planning section. ③ Improvement of working conditions. ④ Establishment of roles of Vientiane Municipality and private companies. ⑤ Establishment of regulatory system of private companies. ⑥ Establishment of training system.
2) Legislation & Enforcement	<ul style="list-style-type: none"> ① Strengthening enforcement capability. 	<ul style="list-style-type: none"> ① Establishment of a law. ② Revision of the present regulation. ③ Establishment of enforcement system.
3) Finance	<ul style="list-style-type: none"> ① Improvement of accounting system. ② Improvement of fee collection system. ③ Collection of data for operational expenditure. 	<ul style="list-style-type: none"> ① Establishment of financial sources. ② Establishment of fee collection system. ③ Establishment of auditing system. ④ Establishment of accounting system.
4) Public Cooperation & Education	<ul style="list-style-type: none"> ① Strengthening present public cooperation on the Cleansing Day on Saturday. ② Preparation of an education program for the primary schools. 	<ul style="list-style-type: none"> ① Establishment of public education system. ② Encouragement of public cooperation.

JICA