

6.12 Measures and Projects for Strengthening Financial Mechanism for Environmental Improvement and Management

6.12.1 Allocation of Finance for Environmental Projects

Financing of environmental improvement in Hanoi faces problems common to most cities in developing countries which are in the process of transition to market-based, industrializing and increasingly urban-oriented economies.

In Vietnam, the provision of environmental services, such as water supply/sewerage, and solid waste management, as well as of other services, such as electricity supply, has traditionally been under public management. Soft budget constraints have resulted in inefficient operational and financial management, and operating costs have been correspondingly high. Dependence upon subsidies from general revenues rather than charging beneficiaries the full costs of supply have encouraged wasteful use of the natural and other economic resources involved, the result being an excessive burden on the environment. Dependency upon central revenues also creates uncertainty and is an obstacle to long term planning.

Similar issues apply to the control of industrial pollution. Historically, state-owned industrial operations have also faced soft budget constraints, and have been able to pass costs on to the general budget. This has resulted in wasteful use of energy and other natural resources. Efforts to introduce financial incentives to make more efficient use of resources, including the discharge of waste into the natural environment, will only succeed if industrial operations in general are also responsive to changes in prices and costs.

The failure of the totally free market system to achieve an efficient use of natural resources (due largely to the presence of environmental externalities) means that the evolution of the free market system must be accompanied by effective government intervention. Economic/financial as well as regulatory instruments have an important role to play in addressing environmental issues. Criteria for selection of alternative financial instruments should include their contribution to the achievement of technically efficient; economically efficient; or cost-effective solutions, as well as their fiscal and social consequences and administrative feasibility.

Market based instruments (MBIs), which employ economic incentives, can be contrasted to Command and Control (CAC) methods which provide mandatory regulation of the quantity and quality of environmental damage that may be permitted. A major advantage of MBIs, particularly where the cost of environmental damage is fully reflected in the price or tax a polluter or user of a natural resource has to pay, is that resources are allocated more efficiently, and

environmental objectives achieved more cheaply, than under physical rationing.

This criteria are referred to below with regard to developing a financial strategy for (a) Environmental Service Providers and (b) Industrial Air and Water Pollution.

6.12.2 Environmental Service Providers

(1) Solid Waste Management

1) User Charges

In principle, charges for solid waste collection and disposal in Hanoi, as elsewhere, should be based upon the economic costs of the service provided, and these might include residential fees based on volume or household characteristics. However, in practice there appears to be no real prospect of charging individual householders on the basis of the amount of solid waste they generate. To do so would invite illegal dumping and evasion of payment for services provided. So in practice user charges will have to be on a flat rate per household basis.

Nevertheless, separate earmarking of revenues for solid waste management for households is an important step that has been taken by URENCO, because this creates an important public awareness of the problem. However, extremely heavy reliance upon general revenues to subsidize URENCO's operations reduces the value of this. For future planning, more accurate costing of the services provided for different beneficiary groups and identification of both the costs and potential revenues from households will be a necessary requirement for possible concessionary arrangements with private sector operators.

There are greater prospects of collecting fees from industrial waste dischargers on the basis of the costs they impose. This will require an assessment of the contribution of various sectors to the total waste load and costs of collection and disposal. The feasibility of introducing charges for each type of user should then be tested. A possible result will be to find that with regard to industrial waste, user charges, whether in the form of tipping fees, based on quality and type of waste, or collection fees based on volume, are administratively feasible, and sufficient to cover the total costs involved. For this to occur, a monitoring and regulatory system adequate to prevent evasion of payment and illegal dumping will have to be developed; in practice the first priority should be given to those industries that produce the largest and most environmentally damaging waste.

2) Deposit-Refund Systems and Product Charges

Consideration should also be given to the introduction of deposit-refund systems for products or substances, which can be reused, recycled or which should be returned for destruction. Traditionally operated in many countries for beverage containers for strictly financial purposes the approach this system is eminently suitable for environmental ones. Deposit-refund systems are appropriate for products such as containers, batteries, crates, and car hulks. Since substantial parts of household waste consists of packaging deposit-refund systems, particularly in parallel with a system of product charges, can considerably reduce waste volumes, and in particular to a reduction in the release of toxic substances into the environment, such as from the disposal of batteries or incineration of plastics. Deposit-refund systems may also be used a part of life-cycle management for certain products that require special handling such as electric appliances. A similar administrative mechanism may be used to introduce "product charges" where taxes are levied on products that will eventually involve environmental costs when ultimately disposed of. These are referred to below under the general heading of Environmental Taxes.

It is important, however, to note that many of these interventions cannot be introduced at the city level, but rather at the national level.

3) Financial Management

URENCO has made considerable progress in improving financial management of environmental services in Hanoi in recent years. Expenditures on environmental services have been separated from those on other municipal activities, and a distinction is made between capital and operating costs. Increasingly information is being generated on the allocation of costs between broad categories of waste dischargers, such as industry and households, and steps are being taken to provide more up to date and adequate indicators of efficiency in cost-output terms. Major requirements now are:

- above all, to give the provider of solid waste services (URENCO) greater financial autonomy and stability, by increasing user charges and reducing its financial dependence upon general revenues
- to accelerate computerization of financial management to provide more rapid and comprehensive indicators of performance
- to plan for possible private sector involvement, by increasingly accurate estimation of the real economic costs of the existing service and proposed long-term expansion plans (this will permit city managers to

be in a strong position to negotiate with potential private suppliers).

(2) Water Supply and Sewerage

Financial, as well as technical and other administrative aspects of sewerage management should be addressed together with water supply. The rate of discharge of sewage is determined primarily by the volume of water consumption, which itself is influenced heavily by pricing policy. Thus water and sewerage pricing and cost recovery policies should be seen as a serious tool for determining the desired rate of water consumption. This is not the case in Hanoi at present, as considerable dependence upon subsidy from general revenues means that user charges do not adequately reflect supply costs.

Artificially low water prices encourage wasteful use, and generate inadequate revenues for system operation and expansion. Decline in service quality is accompanied by greater difficulty in raising prices, resulting in a vicious circle of underfunding and shortages. The cost to consumers of a service not being available is often more than the cost of expanding the service, even when costs are rising. Underpricing - or subsidization - of water supply and sanitation is therefore unjustified in economic and financial terms. It also tends to have perverse income distributional consequences, places a fiscal burden on government, and, by encouraging wasteful use, is also of detriment to the environment.

Some additional costs may be incurred in reforming this situation. Thus, an effective pricing policy would require expanding the number of consumers whose consumption is subject to volumetric measurement (i.e. the costs and benefits of expanding the metering system should be addressed). Nevertheless, the scope for policy reform with its multiple economic, financial and environmental advantages is therefore considerable, and this should be given extremely high priority in Hanoi.

Detailed study is required, but it is probable that an improved pricing/cost recovery system for sewerage would involve including sewerage and sewage treatment costs in the metered water rate where applicable, or in a flat tax per household or commercial or industrial establishment where metering does not exist. (In fact, for larger water users, water metering should be mandatory) Investment costs may be recovered by means of connection charges or betterment levies.

The points made earlier with regard to financial management for solid waste apply in a general sense equally to water supply and sewerage. The autonomy derived from greater reliance upon revenues from consumers will be conducive to the

efficiency of both short term operations as well as long term sectoral planning, including, if desired, the eventual transfer of operations to a private sector operator.

6.12.3 Industrial Air and Water Pollution

The general principles referred to below apply to industrial operations as well as other sectors, such as transportation. The main financial issue relates to the prospects for using environmental taxation of various forms. Taxation may be used to finance regulatory operations, and, more importantly, to influence the amount and quality of waste discharged to the environment. At present, environmental taxation is virtually non-existent in Vietnam.

Ideally, environmental taxes should be set so that waste discharge would take place up to the point that the additional benefit of waste reduction equals the additional cost of achieving it. In principle, one of the main advantages of environmental taxes is that they provide a continuous incentive effect which stimulates waste generators to seek out the least-cost combination of disposal, recycling and reuse that is available to them. However, the efficiency and environmental effectiveness of such instruments is conditioned by the institutional context in which the instruments are introduced. Most developing countries, including Vietnam, lack an extensive and effective waste and pollution control system and enabling agencies, so administrative feasibility is a major constraint.

Various forms of environmental taxation should be considered, as follows:

(1) Effluent or Emission Charges

These should be based upon quantity and quality of effluents discharged by enterprises. In many ways an ideal form of environmental tax, this application of the "polluter pays principle" has merits on efficiency, equity and fiscal grounds. Ideally charges would equal the economic costs of damages caused, for example to downstream water consumers or fisheries, or the public health costs of air pollution, or the traffic congestion caused by automobile use. Such charges (e.g. based upon sulfur dioxide emissions or on BOD or COD), which reflect marginal damage costs and are levied upon individual dischargers, have the potential advantage of ensuring that ambient quality standards are achieved at least cost to society as a whole since each discharger is given the opportunity to weigh the costs of damage against the costs of taking remedial abatement measures. Ideally the charges should reflect regional variations in ambient air or water quality objectives.

An advantage of charges is of course that they raise revenues, which may or may not be used for pollution control purposes by government. Difficulties arise with

regard to the measurement of damage costs, and in particular to their impact upon health, and thus in determining the appropriate level of charge, but this problem is not unique to the choice of economic instruments. Another serious problem -- which again applies to any type of instrument based on plant-level action -- is that of determining the responsibility of individual waste dischargers for damages caused, and practicality and cost of the monitoring and enforcement mechanism required. Emission charge policy is generally developed at the national level, but city mayors can take the initiative in setting local standards, as well as playing a major role in enforcement.

(2) Product Charges

Although there is increasing recognition of the advantages of environmental taxation, the administrative problems associated with emission fees have in practice been a major constraint to their introduction. An alternative approach that is becoming more widespread is to make use of blunter instruments which are based on the presumed environmental damage or disposal costs involved in the use of certain materials in production or consumption. These instruments are known as product charges (or presumptive charges), in which there is a presumed relationship between the use of a resource and its eventual contribution to pollution. In view of the smaller administrative costs associated with presumptive charges, the use of such instruments has been growing at a faster rate in the industrialized countries than effluent or discharge fees. It is also a characteristic of the blunter instruments that they must normally be implemented at the national, rather than the local level.

Product charges can be applied to products or materials that are used in production or consumption in large quantities and diffuse patterns. Items that have been subject to product charges in OECD countries include those on non-returnable beverage, packaging materials, plastic bags, and batteries. Product charges also include special taxes on leaded gasoline, on pesticides, fertilizers, the sulfur content of coal, or on carbon; a sewerage surcharge based upon the volume of water consumed by households is another example. Product charges correspond more closely to emission fees the more precise the technical relationship between the input used and the quality of the eventual discharge to the environment. In some cases e.g. carbon, this relationship is remarkably precise, which makes it a particularly effective tax.

Taxes may be levied on the product, or tax differentiation can be used to discourage the use of products that are highly polluting or difficult to dispose of, and at the same time encourage the use of more environmentally friendly alternatives (where however a product is highly toxic and its use should be

completely eliminated or substantially reduced, a partial or total ban will be preferable). Product charges may be used both for incentive purposes or for raising revenues. They may be introduced at various points, such as a surtax on import duties, or a surcharge may be placed on the price of products. In principle, charges should be based upon the total cost (including environmental cost) of disposing of the waste material after the product has been utilized.

While not as efficient as effluent taxes, in that they do not encourage improvement in the quality of discharges, they clearly do have some incentive effects, and are relatively easy to administer. In view of this, their consideration should be given a high priority in Vietnam. However, such intervention will primarily have to take place at the national, rather than the city level.

(3) Subsidies

Clearly contrary to the "polluter pays principle", governments frequently find subsidization of industrial expenditures on pollution control a necessary complement to pollution taxes or regulatory instruments. Subsidies take a number of forms, including such things as accelerated depreciation for tax purposes or low interest loans to encourage industries to cooperate in pollution control efforts. While inefficiencies in capital markets and considerations of equity may justify such subsidies during the transition period, it would be desirable if this policy were to be phased out over time. Explicit subsidization of pollution control equipment may distort investment decisions, e.g. by favoring end-of-pipe treatment rather than (often cheaper) industrial process changes, and of course they impose a fiscal burden on government. Subsidies from national to provincial or municipal agencies may however be justified, even beyond the transition period, on grounds of equity or where cross-jurisdictional benefits may result from environmental improvements. Moreover, subsidies directed at activities that are inherently environmentally beneficial, such as public transport, may also be justified.

(4) Tradable Permits

A variety of other instruments, which make use of economic incentives, may also be employed. These include tradable permits, in which licenses to pollute are allocated among various enterprises, which can then sell those rights to other enterprises. In principle, this, in common with the emission tax, can also result in the least cost means of achieving ambient targets. Certainty in the attainment of environmental targets is also achieved, and the initial issuance of permits can yield revenues.

(5) Pricing of Public Services

The supply and consumption of certain public services, notably electricity supply, are major causes of environmental degradation. As stated earlier with regard to water supply, efficient use of energy requires that prices reflect true economic and environmental damage costs. Such a policy, of critical importance for urban environmental management, also lies outside the jurisdiction of Hanoi City managers, and must be addressed at the national level.

6.12.4 An Environmental Fund for Hanoi City

The Study Team is in favor of the creation of a special Environmental Fund for Hanoi City, along the lines indicated in the UNDP study, Local and Sectoral Environmental Funds in Vietnam (1997). Such a fund, which provides financial assistance, by means of loans or subsidies for environmental purposes, is seen as an interim solution which is required largely due to the inadequacy of normal budget processes in allocating funds between competing uses. The fund should be phased out over time.

In the short run the advantage of the environmental fund is that it creates an awareness of the linkages between environmental charges/taxes and actual costs incurred. Separate creation of a fund, which would include both the proceeds of environmental taxes plus the specific allocations from concerned government agencies (including the central government) and international donors, highlights the costs of environmental measures rather than such costs being hidden in the accounts of various agencies.

On the other hand, such an approach is in contradiction to the desirability of integrating environmental expenditures within the activities of various ministries and agencies. Such integration, as in the case of overall reform of budgetary processes, is also a long run objective.

The other, more frequently heard argument against earmarking of taxes, as is implied by the creation of an environmental fund is that it is inflexible, funds have to be used for designated environmental purposes and no other (the US Highway Trust Fund is a classic example).

It will be necessary to be precise in what constitutes an environmental project, i.e. what kind of expenditure qualifies for financial support from the fund. For example, should profitable investments in clean production technology be included, or should it be restricted to end-of-pipe investment?

In practice it might be appropriate to restrict the fund to financing of collective actions, such as wastewater collection, disposal and treatment, solid and

hazardous waste management, and flood control, as well as for specific activities such as public awareness and education campaigns. Should government subsidies be deemed, on social and economic development grounds, necessary for privately owned enterprises, it is unlikely that the management of an environmental fund is best qualified to make the relevant decisions. In such a case, for example where a company is too poor to meet local pollution control standards, and the need for subsidy is based upon general development criteria such as local employment effects, financial assistance should come from a development, finance, or economic planning agency with the relevant perspective.

Allocation of environmental taxes and user charges of various forms between the fund and the primary environmental service providers such as URENCO and HSDC will also have to be carefully considered.

This kinds of issue and other details of how an environmental fund should operate in practice should be examined as part of the wider study on pricing and cost-recovery for urban environmental services that is being proposed.

The contents of the Environmental Fund (EF) is tentatively proposed hereunder.

(1) Objectives

Figuratively speaking, EF should be priming water rather than water resources or catalyst rather than raw material. It can not and should not be the major financial source for environmental improvement. Major pollution mitigation efforts should be , in principle, either by means of government budget for public undertakings, drainage and sewerage projects for example and by enterprises for effluent treatment making use of their own capital.

- a) Diversify the financial facility available for environmental improvement, management and awareness raising
- b) Demonstration effect of setting up such fund with the name of Environmental Fund for raising the environmental consciousness of the people and entities concerned
- c) Strengthen the influence of Hanoi DOSTE through the management of this fund over environmental management in the Hanoi City

(2) Fund source and amount of fund

Amount should be a few million dollars. Fund sources should be:

- a) Government budget (State or HPC)
- b) External aid, either bi-lateral or multi-lateral
- c) Fines/penalties against environmental violation
- d) Private contribution including the foreign entities

Table 6.12.1 shows a cost estimate for the environmental fund.

(3) Account of the fund money to be spent

Considering the finance source which include the fines imposed on the violator and limited size of the fund, environmental education and awareness raising (EEAR) of Hanoi citizens and enterprise managers and employees. EF can be utilized for supporting the internal activities of enterprises for awareness raising among themselves. EEAR can be effectively promoted by small amount of fund. Considering that no direct return or profit can be expected through EEAR, fund may be made available in the form of grant.

Considering the urgent need of increasing risk of industrial pollution, another category for using EF may be industrial pollution mitigation projects. Aiming at utilizing the limited fund effectively, priority should be placed on the followings

- a) Small-to-medium scale enterprises
- b) Projects of collective treatment facility for waste water, solid waste, etc.
- c) Projects which are expected to have demonstration effect or model of the subsequent similar projects

(4) Administration of EF

Hanoi DOSTE which is responsible for the overall environmental management of Hanoi City as well as EEAR and industrial pollution mitigation, should administer the use of EF.

(5) Conditions of Disbursement

- a) Subsidy/Grant
For EEAR projects.
- b) Soft loan
Industrial pollution mitigation projects

6.12.5 Direction

Financial strategy for the urban environment in Hanoi, as in other cities, is important not only with regard to the generation of revenue for environmental services and regulation to be performed, but also as a means of influencing the quantity of waste actually generated. The latter has not only environmental implications, but also affects the costs that environmental service providers and regulators have to incur. Financial policy is thus important for both revenues and costs.

The main thrust of financing strategy for Hanoi can, therefore, be summarized as

follows:

- greater financial and operating autonomy for environmental service providers, based on increased user charges
- acceleration of ongoing financial management and accounting reforms for environmental service providers
- consideration of certain environmental taxes for industrial polluters, with priority for deposit-refund measures and product charges; in general, systematically determining the appropriate combination of market based and regulatory instruments in urban environmental management
- continuing on-going price reform in sectors that are responsible for environmental degradation, such as electricity, water supply and transport

Of the above, the first two items fall within the jurisdiction of the Hanoi City government, with the third being primarily under the control of the national government. Under the fourth item, electricity is primarily a national level responsibility, transport is both national and city level, and water supply primarily under the control of the city. The ability of Hanoi to effectively manage urban environmental problems is therefore seriously constrained by industrial, energy, and certain environmental policies that lie outside its control. As the capital city, it can however take a proactive role in making the case for national level policy reforms, such as those relating to environmental taxation and resource pricing policy, which will enable not only Hanoi itself, but also other cities in Vietnam, to be more effective in urban environmental management.

It is recognized that pricing and associated reforms will in practice have to be introduced gradually, but the creation of the institutional capacity for implementing such reforms should begin right away. This involves legislation, training, and introduction of the necessary administrative responsibilities.

Table 6.12.1 Cost Estimate for the Environmental Fund					
1. RECURRENT COSTS					
1.1 ANNUAL SALARY AND OVERHEAD					
Fund Administrative Staff	Additional Staff	4	700	\$ 2,800	
TOTAL SALARY				\$ 2,800	
OVERHEAD (1 times Salary Cost)				\$ 2,800	
TOTAL ANNUAL SALARY AND OVERHEAD				\$ 5,600	\$ 5,600
1.2. ANNUAL OPERATING COSTS					
	General			\$ 1,000	
Evaluation Consultants	Outside Contracts			\$ 40,000	
TOTAL OPERATING COSTS				\$ 41,000	\$ 41,000
TOTAL RECURRENT COSTS					\$ 46,600
2. NON RECURRENT COSTS					
2.1. CAPITAL COSTS (for the entire operational life of the fund)					
Fund Endowment				\$ 2,000,000	
TOTAL CAPITAL COSTS				\$ 2,000,000	\$ 2,000,000
2.2. TECHNICAL ASSISTANCE AND TRAINING					
TOTAL TECHNICAL ASSISTANCE AND TRAINING				\$ -	\$ -
TOTAL NON RECURRENT COSTS					\$ 2,000,000

Chapter 7 Selection and Schedules of Priority Projects

7.1 Selection of Priority Projects and Their Implementation Schedules

7.1.1 Selection Criteria and Selected Priority Projects

(1) Selection Criteria

Out of the measures and projects proposed to fulfill the proposed environmental targets which are given in the previous Chapter 6, priority projects have been selected based on the following selection criteria. Namely, the measures and projects, either structural or non-structural, should meet either one of the following needs or both.

1) Urgent needs

Solve the problems which are already prevailing or currently affecting seriously the environment of Hanoi City, necessitating quick actions in the short-term. Degree of the urgency is evaluated from the gap between the needs and existing capacity of supply, taking duly into account the perception of the organizations and people concerned for the urgency.

2) Fundamental needs

Strengthen the foundation for the effective and efficient management of environment with a view to:

- a) Improving the significant problems and deteriorated environment,
- b) Preventing the expected environmental degradation in the future attributable to the urbanization and industrialization, and
- c) Complimentarity to other proposed projects proposed in this JICA Study including the urgent project as well as those proposed in other studies. Continuity with other projects which are either completed or under construction

It is proposed that considering that the restoration of the sound environment after degradation is always much more costly than prevention, these priority projects should be completed by the year 2005 or at the latest before the year 2010.

It is noted that the solid waste management project comprising Nam Son Phase 2 and waste transfer system which is considered as the most urgent among all and for which a preliminary feasibility study is being carried out in this JICA Study, is named as urgent project and not included among the priority projects.

7.1.2 Selected Priority Projects by Purpose

The selected priority projects can be classified into:

- a) To serve for Integrated Environmental Management,
- b) To serve for Clean and Sanitary Water Environment
- c) To serve for Clean City Environment
- d) To serve for the Diversification of the Financial Tool

The selected priority projects are listed hereunder.

(1) Priority Projects for Integrated Environmental Management

In order to manage the environment in Hanoi City more effectively and in more integrated and coordinated manner at present as well as with the new disposal system and treatment facility in the future, strengthening of the existing organizations and better coordination will be essential. The following four projects are proposed in this context.

1) Establishment of Environmental Coordination Committee and Revolving Environmental Master Plan Procedure

Major objective of establishing the Environmental Coordination Committee (ECC) is to ensure the better coordination among the Departments/ Authorities of HPC as well as between HPC and the Central Ministries and other entities including SOEs both Central and Local which are concerned with the preservation of the environment of the city.

2) Reinforcement of Hanoi DOSTE

Major objective is to strengthen the organization of Hanoi DOSTE by upgrading its status either to Agency or separate Department for Environment and setting up new divisions within its organization together with augmented staffs.

3) Strengthening of Environmental Management at District Level

Major objective is to strengthen the environmental management at district level which is important but very weak at present, either by establishing new either by establishing new offices concerned with environment within the District People's Committees or establishing Hanoi DOSTE's regional environmental offices.

4) Establishment and Reinforcement of the Monitoring System

Major objective is to reinforce the existing environmental monitoring system in order to better grasp the environmental situation for more effective environmental management.

(2) Priority Projects for Clean and Sanitary Water Environment

The chronic flooding in the existing urban area due to the bad rainwater drainage is the most serious problem which is affecting the sanitary condition of the city and the health of the citizens. Another serious problem is the polluted water environment in the urban rivers and the lakes located within the existing urban area. Following projects are selected as priority projects to mitigate these problems.

1) To Lich River Basin Drainage

Major objective is to further expand the drainage system which is currently under construction in the northeastern part of the City.

2) West Lake Water Quality Improvement

Major objective is to improve the water quality of the West Lake which should play the role of a major recreational facility in the city.

3) Main City Lakes Improvement

Major objective is to provide the amenity and recreational opportunity for the Hanoi citizens and to the tourists by improving the access to the waterfront together with the improvement of the West Lake.

4) Public Sewerage Development for the Old City Center

Major objective is to improve the quality of the surface water in the existing urban area as well as to provide more sanitary environment to the citizens.

5) Septage Collection and Disposal

Septage project is selected to fulfill the target of the Clean Water in parallel with the other projects. Major objective is to collect and dispose the septage, only part of which is at present collected.

6) Reform of HSDC

Major objective is to reform the organization of HSDC so that it can effectively manage the new systems of drainage and sewerage.

(3) Priority Projects for Clean City Environment

As the Tay Mo landfill site is being filled up already, construction of the new solid waste disposal site equipped with sanitary facility is an urgent task and selected as Urgent Project together with the transfer/transport system, for which preliminary feasibility study is being prepared in this JICA Study. To supplement this urgent project, Improvement of Primary Collection of Solid Waste project is selected as a priority project. Reform of URENCO is essential to manage the new waste disposal system.

1) Improvement of the Primary Collection System of Solid Waste

Major objective is to improve the primary waste collection system, which together with the implementation of the urgent project, will meet the target of the clean city.

2) Shift of SWM Authority to Districts and Privatization of URENCO

Major objective is to upgrade the SWM management capability and level of service at reduced costs by shifting the authority to Districts and privatizing URENCO.

3) Study on the Possibility of a Waste Incinerator with Power Utilization for Hanoi

Though the sanitary landfill is the most economical system, it is desirable that waste volume should be reduced before being disposed of by the landfill, taking into account the urbanization trend of the Hanoi City and increasing difficulty of land acquisition for landfill. Among the intermediate treatment methods, incineration is the most efficient, reducing the waste by 90 % in terms of volume and 80 % in terms of weight. However, incinerator project would necessitate big financial outlay for investment as well as high operation and maintenance cost. At present, calorific value of the waste generated in the Hanoi City is lower than the required level of 1,000 kcal. Taking into account all these and long lead time for preparation before implementation, it is recommendable that a detailed study on the possibility of a waste incinerator for Hanoi be carried out at the early stage. The contents of the Study should include the followings.

- a) Type of waste incinerator appropriate for the Hanoi City
- b) Appropriate location of the incinerator
- c) Expected environmental impacts and alleviation measures
- d) Expected social impacts and alleviation measures
- e) Executing and management organization of the incineration project

- f) Recruiting and training of the staff for the operation and maintenance of the incinerator
- g) Possibility of the utilization of the energy to be generated associated with the waste incineration, aiming at cost reduction
- h) Estimation of the costs for investment, replacement and operation and maintenance
- i) Financial arrangement and cost recovery

(4) Priority Project for Diversification of Financial Facility

To establish a new financial facility for fighting against pollution besides the Government budget will provide a tool for contributing to the mitigation of pollution by implementing model project and raising environmental awareness.

1) Establishment of Environmental Fund

Major objective is to set up a fund for pollution abatement and environmental awareness raising with the finance of fines/penalties, contribution of enterprises, external aid as well as the Government budget.

7.2 Implementation Schedules and Costs

7.2.1 Selected Priority Projects by Type

As stated in Section 7.1, the 13 projects, which are classified into structural measures and non-structural measures are selected as priority projects for improving the environmental control and management in Hanoi. The following 6 projects are proposed for structural measures of living environmental improvement.

For structural measures:

- a) To Lich River Basin Drainage Project (the 2nd Stage),
- b) West Lake Water Quality Improvement,
- c) 14 City Lakes Improvement in Old City Center,
- d) Public Sewerage Development for Old City Center consisting of Urban Treatment Zones 2-1, 3 and 4,
- e) Improvement of the Primary Collection System of Solid Waste,
- f) Septage Collection and Disposal.

And the following non-structural measures are executed at the same time of the above structural projects for supporting the implementation and effects of the structural projects.

For non-structural measures:

- g) Establishment and Reinforcement of the Monitoring System,
- h) Establishment of Environmental Coordination Committee and Revolving Environmental Master Plan Procedure,
- i) Reinforcement of Hanoi DOSTE,
- j) Strengthening of Environmental Management at District Level,
- k) Reform of HSDC
- l) Shift of SWM Authority to Districts and Privatization of URENCO
- m) Reform of URENCO and Other Solid Waste Management Organizations,
- n) Study on the Possibility of a Waste Incinerator for Hanoi,
- o) Establishment of Environmental Found.

All the priority projects should be implemented by HPC in harmonization between structural measures and non-structural measures. The outlines and details of the selected priority projects are described hereinafter.

7.2.2 Implementation Schedules

The implementation of selected priority projects is scheduled to be done during 2000 to 2005 or by 2010 at the latest, as shown in Figure 7.2.1. Before the

commencement of the project, various administrative procedures and preparatory activities will be required to HPC, as follows:

- Approval of the project implementation by the Government of Vietnam,
- Decision and allocation of the project fund,
- Administrative procedure including application to international or domestic lending/donating agencies,
- Selection of consultants for studies, detail design and construction supervision,
- Land acquisition and compensation for structural measures,
- Selection of contractors through pre-qualification and the international or local competitive bidding,
- Construction works for structural measures and advisory works for non-structural measures,
- Establishment of organizations for operation and maintenance.

7.2.3 Cost Estimate

The estimated total project cost for structural measures is US\$469 million, comprising the foreign currency portion of US\$293 million and the local currency portion of US\$176 million as shown in Tables 7.2.1 (1/5) to (5/5). The project costs of each priority project are summarized below:

Priority Projects	Cost (US\$ million)
To Lich River Basin Drainage Project (2nd Stage)	153.9
West Lake Water Quality Improvement	36.4
Main City Lakes Improvement (14 lakes)	10.3
Public Sewerage Development (Old City Center)	219.0
Improvement of the Primary Collection System of Solid Waste	33.0
Septage Collection and Disposal	16.0
Total	468.6

Rough project costs for the priority projects were estimated in principal under the following conditions:

(1) Project execution method

All the project works will be executed on a contract basis. The construction equipment, materials and labors required for the works will be provided by contractors to be selected through the international or local competitive bidding.

(2) Project cost and financial cost

The project cost comprises the main studies cost, construction cost, land acquisition and compensation cost, engineering services and administration costs, physical contingency, and the financial cost is estimated at adding the project cost to price escalation.

(3) Unit prices

The unit construction costs for the major work items were prepared by referring to the prevailing construction unit prices in the Price List for Construction Materials published by Hanoi Construction Services for governmental works in Vietnam, and to the unit construction costs for contractor systems, including direct and indirect costs, profit, etc., employed by similar projects in Southeast Asian countries. The construction cost for the Project was estimated by applying the said unit costs, as shown in Table 7.2.2.

(4) Price level

All the direct construction costs were estimated at mid 1999 price level. The exchange rate applied for the cost estimation is as follows:

US \$ 1.00 = J¥ 122 =VN Dong 13,900

(5) Land acquisition and compensation

The land needed for wastewater treatment plants, pumping stations, reservoirs, river and channel improvement, sewer rehabilitation and construction, etc., will be acquired by the Government. Houses located on the land acquired will be compensated. The unit costs for land acquisition and compensation were estimated as shown in Table 7.2.2.

(6) Engineering services

The cost of engineering services, including studies, detailed design and construction supervision was estimated on a man-month basis with direct cost, according to the implementation schedule. For some projects, the cost of engineering services is estimated at 15% of the direct construction cost.

(7) Administration cost

The cost for the Project administration by the Government of Vietnam is estimated at 3 % of the direct construction cost.

(8) Physical contingency

Physical contingency is estimated at 10% for the sum of civil works, hydro-mechanical works and the supply of equipment.

(9) Price escalation

Price escalation is estimated by applying an annual inflation rate of 2.0 % for the foreign currency portion and local currency portion.

It should be noted that the degree of the details of the projects vary according to the project due to the availability of the information for each project and whether or not any preceding study results are in available. In the same reason, cost estimate is roughly made for some of the priority projects and for the others not.

Table 7.2.1 Project Cost of FC & LC (1/5)

(Unit: US \$ 1,000)

Item	First Stage Construction			Second Stage Construction			Total		
	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total
	1 Construction Works	88,771	24,616	113,387	69,906	31,702	101,608	158,677	56,318
A. Construction Works	80,021	23,716	103,737	69,906	31,702	101,608	149,927	55,418	205,345
B. Procurement of Equipment & Material	8,750	900	9,650	0	0	0	8,750	900	9,650
2 Administration Cost (3% of 1)	0	3,402	3,402	0	3,048	3,048	0	6,450	6,450
3 Land Acquisition and Compensation Cost	0	15,180	15,180	0	20,050	20,050	0	35,230	35,230
5 Engineering Service (15% of 1)	13,316	3,692	17,008	10,486	4,755	15,241	23,802	8,448	32,249
6 Base Cost (1+2+3+4+5)	102,087	46,890	148,977	80,392	59,556	139,947	182,479	106,446	288,924
7 Physical Contingency (10% of 6)	10,209	4,689	14,898	8,039	5,956	13,995	18,248	10,645	28,892
Grand Total	112,295	51,579	163,874	88,431	65,511	153,942	200,726	117,090	317,817

Note:

Cost: 1999 year price level
 Exchange rate: US\$1.00=VND13,900

Table 7.2.1 Project Cost of FC & LC (2/5)

Urban Public Sewerage Project		(Unit: US\$1,000)												
		T.ZONE 2-1			T.ZONE 3			T.ZONE 4			Total			
		F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	
Sewerage Zone														
Cost Item														
1) Direct Cost	37,287	13,999	51,286	46,590	17,523	64,113	21,610	7,058	28,668	105,487	38,580	144,067		
a. Treatment Plant	25,793	6,448	32,242	32,342	8,085	40,427	17,489	4,372	21,861	75,624	18,906	94,530		
b. Sewer	11,197	7,465	18,662	14,078	9,385	23,464	3,963	2,642	6,605	29,238	19,492	48,731		
c. Diversion Chamber	29	19	48	23	15	38	11	8	19	63	42	105		
d. Relay Pumping Station	268	67	336	147	37	184	147	37	184	563	141	704		
2) Land Acquisition Cost	0	2,505	2,505	0	15,200	15,200	0	11,419	11,419	0	29,124	29,124		
3) Engineering Services Cost (15% of 1)	5,593	2,100	7,693	6,989	2,628	9,617	3,242	1,059	4,301	15,824	5,787	21,611		
4) Administration Cost (3% of 1)	0	1,539	1,539	0	1,923	1,923	0	860	860	0	4,322	4,322		
5) Sub-total	42,880	20,143	63,023	53,579	37,274	90,853	24,852	20,396	45,248	121,311	77,813	199,124		
6) Physical Contingency (10% of 5)	4,288	2,015	6,303	5,358	3,728	9,086	2,485	2,040	4,525	12,131	7,783	19,914		
Total	47,168	22,158	69,326	58,937	41,002	99,939	27,337	22,436	49,773	133,442	85,596	219,038		

(Note)

Cost: 1999 year price level

Exchange rate: US\$1.00 = VND13,900

Table 7.2.1 Project Cost of FC & LC (3/5)

Lake Improvement Project	(Unit: US\$1,000)							
	West Lake Water Improvement			Main City Lakes Improvement (14 Lakes)				
	FC	LC	Total	FC	LC	Total		
1) Construction Cost	18,000	9,000	27,000	3,000	4,000	8,000	13,000	35,000
a. Lake Conservation Works				806	538	1,344	806	1,344
b. Lake Sediments Dredging Works				2,496	3,744	6,240	2,496	6,240
c. Sewer & Dredging	6,000	4,000	10,000				6,000	10,000
d. Large scale Wastewater Treatment	5,600	1,400	7,000				5,600	7,000
e. Flushing Water Facilities	6,000	4,000	10,000				6,000	10,000
2) Land Acquisition Cost		1,250	1,250		375	375	0	1,625
3) Engineering Services Cost (15% of 1)	2,700	1,350	4,050	450	600	1,050	3,150	5,100
4) Administration Cost (3% of 1)		1,000	1,000		0	0	0	1,000
5) Sub-total	20,300	13,000	33,300	3,752	5,257	9,009	24,052	42,309
6) Physical Contingency (10% of 5)	2,070	1,260	3,330	345	498	943	2,415	4,273
Total	22,770	13,860	36,630	3,795	5,473	10,368	26,565	46,998

(Note)

Cost: 1999 year price level
Exchange rate: US\$1.00=VND13,900

Table 7.2.1 Project Cost of FC & LC (4/5)

Project Cost Item	Improvement of Waste Collection and Primary Transport						Equipment and Tools for Central Maintenance Workshop						(Unit: US\$1,000)		
	Vehicle Procurement (2001 - 2005)		Vehicle Procurement (2006 - 2010)		Garage Facilities		F.C.		L.C.		Total		Total		
	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total
1) Direct Cost	18,300	-	18,300	9,600	-	9,600	1,768	442	2,210	1,375	-	1,375	31,043	442	31,485
2) Land Acquisition	-	-	-	-	-	-	-	500	500	-	-	-	-	500	500
3) Engineering Services	732	183	915	384	96	480	-	-	-	-	-	-	1,116	279	1,395
4) Administration	-	549	549	-	288	288	-	-	-	-	-	-	-	837	837
5) Sub-total	19,032	732	19,764	9,984	384	10,368	1,768	942	2,710	1,375	-	1,375	32,159	2,058	34,217
6) Physical contingency	2,000	-	2,000	1,000	-	1,000	-	-	-	138	-	138	3,138	-	3,138
Total	21,032	732	21,764	10,984	384	11,368	1,768	942	2,710	1,513	-	1,513	35,297	2,058	37,355

(Note)
Cost: 1999 year price level
Exchange rate: US\$1.00= VND13,900

Table 7.2.1 Project Cost of FC & LC (5/5)

Project Cost Item	Vehicle Procurement (2001 - 2005)						Vehicle Procurement (2006 - 2010)			Disposal Facility			Total					
	F.C.		L.C.		Total		F.C.		L.C.		Total		F.C.		L.C.		Total	
1) Direct Cost	1,800	-	-	-	1,800	2,100	-	-	-	2,100	1,200	300	1,500	5,100	300	5,400		
2) Land Acquisition	-	-	-	-	-	-	-	-	-	-	-	750	750	-	750	750		
3) Engineering Services	72	18	90	54	210	84	21	105	180	45	225	45	225	336	84	420		
4) Administration	-	54	54	63	162	-	63	63	-	45	-	45	45	-	162	162		
5) Sub-total	1,872	72	1,944	1,944	2,268	2,184	84	2,268	1,380	1,140	2,520	1,140	2,520	5,436	1,296	6,732		
6) Physical contingency	-	-	-	-	-	-	-	-	138	114	252	114	252	138	114	252		
Total	1,872	72	1,944	1,944	2,268	2,184	84	2,268	1,518	1,254	2,772	1,254	2,772	5,574	1,410	6,984		

(Note)
 Cost: 1999 year price level
 Exchange rate: US\$1.00=VND13,900

Table 7.2.2 UNIT PRICES FOR COST ESTIMATION (1/3)

Items Works	Unit	Unit Price (US \$)				Total
		Foreign Currency		Local Currency		
		Unit	Ratio	Unit	Ratio	
A. Construction Cost						
1- Earthwork						
(1) Excavation (normal)	m3	2.4	(0.80)	0.6	(0.20)	3.0
(2) Excavation along rivers/drainage channels	m3	3.4	(0.80)	0.9	(0.20)	4.3
(3) Excavation in city area	m3	3.2	(0.80)	0.8	(0.20)	4.0
(4) Embankment/Backfilling	m3	4.0	(0.80)	1.0	(0.20)	5.0
(5) Gravel bedding	m3	12.0	(0.80)	3.0	(0.20)	15.0
(6) Sand bedding	m3	10.4	(0.80)	2.6	(0.20)	13.0
(7) Clearing	m2	0.8	(0.80)	0.2	(0.20)	1.0
(8) Stripping	m3	1.6	(0.80)	0.4	(0.20)	2.0
2- Structural Work						
(1) Reinforced concrete	m3	132.0	(0.60)	88.0	(0.40)	220.0
(2) RC pile	m	55.0	(0.55)	45.0	(0.45)	100.0
(3) PC pile, 550 mm diameter	m	90.0	(0.55)	80.0	(0.45)	170.0
(3) Steel pile, 600 mm diameter	m	225.0	(0.90)	25.0	(0.10)	250.0
(4) Steel sheet pile	m2	207.0	(0.90)	23.0	(0.10)	230.0
(5) Revetment, 1: 0.3	m3	42.0	(0.45)	52.0	(0.55)	94.0
(6) Revetment, 1: 2.0	m2	14.0	(0.45)	17.0	(0.55)	31.0
(7) Riprap	m3	8.0	(0.80)	2.0	(0.20)	10.0
(8) Gabions for fall structure	m3	45.0	(0.90)	5.0	(0.10)	50.0
(9) Demolishing	m3	28.0	(0.80)	7.0	(0.20)	35.0
3- Composite Structures						
(1) Bridge	m2	910.0	(0.70)	390.0	(0.30)	1,300.0
(2) Bridge protection	pl.	1,400.0	(0.45)	1,705.0	(0.55)	3,100.0
(3) Box culvert	m2	540.0	(0.60)	360.0	(0.40)	900.0
(4) Railway bridge	m	10,400.0	(0.80)	2,600.0	(0.20)	13,000.0
(5) Steel gate structure	m2	20,000.0	(0.80)	5,000.0	(0.20)	25,000.0
(6) Spillway with rubber gates	m	12,000.0	(0.80)	3,000.0	(0.20)	15,000.0
(7) Control structure at outlet of city area lakes	pl.	7,000.0	(0.70)	3,000.0	(0.30)	10,000.0
(8) Pumping station Mechanical (90 m3/s)	m3/s	7,000.0	(1.00)			7,000.0
(9) Intake facilities	pl.	8,400.0	(0.70)	3,600.0	(0.30)	12,000.0
(10) Drainage facilities	pl.	1,200.0	(0.60)	800.0	(0.40)	2,000.0

Table 7.2.2 UNIT PRICES FOR COST ESTIMATION (2/3)

Items of Works	Unit	Unit Price (US \$)				Total
		Foreign Currency		Local Currency		
		Unit	Ratio	Unit	Ratio	
A. Construction Cost						
4- Sewer System						
(1) Concreat pipe (200 mm)	m	24.0	(0.60)	16.0	(0.40)	40.0
(2) Concreat pipe (250 mm)	m	30.0	(0.60)	20.0	(0.40)	50.0
(3) Concreat pipe (300 mm)	m	42.0	(0.60)	28.0	(0.40)	70.0
(3) Concreat pipe (400 mm)	m	54.0	(0.60)	36.0	(0.40)	90.0
(4) Concreat pipe (500 mm)	m	60.0	(0.60)	40.0	(0.40)	100.0
(5) Concreat pipe (600 mm)	m	72.0	(0.60)	48.0	(0.40)	120.0
(6) Concreat pipe (800 mm)	m	90.0	(0.60)	60.0	(0.40)	150.0
(7) Concreat pipe (1,000 mm)	m	120.0	(0.60)	80.0	(0.40)	200.0
(8) Concreat pipe (1,200 mm)	m	150.0	(0.60)	100.0	(0.40)	250.0
(9) Concreat pipe (1,500 mm)	m	180.0	(0.60)	120.0	(0.40)	300.0
(10) Streat drain (U-ditch)	m	90.0	(0.60)	60.0	(0.40)	150.0
(11) Relay pumping station	unit	144,000.0	(0.80)	36,000.0	(0.20)	180,000.0
(12) Diversion chamber with interceopter	unit	5,700.0	(0.60)	3,800.0	(0.40)	9,500.0
5- Wastewater Treatment Plant						
(1) Septic Tank (local)	unit	800.0	(0.40)	1,200.0	(0.60)	2,000.0
(2) Septic tank (Johkaso)	unit	3,200.0	(0.80)	800.0	(0.20)	4,000.0
(3) Community treatment plant	m3	800.0	(0.80)	200.0	(0.20)	1,000.0
(4) Centralized treatment plant	m3	480.0	(0.80)	120.0	(0.20)	600.0
6- Others						
(1) Land preparation	m2	2.0	(0.80)	0.5	(0.20)	2.5
(2) Environmental measures	m2	0.9	(0.30)	2.1	(0.70)	3.0

Table 7.2.2 UNIT PRICES FOR COST ESTIMATION (3/3)

Items of Works	Unit	Unit Price (US \$)				Total
		Foreign Currency		Local Currency		
		Unit	Ratio	Unit	Ratio	
B. Compensation Cost						
1- Land Acquisition						
(1) Around urban area	m2	-	()	35.0	(1.0)	35.0
(2) Rural area	m2	-	()	25.0	(1.0)	25.0
(3) Inside urban area	m2	-	()	450.0	(1.0)	450.0
2- House Evacuation	House	-	()	2,500.0	(1.0)	2,500.0
3- Fishery Compensation	m2	-	()	3.0	(1.0)	3.0

Figure 7.2.2 Overall Implementation Schedule of Priority Projects - Non Structural Measures

No.	Priority Project	Cost US\$ mil	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	Financial Source to be Expended for Project Implementation
7	Establishment and Reinforcement of Monitoring System Construction of Air Quality Monitoring Station and Procurement Procurement of Additional Equipment for Water Quality Analysis Establishment of Environmental Data Management System Staff Training																							
8	Establishment of Environmental Coordination Committee and Revival Approval of Environmental Master Plan Environmental Coordination Committee Committee Meeting																							HPC
9	Reinforcement of Hanoi DOSTE Establishment of Environmental Agency Recruitment Technical Assistance and Training Equipment Procurement																							VCEP
10	Strengthening of Environmental Management at District Level District Level Environmental Management Unit in DOSTE Recruitment Technical Assistance and Training Equipment Procurement																							
11	Reform of HSDC Recruitment Technical Assistance and Training Equipment Procurement																							1 year before WWTP 2 years commissioning and technical ass.
12	Reform of Urenco and Other Solid Waste Management Organizations Create 5 UEE for District Administration Institute Urban District Collect Fees Each UEE Responsible for Transport to Transfer Station Contracting Out Collection Service URENCO Detached from HPC Technical Assistance to URENCO Technical Assistance to TUPWS Technical Assistance and Capacity Building for District Admin.																							
13	Establishment of Environmental Fund Fund Approval Fund Oversight Committee Fund Startup and Initial Allocation Operation of Fund																							
	Total																							

— Ongoing
- - - Intermittent Implementation

REORGANIZATION DEVELOPMENT

Cost: 1999 Base Price (incl. price contingency)

() Approx. Estimate

7.3 Evaluation of Priority Projects

For structural type priority projects, degrees of satisfying the environmental targets set in the JICA Study was evaluated based on the levels of protection/improvement as well as the ratio of the area of each environmental zone covered by each project based on the criteria given in the Table 7.3.1. Area covered and number of beneficiaries as well as other tangible benefits attributable to each structural type priority project is summarized in Table 7.3.2.

For non-structural type priority projects, beneficial effects for the improvement of environmental improvement and management are analyzed and described.

Evaluation of the selected 13 priority projects are given hereunder.

7.3.1 Establishment of Environmental Coordination Committee and Revolving Environmental Master Plan Procedure

(1) Benefits

The creation of the Environmental Coordination Committee (ECC) is essential to the successful implementation of the Environmental Management Plan (EMP). The creation of the ECC is crucial to the achievement of the objectives of:

- formal submission of the EMP to the HPC for approval;
- ensuring the EMP's priority projects and activities are included in socio-economic development plans;
- ensuring that the environmental objectives of the EMP are incorporated in Hanoi General Urban Plan; and
- coordination of the implementation of projects and activities of the EMP.

The EMP will be amended every five years to take account of new challenges and opportunities. The ECC has a critical role to play in coordinating the amendment process.

The choice of HAPI as the Secretariat is in recognition of the important role that HAPI will play in ensuring that the priority projects of the EMP become part of the socioeconomic plans for Hanoi City. Under the advice of the ECC, HAPI will be directed by the HPC to incorporate the priority projects of the EMP into Hanoi socioeconomic development strategy.

Another key role for the ECC is in ensuring that the results of the EMP are incorporated into the general urban planning process. The key agencies involved in developing the Hanoi General Plan to 2020 are all members of the ECC. Both the HCAO and Ministry of Construction planning agencies (c.g. NIURP) need to take a leadership role in linking the EMP to the Hanoi General Plan to 2020.

The DOSTE must participate more often and more effectively in planning in Hanoi City. The DOSTE's key role as the Chairman of the Technical Subcommittee will increase the DOSTE's ability to influence planning in Hanoi City. In the longer term, the DOSTE may take responsibility for coordination of the amendments to the EMP.

(2) Support for Other Priority Projects

No one agency is responsible for environmental management in Hanoi, and no one agency has the capacity for implementing all components of the EMP including the priority projects. The creation of the ECC under the HPC places the leadership responsibility in the correct place. Strong leadership by the ECC will directly influence the success of the implementation of the priority projects. Many of the structural and non-structural measures of the EMP will be undertaken by Hanoi City level agencies.

Creation of the ECC will also mean official recognition of the importance of environmental management activities in Hanoi. As such, it will increase the support and influence for the environmental management activities of the DOSTE and district level. Because the ECC needs reliable and regular information on environmental quality, it will also be very supportive of the environmental monitoring system. The ECC will also have a role in the setting strategy for and in the administration of the Environmental Fund.

7.3.2 Reinforcement of Hanoi DOSTE

(1) Benefits

The proposed creation of an environmental agency at the DOSTE level will solve some of Hanoi's immediate environmental problems. This is of course dependent on the level of staffing and the operating funds that the new agency receives. The proposed strengthening of the new agency is designed to create effective functional units for:

- environmental monitoring
- EIA and technology
- pollution control
- environmental inspection
- public relations and environmental awareness

These functional units can be made effective through a combination of provision of adequate program funding, necessary environmental equipment, and technical assistance and training.

(2) Support for Other Priority Projects

The environmental management functions of the Hanoi DOSTE must be strengthened to increase its ability undertake its responsibilities for state environmental management. Four key functions are critically important to ensuring the success of other priority projects.

- a) Effective environmental impact assessment by EIA division can be used to ensure that the goals and objective of EMP and the structural priority projects are considered during the review and appraisal of new developments that may impact on the physical facilities and the environment improvements associated with the priority projects.
- b) Strengthened pollution control efforts of the DOSTE are necessary to help ensure the water quality benefits of the priority projects are not jeopardize by existing and new sources of pollution.
- c) A strong DOSTE is needed to provide leadership to the ECC and to provide technical input into the ECC's Technical Subcommittee.
- e) A strong DOSTE is needed to ensure effective operation of new monitoring system and in particular the air and water sampling network.

7.3.3 Establishment of Environmental Management at the District Level

(1) Benefits

The main benefit of district environmental management is to extend, to the district level, the capacity to undertake some environmental management functions including:

- environmental impact assessment of new construction projects or upgrading projects
- environmental education and awareness
- environmental inspection of enterprises to verify compliance with environmental regulations and standards of the State
- complaint and dispute resolution
- assessing fines and other administrative penalties for violation of EPLaw

Effective environmental management at the district level will only reduce part of the workload at the Hanoi City level. As the district level authorities have relatively little power over SOEs owned by the Hanoi City and the Central levels, many pollution control and waste management issues occurring within district will have to raised to higher levels of government for resolution.

(2) Support for Other Priority Projects

District environmental management primary role is to complement and extend environmental management activities of the DOSTE. District environment management has the three major functions related to the success of other priority projects. These are:

- effective environmental impact assessment by EIA division ensure that the goals and objective of EMP and the structural priority projects are considered during the review and appraisal of new developments
- strengthened pollution control efforts of the DOSTE are necessary to help ensure the water quality benefits of the priority projects are achieved
- provision of environmental monitoring information to assess environmental quality and the success of the EMP and its priority projects

7.3.4 Establishment and Reinforcement of the Monitoring System

(1) Benefits

The proposed strengthening of the new monitoring system is designed to create effective functions as shown below.

- Surface Water Quality
- Groundwater Quality
- Air Monitoring Quality

The benefit of Establishment and Reinforcement of the Monitoring System is to expand the capacity to understand following aspects.

- Present Environmental Situation in Hanoi
- Changing of Environmental Condition from the past

(2) Support for Achievement of Environmental Target proposed by EMP

The results of the monitoring by the proposed system can be used to assess effectiveness of priority projects and attainment of the environmental quality target set up by the EMP. The following functions are expected in the monitoring system.

- To evaluate attainment of Environmental Quality Target set up in the EMP in the field of water and air quality
- To assess the effectiveness of Priority Projects "West Lake Water Quality Improvement", "Main Urban Lakes Improvement", "Public Sewerage Development" and "Septage Collection and Disposal"
- To assess the operation and maintenance condition of Priority Projects, especially "Public Sewerage Development" and "Septage Collection and

Disposal”

- To work as a part of “Reinforcement of Hanoi DOSTE” in the field of monitoring function.

7.3.5 To Lich River Basin Drainage Project (2nd Stage)

(1) Target Satisfaction and Objective Achievement

1) Target Satisfaction

The objective of To Lich River Basin Drainage Project is to improve water-related sanitary condition of mainly EZ 1 and EZ 7, which are the most urbanized area of the Hanoi City at present, and EZ 3 which lies to the south of EZ 1 and is expected to be urbanized quickly in the coming years, by way of upgrading the drainage condition of the To Lich basin. The areas covered by the project in each EZ are shown below.

Environmental Zone covered by the Project Area

Environmental Zone	Area (km ²)	Description
Zone 1	31.9	The area is 91% of Zone 1, excluding outside of Red river dyke area.
Zone 2	3.4	The area is 6% of Zone 2.
Zone 3	21.9	The area is 81% of Zone 3.
Zone 7	4.1	All of Zone 7
Suburban Area	14.1	Part of Thanh Tri District
Total	75.4	

To Lich Project is implemented in two stages. First stage is already started which will ensure the average protection level corresponding to about 2 year return period storm water for storm water sewers (5 year return period for rivers and retention ponds), meeting the Considerably Protected Target. Second stage is the priority project selected in the JICA Study which would achieve the protection level corresponding to 10 year return period, meeting Fully Protected Target. Targets met and the degree of satisfaction for each EZ are shown below.

Target Satisfaction by Environmental Zone

Zone	Clean & Quiet			Co-existing with Nature	
	Sanitary Water Environment	Clean Water Environment	Clean City	Green	Friendly Water
1	3+	0	0	0	0
2	1+	0	0	0	0
3	3+	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	1+	0	0	0	0
7	3+	0	0	0	0

Note: Target Satisfaction Level (3+, 2+, 1+, 0) are mentioned in Table 7.3.1.

As seen in the table, To Lich project would contribute substantially to the satisfaction the Sanitary Water Environment Target in EZ 1,3 and 7 and to some extent in EZ 3 and 6. To Lich project would not contribute or contribution would be negligible to the other environmental zones and to the other targets.

2) Accrued Benefits

From the environmental improvement viewpoint which is the subject of the JICA Study, the major benefit to accrue through the implementation of the project is the substantial improvement of the water-related sanitary condition by quickly draining the storm water in the city area, thereby preventing flooding of the city and streets which would cause unsanitary condition and possibly water-borne diseases. The number of the direct beneficiaries of the project in the year of 2010, is estimated to be 1,086 thousand persons in total or about 40% of the total population of the city as shown below.

Number of Beneficiary of the Project

	Population in 2010
Zone 1	774,672
Zone 2	34,630
Zone 3	214,810
Zone 7	27,773
Suburban Area	34,010
Total Beneficiaries of the Project	1,085,895
Total Population in Hanoi	2,810,149

In addition, the following benefits would be delivered from the project.

(a) Enhanced economic activities and reduction of interruption of traffic

Occasions and time duration of the inundation of the land and streets and flooding of the buildings and factories due to storm water would significantly be reduced through the implementation of the project. Subsequently, interruption of the economic activities and traffic would be much reduced. Based on the Hanoi Urban Drainage and Sewerage Study, JICA, 1995, these economic benefits which would be derived through the implementation of the Stage 1 and Stage 2 (To Lich priority project) together would amount to about US\$16 million in 1999 price, annually by reducing property damage and economic loss.

(b) Enhancement of land value and securing the urban development

Land would be more secured from urban flooding and land value would be enhanced. More smooth realization of the urban development envisaged in the Hanoi Urban Master Plan for 2020 can be expected.

(2) Cost Effectiveness

Cost per beneficiary is estimated at US\$10.6 per year as in 2010 which is considered cost effective.

(3) Environmental Impacts

The possibilities of environmental impacts caused by the project are considered through 23 environmental items as shown in Table 7.3.3. The Project is planned to prepare positive impacts on environment especially in the field of "Sanitation". However, the Project is expected to create a negative environmental impact as shown below.

Summary of the Results of Environmental Check List

Evaluation	Environmental Items
Serious Negative Impacts	Nothing
Minor Negative Impacts	Resettlement & Waste
Uncertainly Impacts	Flora and Fauna

1) Social Impact

(a) Resettlement

The resettlement due to the construction of reservoirs and along the rivers is not a serious problem, as there are few houses to be moved. The problem is in the resettlement of people (about 200 households) who live along the

channels.

It is difficult to relocate people to similar areas with similar conditions. This problem is to be carefully studied before starting the project and compensation and resettlement plan is to be prepared to keep the negative impact to a minimum.

(b) Waste & Transportation

The construction of the project includes Dredging Works. The dredging works will generate large amount of sludge. Treatment of the sludge should be taken carefully. Road transportation condition may be effected by transport of the sludge.

2) Natural Environmental Impact

The construction of reservoirs and connecting channels, and the dredging of lakes may cause negative environmental impacts if work is carried out without environmental consideration in the fields of "Flora and Fauna", "Noise and Vibration" around construction site and, "Soil Erosion" caused by the construction works, ,

This problem is to be carefully studied before starting the project and a compensation and resettlement plan is to be prepared to keep the negative impact to a minimum.

7.3.6 West Lake Water Quality Improvement Project

(1) Target Satisfaction and Objective Achievement

1) Target Satisfaction

The objectives of West Lake Water Quality Improvement Project are to preserve the natural environment and to improve amenity of the West Lake area in EZ 7. The surface of the lake is 520 ha and the length of shoreline (ring road) of the lake is 12 km

The West Lake area is the valuable spot from the view of ecology and amenity in Hanoi City. According to the Hanoi City development master plan up to 2020, the area is expected to be developed as a center of recreation, culture and tourism of the city. The project consists of mainly three parts, "Public Sewerage System", "Lakeshore Dredging / Conservation Work" and "Flushing Water Introduction". Targets met and the degree of satisfaction are shown below.

Target Satisfaction by Environmental Zone

Zone	Clean & Quiet			Co-existing with Nature	
	Sanitary Water Environment	Clean Water Environment	Clean City	Green	Friendly Water
1	0	2+	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	3+	0	0	3+

Note: Target Satisfaction Level (3+, 2+, 1+, 0) are mentioned in Table 7.3.1.

As seen in the table, the project would contribute substantially the satisfactions of the Clean Water Environment and the Friendly Water Targets in EZ 7.

2) Accrued Benefit

The beneficiaries are assumed as the residents in EZ 1 and 7, because they could enjoy amenity of the waterfronts and could get benefits from tourists to be attracted by the beautiful West Lake. Number of beneficiaries in 2010 is estimated 854,090.

After implementation of the project, the following economic benefits are expected to emerge in the project area:

- Provision of suitable waterfront on West Lake with total 520 ha water surface and 12 km shoreline
- Water pollution generation load of BOD 6,432 kg/day in 2010 is to be treated properly by the sewerage system to be constructed by the project,
- "Pollution Condition of the Lake" is predicted as below.

	without Project	with Project
Prediction of Pollution Condition	Polluted	Unpolluted

- Increase of land value in EZ 1 and 7,
- Tourism promotion and cultural heritage conservation along the shore line,
- Protection of fishery production with annual production of 300 tons on average

(2) Cost Effectiveness

Cost per beneficiary is estimated at US\$3.3 which is considered to be cost effective.

(3) Environmental Impacts

The possibility of environmental impacts of caused by the project are considered through 23 environmental items as shown in Table 7.3.4.

The project is planned to prepare positive impacts on environment especially in the field of "Lake, Marsh and River", "Coastline and Sea", "Flora and Fauna", "View", "Economic Activity". However, the project is expected to create a negative environmental impact as shown below.

Summary of the Results of Environmental Check List

Evaluation	Environmental Items
Serious Negative Impacts	Nothing
Minor Negative Impacts	"Resettlement" & "Waste"
Uncertainly	"Flora and Fauna" & "Noxious odous"

1) Social Impact

(a) Resettlement

Resettlement surrounding the lake might cause the negative impact. This problem is to be carefully studied before starting the project and a compensation and resettlement plan is to be prepared to keep the negative impact to a minimum.

(b) Waste & Transportation

The construction of the project includes Dredging Works. The dredging works will generate large amount of sludge. Treatment of the sludge shall be take carefully. Road transportation condition may be effected by transport of the sludge. Road transportation condition may be effected by transport of the sludge.

2) Natural Environmental Impact

(a) Flora and Fauna

The dredging work and flushing water introduction may cause a negative environmental impact during the dredging of lakes and after diluting water from the Red River. The execution of dredging work may have a negative impact on fauna and ecology for a long time and the Red River may make the

water quality of the lake worse than the present, particularly in turbidity if not prepared for the proper pre-treatment. Eventually, changes of water level and water quality in the lake by flushing water introduction may disturb lake ecosystems.

(b) Noxious Odors

Wastewater treatment plants will be constructed at some places around West Lake. Small impacts will be happen on noxious odors around the wastewater treatment plants.

7.3.7 Main City Lakes Improvement (14 lakes)

(1) Target Satisfaction and Objective Achievement

1) Target Satisfaction

The objectives of Main City Lakes Improvement are to restore functions for storm-water retention ponds and water front resort on 14 lakes in Environmental Zone 1. The project consists of Lake Dredging Works and Lake Conservation Works including construction of lakeshore roads and environmental revetments, planting tree, provision for parks and promenades. The outline of the lakes and proposed measures for each lake are as shown below.

Outline of Target Lakes and Measures

Lake	Surface (ha)	Shore Line (km)	Contents of Measure*
Ngoc Khanh	4.5	0.9	D & C
Thanh Cong	6.5	1.2	D
Hao Nam	2.8	0.5	D & C
Nghia Do 1	5.2	0.8	D & C
Van Chuong	4.1	0.8	D & C
Tho Quang	1.5	0.6	D
Trung Tu	5.1	0.9	D & C
Phuong Liet 1	5.6	1.2	D & C
Phuong Liet 2	1.9	0.6	D & C
Bay Mau	23.1	2.0	D
Trai Ca	4.7	1.1	D & C
Lang Tam	1.9	0.9	D & C
Thanh Liet	13.2	1.4	D & C
Dam Sct	3.6	0.6	D & C
	83.7	13.5	-

*) D: Dredging Works, C: Conservation Works

Main City 18 lakes controlled by HSDC function not only as recreational area but also as storm-water retarding ponds. Target met and the degree of satisfaction are shown below.

Target Satisfaction by Environmental Zone

Zone	Clean & Quiet			Co-existing with Nature	
	Sanitary Water Environment	Clean Water Environment	Clean City	Green	Friendly Water
1	1+	0	0	1+	1+
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	1+	1+

Note: Target Satisfaction Level (3+, 2+, 1+, 0) are mentioned in Table 7.3.1.

As seen in the table, the project would contribute the satisfaction of the Sanitary Water Environment and the Friendly Water in EZ 1.

2) Accrued Benefit

The beneficiaries of the project are assumed as the residents in Environmental Zone 1 and 7. Number of beneficiaries in 2010 is estimated at 854,090.

The project will create a positive impact on the living environment and amenity. Following complement impacts are expected after completion of the project:

- a) Provision of suitable waterfront on 14 lakes with total 83.7 ha water surface and 13.5 km shorelines,
- b) Activating tourist industry in Hanoi, especially in EZ 1 & 7
- c) Sustaining the living environment and amenity for residents in EZ 1 & 7
- d) Reduce the flood damages,
- e) Improvement of welfare and social security.

(2) Cost Effectiveness

Cost per beneficiary is estimated at US\$10.6 per year as in 2010 which is considered cost effective.

(3) Environmental Impacts

The possibility of environmental impacts of caused by the project are considered through 23 environmental items as shown in Table 7.3.5.

The project is planned to prepare positive impacts on environment especially in the field of "sanitation", "View", "Lake, Mash and River", "Soil Erosion". However, the project is expected to create a negative environmental impact as shown below.

Summary of the Results of Environmental Check List

Evaluation	Environmental Items
Serious Negative Impacts	Nothing
Minor Negative Impacts	"Waste"
Uncertainly	"Flora and Fauna"

1) Social Impact

The construction of the project includes Dredging Works. The dredging works will generate large amount of sludge. Treatment of the sludge shall be take carefully. Road transportation condition may be effected by transport of the sludge. Road transportation condition may be effected by transport of the sludge.

2) Natural Environmental Impact

The dredging work may cause a negative environmental impact such as disturbing lake ecosystem during the dredging of lakes.

7.3.8 Public Sewerage Development for Old City Center

(1) Target Satisfaction and Objective Achievement

1) Target Satisfaction

The objective of Public Sewerage Development for Old City Center is to improve water environmental condition of EZ 1 and EZ 3 which is located downstream of EZ 1, by way of construction of suitable sewerage in EZ 1. The sewerage development area is planned in the area as below.

Environmental Zone covered by the Project Area

Environmental Zone	Area (km ²)	Description
Zone 1	28.8	82% of Zone 1

Due to completion of the project in EZ 1, the condition of water bodies in EZ

3 which is located downstream of EZ 1, is also expected improved, because the water bodies in EZ 3 have received pollution load generated in EZ 1. Targets met and the degree of satisfaction for each EZ are shown below

Target Satisfaction by Environmental Zone

Zone	Clean & Quiet			Co-existing with Nature	
	Sanitary Water Environment	Clean Water Environment	Clean City	Green	Friendly Water
1	0	3+	0	0	2+
2	0	0	0	0	0
3	0	2+	0	0	1+
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0

Note: Target Satisfaction Level (3+, 2+, 1+, 0) are mentioned in Table 7.3.1

As seen in the table, the project would contribute substantially to the satisfaction of the Clean Water Environment Target in EZ 1 and some extent in EZ 3. The project would also contribute to some satisfaction of the Friendly Water in EZ1 and 3 by improvement of water quality in the EZs.

2) Accrued Benefits

From the environmental improvement view point which is the subject of the JICA Study, the major benefit to accrue through the implementation of the project is substantial improvement of water quality by preparing of suitable sewerage system in EZ 1 which is most serious water pollution generation area. The beneficiary of the projects is assumed as service population of the sewerage system to be implemented by the project. The number of the beneficiary in the year of 2010 is estimated to be 712 thousand persons. If the beneficiaries are assumed as the residents in the catchment area of To Lich River System of which water qualities are to be improved by the project, the number of beneficiaries are estimated 996 thousands shown below.

Number of Beneficiary of the Project

Environmental Zone	Sewerage Service Population in 2010	Residents in Catchment Area of To Lich River System
Zone 1	712,493	712,493
Zone 2		34,630
Zone 3		214,810
Sub-Urban Area		34,010
Total	712,493	995,943

After implementation of the project, the following benefits are expected to emerge in the project area:

- a) Water pollution load of BOD 74,700 kg/day in 2010 is to be treated properly by the sewerage system of the project
- b) Improvement of water quality in urban rivers in Environmental Zone 1 & 3 by way of the above treatment is as shown below.

Prediction of Water Quality of Urban Rivers

River	Pollution Condition in 2010	
	without Project	with Project
To Lich River, Upper	P	SP
To Lich River, Middle	P	SP
To Lich River, Lower	P	SP
Kim Nyuu River, Upper	P	U
Kim Nyuu River, Lower	P	SP
Lu River, Upper	P	U
Lu River, Middle	P	SP
Set River, Upper	P	U
Set River, Middle	P	SP

Note: P: Polluted, SP: Slightly Polluted, U: Unpolluted

- c) Improvement of the living environment and health with reduction in disease contraction in EZ 1,
- d) Tourism promotion due to preparing clean water environment in Hanoi,
- e) Improvement of water resources, such as lakes and groundwater, and Securing the agriculture and fishery activities in EZ 1 and 3,
- f) Sustaining the living environment and amenity for residents EZ 1

(2) Cost Effectiveness

Cost per beneficiary is estimated at US\$24.7 per year as in 2010 which is not small. However, as the cost of full scale central sewerage system, the per capita cost is considered cost effective.

(3) Environmental Impacts

The possibility of environmental impacts of caused by the project are considered through 23 environmental items as shown in Table 7.3.6.

The project is planned to prepare positive impacts on environment especially in the field of "Sanitation", "View", "Lake, Mash and River".

However, the details of the project are not fixed. The following issues are very important factor to effect environmental impacts.

- Location of the sites for Wastewater Treatment Plants
- Discharge Points of Treated Wastewater from the treatment plants

In further feasibility study and detailed design of the project, consideration should be taken to minimize the possibility of environmental issues, such as "Resettlement", "Noxious" and "Lake, Mash and River" as shown below.

Summary of the Results of Environmental Check List

Evaluation	Environmental Items
Serious Negative Impacts	Nothing
Minor Negative Impacts	Nothing
Uncertainly	"Resettlement" & "Waste" & "Flora and Fauna" & "Noxious odors"

7.3.9 Organizational Strengthening of HSDC

(1) Description

1) Short-term (2000 to 2005):

- create a new organizational unit for drainage operations
- create a new wastewater treatment enterprise
- hire and train operating personnel
- integrate mechanical & electrical maintenance functions
- implement a central laboratory to support treatment plant process control
- transfer responsibility for septage collection and disposal

2) Mid-term (2006 to 2010):

- create new operational units for each new wastewater treatment plant
- implement maintenance management systems
- implement cost accounting and management information systems

(2) Target satisfaction

1) Benefits

Organizational strengthening will provide the following benefits:

- improved maintenance that reduces the impact of operations on the environment
- improved maintenance levels to protect the significant investment in infrastructure
- improved data collection and technical capacity to enhance future planning and management functions.

2) Relationship to other projects

Organizational strengthening is required for the proper operation and maintenance of the major infrastructure projects in drainage and sewerage that are proposed in the near future:

- To Lich River Drainage
- West Lake Water Quality Improvement
- Main City Lakes Improvement
- Public Sewerage
- Septage Collection And Disposal

The ultimate goal is to ensure that the investment projects lead to a reduction in flooding, and a reduction in pollution. Structural project sustainability is principally dependent on having qualified operating staff and establishing a properly trained and equipped maintenance organization. Without organizational strengthening the investment projects will not yield the intended environmental benefits.

7.3.10 Establishment of Septage Collection and Disposal System

(1) Target Satisfaction and Objective Achievement

1) Target Satisfaction

The objective of Establishment of Septage Collection and Disposal System is to establish suitable system for collection and disposal of septage generated from septic tanks in Hanoi, except for Environmental Zone 6, Suburban Area. The service area of the project is shown below..

Environmental Zone covered by the Project Area

Environmental Zone	Area (km ²)
Zone 1, 2, 3 & 7	122.0
Zone 4	85.3
Zone 5	43.0
Total	75.4

The project consists of:

- Supply of specialized vacuum tanker trucks for collection of septage
- Feasibility study, design and construction of septage treatment ponds

The following table shows effectiveness of the project in each environmental zone and on each environmental item.

Target Satisfaction by Environmental Zone

Zone	Clean & Quiet			Co-existing with Nature	
	Saunary Water Environment	Clean Water Environment	Clean City	Green	Friendly Water
1	0	1+	0	0	0
2	0	1+	0	0	0
3	0	1+	0	0	0
4	0	1+	0	0	0
5	0	1+	0	0	0
6	0	0	0	0	0
7	0	1+	0	0	0

Note: Target Satisfaction Level (3+, 2+, 1+, 0) are mentioned in Table 7.3.1.

2) Accued Benefit

The beneficiaries of the project are assumed as the residents who get septage collection service. The number of beneficiaries directly from the project in 2010 is assumed at 648,972.

Number of Beneficiaries

Environmental Zone	Service Population in 2010	Description (Population with septic tank and Service Ration in each area)
Zone 1, 2, 3 & 7	430,761	531,804 x 81 %
Zone 4	120,002	160,002 x 75 %
Zone 5	98,209	153,452 x 64 %
Total	648,972	

The following benefits are expected after completion of the project

- a) Improvement of the living environment and health condition with reduction in disease contraction,
- b) Improvement of water environmental condition of rivers, lakes and groundwater, and securing the agriculture and fishery activities,

(2) Cost Effectiveness

Cost per beneficiary is estimated at US\$3.0 per year as in 2010 which is considered quite cost effective.

(3) Environmental Impacts

The possibility of environmental impacts of caused by the project are considered through 23 environmental items as shown in Table 7.3.7.

The project is planned to prepare positive impacts on environment especially in the field of "sanitation". However, the project is expected to create a negative environmental impact as shown below.

Summary of the Results of Environmental Check List

Evaluation	Environmental Items
Serious Negative Impacts	Nothing
Minor Negative Impacts	"Transport" & "Soil Contamination" & "Noxious odors"
Uncertainly	"Resettlement" & "Waste"

The details of the structural plan of the project are not decided. In further feasibility study, consideration should be taken to minimize environmental impact shown above.

7.3.11 Improvement of the Primary Collection System of Solid Waste

(1) Target Satisfaction and Objective Achievement

1) Target Satisfaction

This priority project consists of the following components, i.e. procurement of waste collection vehicles and water sprinkling vehicles, rehabilitation of the existing two garages, and construction of two new garages, and procurement of some facilities for the central workshop of URENCO.

The target area of this priority project is the whole urban areas including the existing seven urban districts as well as the surrounding areas that would be urbanized in future.

Environment zones 1, 2, 3, and 7 will receive substantial benefits in terms of cleanliness of the city. The project will also contribute to the clean water because an improved waste collection would lead to the reduction of people's waste dumping into channels, rivers and lakes.

Effectiveness of the Project

Zone	Clean & Quiet			Co-existing with Nature	
	Sanitary Water Environment	Clean Water Environment	Clean City	Green	Friendly Water
1	0	1+	3+	0	0
2	0	1+	3+	0	0
3	0	1+	3+	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	1+	3+	0	0

2) Accrued Benefit

The beneficiary of the project will be the population living in the environment zones 1, 2, 3 and 7. According to the projection of the population, the population in those four zones will be about 1.4 million in 2010, and 1.5 million in 2020.

(2) Cost Effectiveness

Cost per beneficiary is estimated at US\$4.8 per year as in 2010 which is considered cost effective.

(3) Affordability

This project is a part of the solid waste management improvement (SWM) projects planned for HPC. Other main components are the provision of waste transfer systems (transfer station and the secondary transport vehicles) and Nam Son Phase 2 Sanitary Landfill.

It is judged that the implementation of the whole SWM projects is affordable for HPC in terms of 1) ratio of the SWM project cost to HPC's revenue and 2) ratio of the SWM project cost to the Gross Regional Product of Hanoi.

Those ratios are currently around 5% and 0.8% respectively. With the implementation of the whole SWM projects, the corresponding ratios will increase to 7.7% and 1.2% approximately at the peak year 2005. Then the ratios will gradually decrease, and reach 6.9% and 1.1% in 2010, and 4.9% and 0.8% in 2020.

In general, cities in developing countries find that SWM costs pose a financial burden if the SWM cost ratio to GRP exceeds 1%. The corresponding ratio will be over 1% in Hanoi during the period of 2004 – 2014. During this period, HPC may feel that the SWM cost is much.

Eventually however, the SWM cost ratios to GRP would decrease because the economic growth will be faster than the increase in waste generation.

In case of Hanoi, the high SWM cost is attributable mainly to the following two factors, i.e., use of distant landfill site in Nam Son, and application of sanitary landfill in Nam Son. However, these two factors (changes) are inevitable, and cannot be avoided. Considering the fact that Hanoi is the capital city, the planned SWM projects would be affordable for HPC, and HPC would be able to find sources of finances for the required investments.

(4) Environmental Impacts

Due to the primary collection vehicles, traffic may be increased. But the ratio to the current total traffic is small and impact would be quite small. Besides, the renewed vehicle condition is much better than the present ones in terms of exhaust gas quality.

7.3.12 Shift of Solid Waste Management Responsibility to Districts and Privatization

(1) Description

This is a policy issue rather than a project. The recommended policy is to:

- Shift solid waste management (SWM) responsibility from URENCO to Districts
- Privatize solid waste management service in the form of "contracting out"
- Transform URENCO into a pure service provider
- Increase cost recovery from waste generator, i.e. household and industries

These issues are linked to each other, and benefits are maximized when they are implemented in a coordinated way.

Detailed description of the policy is shown in Section 6.5.2.

(2) Rational

The rational for the shift of SWM responsibility from URENCO to districts are as follows:

- SWM service (particularly waste collection service) is a community-based service.
- At present, size of population of each district is large enough in terms of scale of economy of SWM service
- The shift would promote the privatization because districts will have choices regarding way of providing service including privatization.
- Rational for the privatization is:
- The privatization will bring the benefits mentioned below:

(3) Benefits

Ultimate benefits of the privatization and the shift of the SWM responsibility to districts are:

- Improvement of solid waste management services in terms of quality (cleanliness, sanitation, level of satisfaction of the service recipients) and

- quantity (expansion of service area)
- Increase of efficiency of solid waste management services (reduction of unit cost of SWM services)
- Cost reduction

7.3.13 Study on the Possibility of a Waste Incinerator with Power Utilization for Hanoi

Being different from the other priority projects, this is a priority project in the form of study. This priority study project would bring about the following benefits.

- a) Select appropriate type and size of an incinerator fit for Hanoi
- b) Select appropriate location for constructing an incinerator
- c) Work out alleviation measures against the possible social and impacts caused by the incinerator
- d) Work out the appropriate organization for the implementation and management of the incinerator project
- e) Evaluate the feasibility of the implementation of the incinerator project
- f) Determine the conditions and appropriate timing of the introduction of the incinerator

7.3.14 Establishment of Environmental Fund

(1) Benefit

The establishment of the Environmental Fund is essential to hasten the pace of the implementation of environmental management in Hanoi City. It will provide additional monies to finance pollution abatement loans to industrial facilities and to the people/organizations working for environmental awareness raising. It will also provide additional monies that can be earmarked for specific state environmental management activities. The management of this fund must be under a responsible agency under the supervision of the HPC. Successful achievement of the objectives for the fund will depend on ensuring a reliable source of revenues and the development of limited set of uses for proceeds of the Fund.

The cost of needed improvements for pollution control equipment and process technology far exceeds the available capital within the industrial sector. The Environmental Fund will provide a small amount of additional capital for selected investments in pollution abatement. However, the fund will only be able to meet a small part of the total need. Clear and limited objectives must be set. Success in facilitating pollution abatement will likely come from successful demonstration projects rather than significant investments in major pollution control measures.

The Environmental Fund will also be used as a source of revenue for environmental

management activities. It is anticipated that a significant portion of the earmarked funds will be used to fund environmental education and awareness programs. These programs will be targeted at individual enterprises, the Ministries and People's Committee that control the SOEs, and the general public.

The agency responsible for overall administration of the fund will be carefully scrutinized to avoid any mismanagement of the fund. The fund administrator may receive strategic direction from the HPC and the ECC (assuming that the ECC is created). It is very important that a clear policy be established to decide how the monies will be used. If the pollution charges and fines are to be a major source of the Environmental Fund, industry may not be willing to cooperate unless most of the collected charges are channelled back to the polluters. A portion of the Environmental Fund that is financed by pollution charges may be used to invest in other environmental projects. This is acceptable in a transition economy and is a good way to direct environmental investment. The fund administrator must achieve a balance between the use of Fund to assist industry to make pollution abatement investments and use of the fund for State environmental management.

(2) Support for Other Priority Projects

The environment fund is will be used to enhance pollution control and increasing environmental awareness. It will likely be administered to some funding support the overall implementation of state environmental management. The benefits from the Environmental Fund's water pollution control projects will indirectly support the water quality objectives of the structural priority projects (i.e. West Lake Water Quality Improvement, and Main City Lakes Improvement).

The allocation of some of the fund to support state environmental management will directly support the activities of the new environmental agency DOSTE and/or the operations of special projects undertaken on behalf of the ECC.

Table 7.3.1 Definition of Target Satisfaction Levels

Sanitary Water Environment

Effective Area	Protection Level		
	less than 5-year return period	Between 5-year and 10-year return period	more than 10-year return period
Less than 50%	0	0	1+
Between 50% and 75%	0	1+	2+
More than 75%	0	2+	3+

Clean Water Environment

Effective Area	Water Pollution Level		
	Polluted	Slightly-Polluted	Un-Polluted
Less than 50%	0	0	1+
Between 50% and 75%	0	1+	2+
More than 75%	0	2+	3+

Clean City: Waste collection service coverage in terms of population (%)

Coverage Area	Collection Level
100	3+
Between 50 to 100	2+
Less than 50	1+

Green

Effective Area	Area of Green Park		
	Less than 10 m ² per capita	10 m ² or more than 10 m ² per capita	20 m ² or more than 20 m ² per capita
Less than 50%	0	0	1+
Between 50% and 75%	0	1+	2+
More than 75%	0	2+	3+

Friendly Water

Recreation Area	Water Front		
	Polluted Water Bodies	Slightly-Polluted Water Bodies	Un-Polluted Water Bodies
without Recreation Area	0	1+	2+
with Recreation Area	1+	2+	3+

Table 7.3.2 Benefits of Priority Project

Priority Project	Target	Area	Number of Beneficiaries in 2020	Other Tangible Benefits
To Lich River Basin Drainage Project	<ul style="list-style-type: none"> Sanitary Water 	75.4 km ² (To Lich River)	1,085,895	<ul style="list-style-type: none"> The project will ensure the average protection level corresponding to 10 year return period storm water. Enhanced economic activities and reduction of interruption of traffic Enhancement of land value and securing the urban development
West Lake Water Quality Improvement Project	<ul style="list-style-type: none"> Clean Water Friendly Water 	39.1 km ² (EZ 1 & 7)	854,090	<ul style="list-style-type: none"> Provision of suitable waterfront on West Lake with total 520 ha water surface and 12 km shoreline Water pollution generation load of BOD 6,432 kg/day in 2010 is to be treated properly by the sewerage system to be constructed by the project, Water quality of the Lake is to be improved to Un-polluted level.
Main City Lakes Improvement Project	<ul style="list-style-type: none"> Sanitary Water Friendly Water 	39.1 km ² (EZ 1 & 7)	854,090	<ul style="list-style-type: none"> Provision of suitable waterfront on 14 lakes with total 83.7 ha water surface and 13.5 km shorelines, Activating tourist industry in Hanoi, especially in EZ 1 & 7 Sustaining the living environment and amenity for residents in EZ 1 & 7 Reduce the flood damages, Improvement of welfare and social security.
Public Sewerage Development for Old City Center	<ul style="list-style-type: none"> Clean Water Friendly Water 	28.8 km ²	712,493	<ul style="list-style-type: none"> Water pollution load of BOD 74,700 kg/day in 2010 is to be treated properly by the sewerage system of the project Improvement of water quality in urban rivers in Environmental Zone 1 & 3 by way of the above treatment is as shown below. Improvement of the living environment and health with reduction in disease contraction in EZ 1, Tourism promotion due to preparing clean water environment in Hanoi, Improvement of water resources, such as lakes and groundwater, and Securing the agriculture and fishery activities in EZ 1 and 3, Sustaining the living environment and amenity for residents EZ 1
Improvement of the Primary Collection System of Solid Waste	<ul style="list-style-type: none"> Clean City 	84.1 km ² (7 urban district)	1,433,861	<ul style="list-style-type: none"> Preparation of clean city area of 84.1 km² Improvement of water environment by way of free from uncollected garbage
Establishment of Septage Collection and Disposal System	<ul style="list-style-type: none"> Clean Water Clean City 	250.3 km ²	648,972	<ul style="list-style-type: none"> Improvement of the living environment and health condition with reduction in disease contraction, Improvement of water environmental condition of rivers, lakes and groundwater, and securing the agriculture and fishery activities,

Table 7.3.3 Environmental Impact Check List: To Lich River Basin Drainage

Item	Evaluation	Reason
1. Resettlement	B	
2. Economic Activities	D-2	Positive impacts expected
3. Transport	D-1	Need attention during construction
4. Separation of Community	D-2	Nothing expected
5. Cultural Assets and Archacology	D-2	No such sites
6. Water and Common Rights	D-2	Nothing expected
7. Sanitation	D-2	Nothing expected
8. Waste	B	Sludge generated by Dredging Works should be managed properly.
9. Dangers	D-2	Nothing expected
10. Topography and Geology	D-2	Nothing expected
11. Soil Erosion	D-1	Need attention during construction
12. Groundwater	D-2	Nothing expected
13. Lake, Marsh and River	D-2	Nothing expected
14. Coastline and Sea	D-2	Nothing expected
15. Flora and Fauna	C	Construction works may effect Flora and Fauna at the construction sites.
16. Weather	D-2	Nothing expected
17. View	D-2	Nothing expected
18. Air Pollution	D-2	Nothing expected
19. Water Pollution	D-2	Nothing expected
20. Soil Contamination	D-2	Nothing expected
21. Noise and Vibration	D-1	Need attention during construction
22. Ground Subsidence	D-2	Nothing expected
23. Noxious odors	D-2	Nothing expected

- A : Serious Negative Impact expected
 B : Minor Negative Impact expected
 C : Uncertain (may become clear on investigation)
 D-1 : Almost no Negative Impact expected, if proper construction is carried out
 D-2 : Almost no Negative Impact expected, or Positive Impact only

Table 7.3.4 Environmental Impact Check List: West Lake Water Quality Improvement Project

Item	Evaluation	Reason
1. Resettlement	B	
2. Economic Activities	D-2	Positive impacts expected
3. Transport	D-1	Need attention during construction
4. Separation of Community	D-2	Nothing expected
5. Cultural Assets and Archaeology	D-2	No such sites
6. Water and Common Rights	D-2	Nothing expected
7. Sanitation	D-2	Nothing expected
8. Waste	B	Sludge generated by Dredging Works should be managed properly.
9. Dangers	D-2	Nothing expected
10. Topography and Geology	D-2	Nothing expected
11. Soil Erosion	D-1	Need attention during construction
12. Groundwater	D-2	Nothing expected
13. Lake, Marsh and River	D-2	Nothing expected
14. Coastline and Sea	D-2	Nothing expected
15. Flora and Fauna	C	dredging works and dilution water may effect Flora and Fauna in West Lake..
16. Weather	D-2	Nothing expected
17. View	D-2	Nothing expected
18. Air Pollution	D-2	Nothing expected
19. Water Pollution	D-2	Nothing expected
20. Soil Contamination	D-2	Nothing expected
21. Noise and Vibration	D-1	Need attention during construction
22. Ground Subsidence	D-2	Nothing expected
23. Noxious odors	C	Any sewage generates odors. Odor is expected improved

A : Serious Negative Impact expected

B : Minor Negative Impact expected

C : Uncertain (may become clear on investigation)

D-1 : Almost no Negative Impact expected, if proper construction is carried out

D-2 : Almost no Negative Impact expected, or Positive Impact only

Table 7.3.5 Environmental Impact Check List: Main City Lakes Improvement

Item	Evaluation	Reason
1. Resettlement	D-2	Nothing expected
2. Economic Activities	D-2	Positive impacts expected
3. Transport	D-1	Need attention during construction
4. Separation of Community	D-2	Nothing expected
5. Cultural Assets and Archaeology	D-2	No such sites
6. Water and Common Rights	D-2	Nothing expected
7. Sanitation	D-2	Nothing expected
8. Waste	B	Sludge generated by Dredging Works should be managed properly.
9. Dangers	D-2	Nothing expected
10. Topography and Geology	D-2	Nothing expected
11. Soil Erosion	D-1	Need attention during construction
12. Groundwater	D-2	Nothing expected
13. Lake, Marsh and River	D-2	Nothing expected
14. Coastline and Sea	D-2	Nothing expected
15. Flora and Fauna	C	Dredging works may effect Flora and Fauna in the lakes.
16. Weather	D-2	Nothing expected
17. View	D-2	Nothing expected
18. Air Pollution	D-2	Nothing expected
19. Water Pollution	D-2	Nothing expected
20. Soil Contamination	D-2	Nothing expected
21. Noise and Vibration	D-1	Need attention during construction
22. Ground Subsidence	D-2	Nothing expected
23. Noxious odors	D-2	Improvement expected

- A: Serious Negative Impact expected
- B: Minor Negative Impact expected
- C: Uncertain (may become clear on investigation)
- D-1: Almost no Negative Impact expected, if proper construction is carried out
- D-2: Almost no Negative Impact expected, or Positive Impact only

Table 7.3.6 Environmental Impact Check List: Public Sewerage

Item	Evaluation	Reason
1. Resettlement	C	
2. Economic Activities	D-2	Positive impacts expected
3. Transport	D-1	Need attention during construction
4. Separation of Community	D-2	Nothing expected
5. Cultural Assets and Archaeology	D-2	No such sites
6. Water and Common Rights	D-2	Nothing expected
7. Sanitation	D-2	Nothing expected
8. Waste	C	Need attention to sludge treatment
9. Dangers	D-2	Nothing expected
10. Topography and Geology	D-2	Nothing expected
11. Soil Erosion	D-1	Need attention during construction
12. Groundwater	D-2	Nothing expected
13. Lake, Marsh and River	D-2	Nothing expected
14. Coastline and Sea	D-2	Nothing expected
15. Flora and Fauna	C	Not clear
16. Weather	D-2	Nothing expected
17. View	D-1	Need attention during construction
18. Air Pollution	D-2	Nothing expected
19. Water Pollution	D-2	Nothing expected
20. Soil Contamination	D-2	Nothing expected
21. Noise and Vibration	D-1	Need attention during construction
22. Ground Subsidence	D-2	Nothing expected
23. Noxious odors	C	Any sewage generates odors. Odor is expected improved

- A : Serious Negative Impact expected
 B : Minor Negative Impact expected
 C : Uncertain (may become clear on investigation)
 D-1 : Almost no Negative Impact expected, if proper construction is carried out
 D-2 : Almost no Negative Impact expected, or Positive Impact only

Table 7.3.7 Environmental Impact Check List: Septage

Item	Evaluation	Reason
1. Resettlement	C	Not clear
2. Economic Activities	D-2	Positive impacts expected
3. Transport	B	Septage collection vehicle will effect transportation.
4. Separation of Community	D-2	Nothing expected
5. Cultural Assets and Archaeology	D-2	No such sites
6. Water and Common Rights	D-2	Nothing expected
7. Sanitation	D-2	Nothing expected
8. Waste	C	Sludge collected by the vehicles should be managed properly.
9. Dangers	D-2	Nothing expected
10. Topography and Geology	D-2	Nothing expected
11. Soil Erosion	D-1	Need attention during construction
12. Groundwater	D-1	Need attention during Detailed Design of Septage Treatment Works
13. Lake, Marsh and River	D-2	Nothing expected
14. Coastline and Sea	D-2	Nothing expected
15. Flora and Fauna	D-1	Need attention during construction
16. Weather	D-2	Nothing expected
17. View	D-1	Need attention during Detailed Design of Septage Treatment Works
18. Air Pollution	D-2	Nothing expected
19. Water Pollution	D-2	Positive impact expected
20. Soil Contamination	B	Septage Treatment Works may effect Soil Contamination. Need attention during Detailed Design of Septage Treatment Works
21. Noise and Vibration	D-1	Need attention during construction
22. Ground Subsidence	D-2	Nothing expected
23. Noxious odors	B	Any septage generates odors. Need attention during Detailed Design of Septage Treatment Works

- A : Serious Negative Impact expected
 B : Minor Negative Impact expected
 C : Uncertain (may become clear on investigation)
 D-1 : Almost no Negative Impact expected, if proper construction is carried out
 D-2 : Almost no Negative Impact expected, or Positive Impact only