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CHAPTER 6

INSTITUTIONAL CONSIDERATION

CHAPTER 6
INSTITUTIONAL CONSIDERATION

6.1 GENERAL

Sewerage system is being managed by the government sector in Nepal. The management of the sewerage system is integrated with drinking water. Nepal Water Supply Corporation (NWSC) is responsible for the management and operation of the drinking water and sewerage system in major towns of Nepal, including in Pokhara Sub-metropolis (PSMC). NWSC is a state owned corporation.

Department of Water Supply and Sanitation (DWSS) is responsible for drinking water and sanitation system in small towns and rural areas.

From the past experience in the management of the sewerage system by the government sector, several lessons have been learnt. These are:

- low priority was given for the development of planned sewerage system;
- people are less concerned and aware in maintaining environmental sanitation;
- the rampant urban growth has caused overuse of existing drainage and sewerage facilities rendering them grossly inadequate;
- at some places, the outlets of the septic tanks are connected to storm-water drainage system;
- discharge from sewer is directly disposed into rivers or lakes causing extreme pollution of the water bodies.

No comprehensive sewerage system exists in Pokhara City. A sewer line for houses along the street in Wards Number 2, 3, 4 and 8 of Pokhara Sub-metropolis with three community septic tanks was constructed in 1995. The sewer line is not yet connected to the individual household and therefore the existing facility has not even started functioning. The sewer line was constructed by the regional office of the Department of Housing and Urban Planning under Tourism Infrastructure Development Project was handed over to the Pokhara Sub-metropolis for operation and maintenance.

6.2 IMPLEMENTATION OF THE SEWERAGE SYSTEM

Ministry of Population and Environment (MOPE) will be the overall implementing agency. The proposed Phewa Lake Environment Conservation Committee (PLECC) should be the responsible and authorized institution for the execution of Phewa Lake conservation projects, including execution of the proposed sewerage system. Operation and maintenance of the sewerage system as well as collecting service charge from the beneficiaries should be the responsibility of PLECC in cooperation with NWSC as well as PSMC.

The PLECC will be responsible for overall administration of works related to its program. But such works will be carried out according to the Financial Rules and Regulation of the country.

As the committee itself may not be capable enough to directly administer such works, it can arrange technical as well as management cooperation with the related Government line agencies such as NWSC. Implementation of work will be carried out by a Project Management Office.

The work can be executed through procurement of contractors according to the Financial Rules and Regulation of the country.

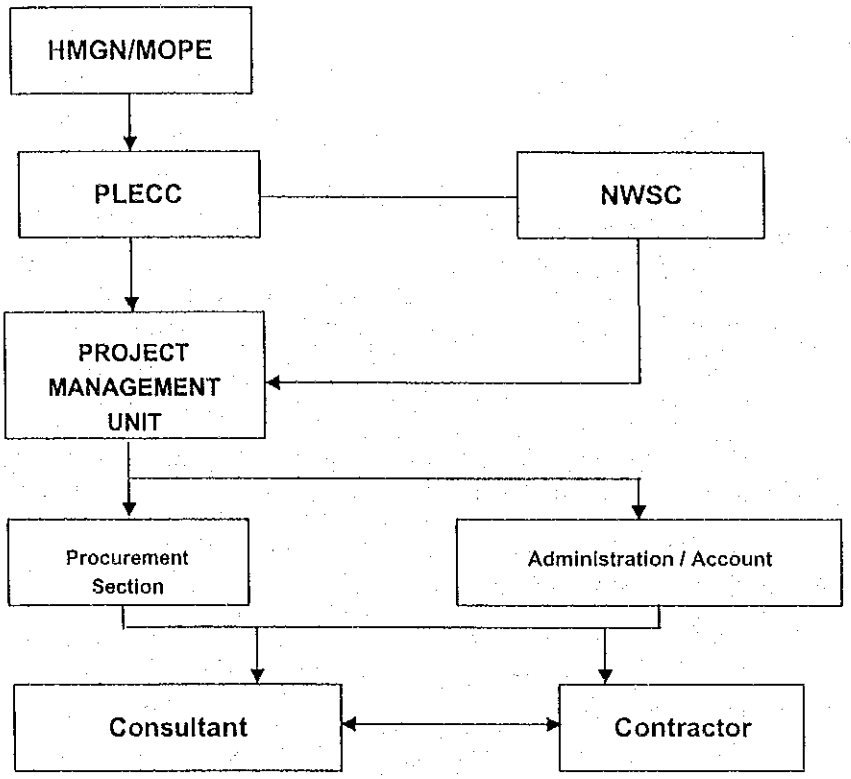

Fig. II-6.1: Proposed Setup for Implementation and O&M of Proposed Sewerage System

6.3 PRIVATISATION OF PUBLIC SERVICE SECTOR

Recently, privatization of public service sector is getting sufficient attention in the country. It includes a complete privatization or partnership with public agency. Private sector will be obviously interested to be involved in such area which is economically viable. An example of public-private partnership in municipal services is door-to-door source segregated solid waste collection and transfer program being carried out in Ward Nos. 13, 14 and 15 of Kathmandu Metropolis (KMC) with KMC partnering with SILT Environmental Services (P) Ltd. Nepal (SILTES). Similarly an integrated Solid Waste Management Program is being carried out at Biratngar Sub-metropolis (BMC) with BMC partnering with SILTES. Nepal never had any experience on privatisation in sewerage system.

Although, no survey has been conducted in the past for willingness to pay for sewerage system but, during the execution of environment related activity in the Second Tourism Infrastructure Development Project in Pokhara Sub-metropolis, strong indication for willingness was observed to participate with financial contribution in activity related to environment conservation of Phewa Lake. Similarly, strong willingness to pay for the services was also expressed by the inhabitants of the Study Area during field survey under this Study. Privatisation of this sector can thus be one of the alternatives for O&M of the system.

At the initial stage and to be in safe side, privatisation can be only partial, or it can be executed in a partnership basis. Partnership in this case may be:

- Partial investment in construction, operation and maintenance from the private sector;
- Privatisation of operation and maintenance only;

- Privatisation of operation only.

Another option for this may be community owned services, where the community may undertake the responsibility for O&M with minimum or no profit.

6.4 PROPOSED OPERATIONAL STRUCTURE OF SEWERAGE SERVICE

MOPE will be the implementing agency and PLECC will be the executing the agency for the sewerage system. Sewage system, as discussed above although is suggested to be the responsibility of PLECC, it will be more practical if its operational management is handed over to some other agencies (private or NWSC) and PLECC will only monitor the whole service.

NWSC is at present charging for sewerage along with the water supply charge. Thus, NWSC can collect the charge for sewerage system as usual, and PLECC will coordinate with it for ensuring efficient services and protection of Lake water. The service charge raised by NWSC will be kept with separate account, and should be utilized for O&M of the system and other conservation works. Any major maintenance work required in future can be done by PLECC from the surplus service charge as well as conservation fund raised by it from other sources. An operational structure of sewerage system is presented in **Fig. II- 6.2.**

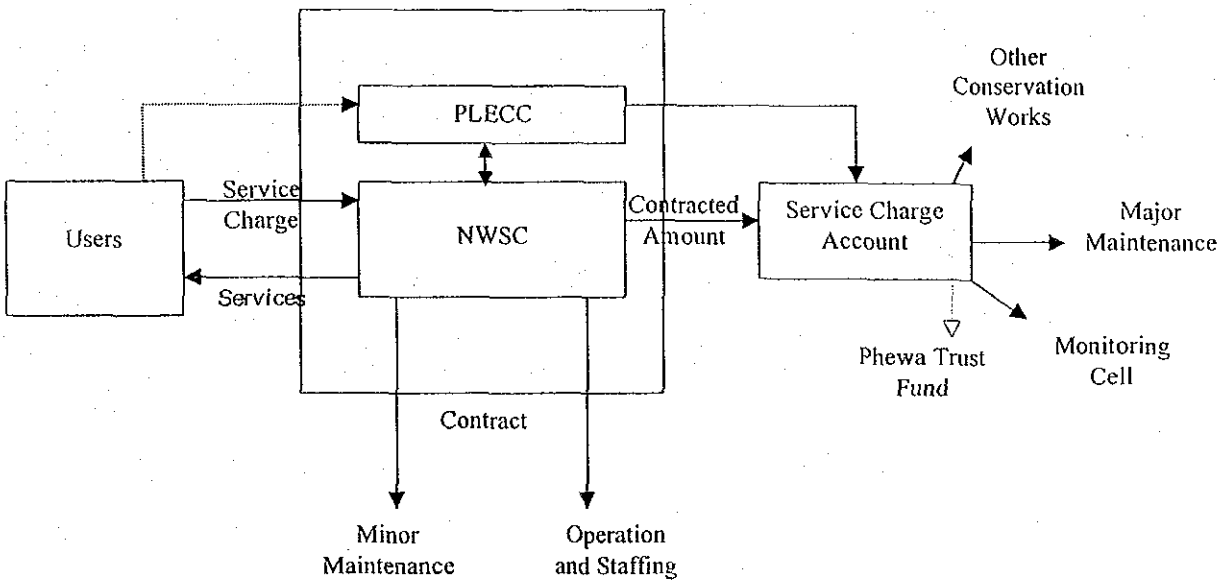

Fig. II- 6.2: Operation Structure of Sewerage System

6.5 OPERATIONAL STAFF FOR MONTIROING THE SEWERAGE SYSTEM

Operational staff for monitoring the sewerage system is estimated based on the proposed operational structure as presented in following **Table II- 6.1.**

Table II-6.1: Operational Staff for Monitoring the Sewerage System

1.	Monitoring Officer (overall management of the system including contract administration)	No. 1
2.	Civil Engineer (sanitation)	No. 1 (for construction period only)
3.	Junior Engineer	No. 2 (one for construction period only)
4.	Secretariat Staff	No. 1
5.	Inspector	No. 1
6.	Account Officer	No. 1 (job to be overlapped with the central account section of PLECC/PLECF)
7.	Junior Accountant	No. 1 (job to be overlapped with the central account section of PLECC/PLECF)
8.	Helper	No. 1

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CHAPTER 7

ENVIRONMENTAL ASSESSMENT

The Development Study on Environmental Conservation of Phewa Lake in Pokhara, Nepal

CHAPTER 7
ENVIRONMENTAL ASSESSMENT

7.1 OBJECTIVE

A preliminary Environmental Assessment has been conducted under the current Study with the following objectives:

- to review the existing condition within the project area,
- to assess the possible environmental impacts due to the implementation of proposed project,
- to propose countermeasures for mitigating the adverse impacts, and
- to prepare environmental monitoring plan.

7.2 NATURAL AND ENVIRONMENTAL IMPACTS

7.2.1 General

Discharge of untreated urban sewage directly or through various streams and drainage are one of the major causes of water quality degradation in Phewa Lake. The degradation of water quality of the Lake has adversely affected the scenic beauty, caused algal growth on the Lake surface and created foul odor around the shore area. This has resulted the Lake water quality unfit for recreational activities, particularly related with promotion of tourism industry. The proposed construction of sewerage system will reduce the pollution load in the Lake water by diverting all raw sewage generated in urban watershed of the Lake. The reduction in pollution will be particularly in terms of Total Nitrogen (TN), Total Phosphorous (TP), BOD, COD, and Coliform. This will also enhance the scenic beauty of Lake, public living condition as well as conserve the bio-diversity of fauna and flora in the area. This will eventually enhance the tourist inflow and generate more employment directly and indirectly as well. Apart from this, the construction of proposed sewerage project will have following positive impacts:

- **Increase self purification capacity of Lake water:** *Increase in Dissolved Oxygen content of Phewa Lake due to diversion of sewage will increase self purification capacity of the Lake water*
- **Conservation of aquatic biodiversity:** *Improvement in water quality will be contributory in re-establishment of pollution intolerant floral and faunal species, which will pose positive impact on conservation of local biodiversity.*

7.2.2 Topography and Geology

The construction of proposed sewerage system and natural treatment facilities will not affect adversely the natural condition of surrounding areas. The topographic and geological changes due to the construction work will be minimal and will not cause significant impacts in the surrounding area.

7.2.3 Temporary Hazard

During the construction period, some limited area along the road may be affected from dust, noise, and vibration to some extent. These can be controlled by adopting careful control measures.

7.2.4 Water Quality

The construction of sewerage system will greatly enhance the Lake water quality by diverting pollution load. However, the water quality of Phusre Khola will be affected to some extent due to the disposal of sewage by the sewerage system. A provision has been made to treat the wastewater through natural oxidation process by allowing it to flow through cascade structure prior to the disposal. Furthermore, water of Phusre Khola in the stretch of about 2 km between proposed sewage disposal site and its confluence with Seti are currently not in use for any purpose. It is also assumed that disposal of wastewater into the Phusre Khola will be purified through dilution process. However, to keep the pollution load of Phusre within acceptable limit, regular water quality monitoring is required.

The prevailing Environmental Protection Act (EPA), 1995 restrict the activities that affect the bio-diversity of the area, and disposal of chemical into water body, which affect the aquatic life. The disposal of urban sewage into Phusre Khola after natural oxidation treatment does not affect the bio-diversity and aquatic life. However, during the course of detail design, a full scale Environmental Impact Assessment (EIA) in accordance with the EPA, 1995 is recommended to abide by the prevailing law.

However, a regular water quality monitoring of Phusre Khola is recommended. If the pollution load crosses the threshold limit even after treating by oxidation process, a suitable treatment facility such as constructed wetland (Reed Bed Treatment System) should be provisioned.

7.3 SOCIO ECONOMIC IMPACTS

During the Construction of proposed sewerage system, some adverse socio-economic impacts will occur particularly to the hotel owners, restaurant owners and their employees due to disturbances to the tourists by the construction activities. The reduction in tourist inflow is primarily attributed to the disturbances caused by noise, dust, and disruption of road. These impacts are short term and take place only during construction period. It will be mitigated by minimizing the construction period through optimized construction activities, carrying out the work during off-season and scheduling the work to minimize the closure of road.

7.4 POSITIVE IMPACTS

- *Domestic Users*

The residential area will be served by trunk sewers and households will be made mandatory to connect their household sewage into the trunk sewer. This will eventually restrict the pollution load into local streams that discharge into the Lake. The major positive impact in the residential area will be reduction in noxious odor from local streams, reduction in vector borne diseases and improvement in public health. The seepage from un-hygienically constructed open bottomed septic tanks will also be controlled.

- ***Commercial Users***

The diversion of sewage generated in urban area will reduce the pollution load in Lake. This will reduce the foul odor in the Lakeshore, reduce algal growth and water hyacinth in the Lake and increase it's scenic beauty. This will greatly enhance the environmental condition and assist in increase of tourist and business activities. This will eventually increase the income level of people living within the area.

7.5 NEGATIVE IMPACTS

Although every effort have been made for planning, design and construction of an optimum system, it may not be possible to completely eliminate all the impacts due to the project implementation. Such residual or unavoidable impacts in the future, although not significant, may include :

- increase in construction related traffic volume along the road during construction and increase noise and dust,
- disruption of road facilities with excavation for sewer during construction,
- reduction in business activities of hotels and restaurants located along the alignment during construction period,
- disruption of water supply pipeline etc.

7.6 OVERALL REMARKS

As shown in **Table II-7.1** and **II-7.2**, the current assessment has indicated that the overall project appears to be well planned to achieve environmental enhancement of Lake and its urban watershed area, and will create employment during construction period providing maximum benefits for the local people, which will surely enhance the socio-economic status and quality of life of the poor people of its watershed.

The assessment result can be summarized as follows:

- The proposed project as a whole has positive environmental impacts in the water quality, overall environment, public health of resident, and tourism related activities in the city,
- Pollution of Phewa Lake through point sources from the city area will be completely controlled,
- The beneficial impacts of the project outweigh the negligible adverse impacts, and
- A detailed EIA level study during the detail design shall be conducted on predicting the extent of impacts, mitigation and remedial measures.

Table II-7.1: Existing Condition and Evaluation of Impacts by Construction of Proposed Sewerage System

Items	Environmental Situation	Evaluation of Impacts
Public Health Condition	The wastewater quality, which is being discharged into the Lake indicate that the total coliform level is 9.5x10^4 number per 100 ml. to 8.4x10^2 number/100 ml. This exceeds the threshold limit of 1x10^2 number/100 ml. The proposed project will divert all the point sources of pollution load and will assist to bring the coliform level within permissible standard. This will greatly enhance the public health condition of the people living near the Lake surroundings.	Positive Impact
Resettlement	The alignment of proposed sewerage system passes through the existing road. No resettlement is required. However, during the construction minimum number of household may need to	Insignificant

Items	Environmental Situation	Evaluation of Impacts
	be resettled.	
Noise and Vibration of Traffic	During the construction phase, the heavy equipment for transporting construction materials, excavation, backfilling, lowering of humepipes and tunneling may be utilized in order to complete the construction work in stipulated time. This will have noise around the construction site. A suitable counter measures should be considered. The impact will not be significant if proper mitigation measures are adopted. During the construction of tunnel, the vibration on the ground along the road and buildings located in nearby areas may have some impacts. The suitable technology shall be adopted to minimize the vibration. The impact will not be significant. The proposed sewerage route is one of the busiest roads and has been utilized by tourist and trekkers. The traffic volume in this area is quite high. For this, by-pass roads during construction shall be used and construction shall be done in shortest possible period. The impact will be not very significant.	Insignificant Insignificant Insignificant
Water Rights and Right of Common	The construction of diversion sewerage line covering the low flow of Seti Canal and Phirke Khola will not disturb the water balance situation of Phewa Lake. This will not have any adverse impact on existing water utilization. The disposal of sewerage water in Phusre Khola will also have no adverse impact. Water of Phusre Khola is not used for any purpose in between disposal location to its confluence with Seti River. There will be no significant impact on water rights.	No Impact
Hazard	Based on the result of field survey, the design of infrastructure and construction methodology need to be done to avoid hazard during construction. If proper design and construction methodology will be adopted the impact will be insignificant.	Insignificant
Topography and Geology	The implementation of the proposed sewerage facility will not make any change in topography and geology significantly. The impact will be insignificant.	Insignificant
Hydrology	The construction of sewerage system will not make any significant change in hydrological cycle of the Lake, and other streams located in nearby area. This will add about 0.85 m^3/sec of discharge into Phusre Khola after natural treatment. The impact of the sewerage system will be insignificant.	Insignificant
Fauna and Flora	The construction of sewerage will enhance the living condition of fauna and flora in the Lake. This will have positive impacts.	Positive Impact
Socio-economic Condition	The construction of sewerage will generate local employment considerably. It will provide opportunity for employment during construction period to a large a number of people living within the project area. However, during the construction period, with the excavation of road, the business activities will be affected to a limited period. By shortening the construction period, the impact on local business community will be minimized. The impact will be insignificant.	Positive Impact Insignificant
Water Pollution	The Lake water quality ranged from oligotrophic in 1970s to mesotrophic in 1980s and eutrophic by 1990s. Present field survey recorded maximum level of TN (3430 ug/l),TP (520ug/l) and Chlorophyall "a" (5.32 ug/l), Fecal Coliform (4018MPN/100ml), Total Coliform (60,800 MPN/100ml), BOD (5.03mg/l) , COD(7.04 mg/l), and Sechhi Disk Transparency (2.48m) surpassing threshold value of mesotrophic condition and indicate eutrophic and advancing hyper trophic condition in some instances such as level of bacterial pollution. The	Positive impact

Items	Environmental Situation	Evaluation of Impacts
	construction of sewerage system will bring back the load of these pollution to an acceptable limit. It will have positive impacts.	

Table II-7.2: Mitigation Measures

Items	Countermeasures
Acquisition, Compensation and Resettlement	Alignment should be made along the road and ensure that no household needs to be resettled, *Adopt the construction technology to minimize the cutting width,* Provide adequate compensation for the Project Affected Families, if any.
Noise, Vibration and Traffic	The use of heavy construction equipment shall be prohibited in night and early morning. Use the equipment with low noise and low vibration, Dump trucks and other equipment shall be operated in reasonable speed to avoid vibration, During the construction, the noise and vibration level shall be checked regularly in certain interval of time, Vibration from tunnel work shall be minimized with the use of appropriate equipment, Nearby roads shall be improved for the traffic flow, Before the start of construction, a mitigation and monitoring plan shall be prepared and strictly monitored by competent authority.
Water Quality of Phusre	The disposal of sewerage into Phusre shall be ensured that it has been treated through natural oxidation system. The design of oxidaton system shall be properly done. If the pollution load increase in future, adequate measure to reduce the pollution load shall be taken by constructing oxidation tank or constructed wetland. For this, regular monitoring of Phusre water shall be done.
Hazard	Proper safety measures during construction of sewerage and tunnel shall be taken.
Socio-economic	The people or hotels located along the sewer line will be affected during the construction period. The mitigation measures for this will be to complete the construction work in minimum time.

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CHAPTER 8

PROJECT EVALUATION

The Development Study on Environmental Conservation of Phewa Lake in Pokhara, Nepal

CHAPTER 8
PROJECT EVALUATION

8.1 JUSTIFICATION OF STUDY

The proposed sewerage system project is one of the efforts to enhance the water quality of Phewa Lake by diverting urban sewage being discharged (directly or indirectly) into the Lake. The basic justification of the project evaluation is to confirm its necessity as well as significance for improving the Lake water quality for improving the socio-economic condition of the people. This will be followed by economic analysis through the conventional cash flow estimation on related costs and benefits accrued from the project. The basic objective of the economic analysis is to determine whether the project is economically viable or not in terms of national economic perspective. Apart from the justification of project essentialities and economic analysis, project evaluation is essential in terms of technical evaluation and environmental examination. This is to make suitable technical intervention with minimum environmental degradation so as to design a sustainable project.

8.2 PROJECT JUSTIFICATION

Considering the degraded environmental condition of Phewa Lake, current Study has aimed to formulate integrated plan for environmental conservation of the Lake. During the course of this Study, primary factors attributed for Lake environment degradation have been identified and 9 numbers of Master Plans have been prepared to address the situation. Among the identified factors, direct disposal of untreated urban sewer into the Lake has been identified as one of the primary reasons responsible for it's water quality degradation. This has increased pollution load in the Lake in terms of nutrients (Total Nitrogen and Total Phosphorous) and Pathogens etc. This has resulted into growth of water hyacinth, occurrence of algal bloom, increase in foul smell, skin diseases, and destruction of aquatic life. This eventually leads to reduction in aesthetic beauty of the Lake and restriction in recreational activities for tourists. The pollution of water also affects biodiversity and Lake ecosystem. Reduction in yield of fish and increase in fish mortality has become common. Thus, the degradation of Phewa water quality ultimately reduces the income generation from tourism as well as from fisheries.

Based on the analysis of various Master Plans prepared, urban sewage management has been identified as most essential countermeasure to be implemented immediately for restoring healthy Lake water quality. Sewerage system by diverting urban sewage into downstream of Lake is found most appropriate alternative for up-keeping the scenic beauty of Lake, ecosystem health and conservation of water quality of the Lake. This will assist directly in enhancing the income generation from tourism as well as from agriculture and aquaculture. Consequently, this component has been studied at feasibility level study.

8.3 ECONOMIC EVALUATION

The economic evaluation of the sewage treatment plan was carried out for all the three technical options, that can be adopted for keeping Phewa Lake water safe and clean. The capital and the

Similarly, the economic benefits identified in **Chapter 14** of the **Part I** of this Report have been computed for the analysis. To make the evaluation more realistic the following assumptions have been considered:

- Fifty percent of the total number of households of the watershed area will pay sewerage tax.
- Tariff against sewerage service has been assumed as 50 % of water supply tariff (as the practice adopted in Nepal). Furthermore, it is also assumed that only 50 % of total household in the service area will use the sewerage system. The average tariff to be paid by household is only considered, and not by the business entity and public buildings. It is assumed that the earnings from higher tariff rate from business entity and public buildings will be additional income for undertaking Lake conservation activities.
- It is assumed that the average length of stay of tourists will be 3 days for the years 2006 to 2015, and 35 days for the years 2016-2030.
- Increment in fish catch will occur in the beginning but from 2016 onwards there will not be an increment in fish catch.
- Benefits from increased number of visitor to Pokhara has been taken as 20%.
- 7% discount rate as cost of capital has been adopted.

The detailed economic analysis based on the above assumptions is presented in **Annex 3** to this Report. The summary of the analysis is presented in **Table II-8.1** and **Fig. II-8.1**, **II-8.2** and **II-8.3**.

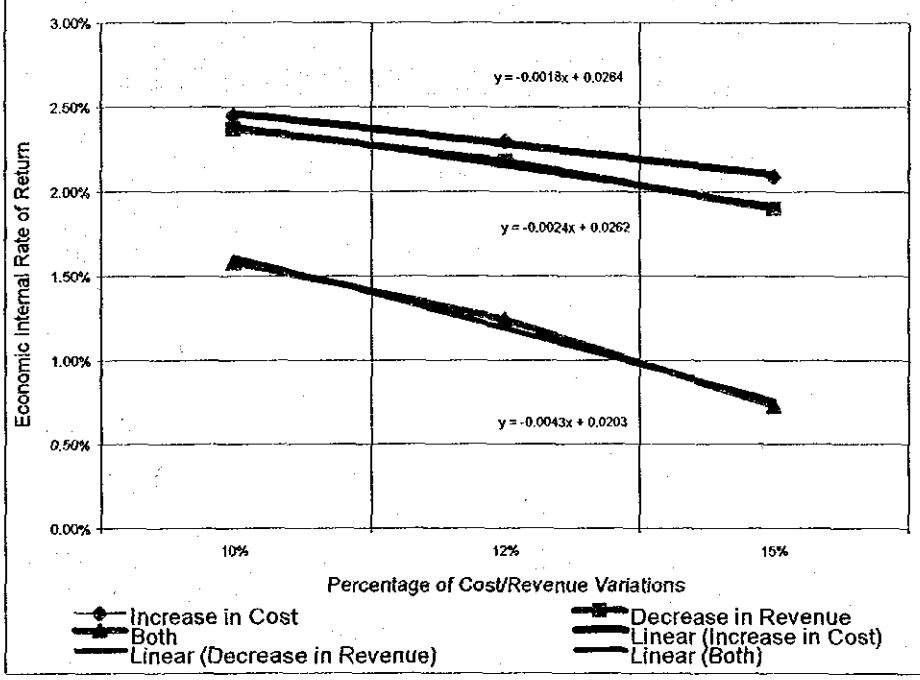
Table II-8.1 Summary of Economic Analysis

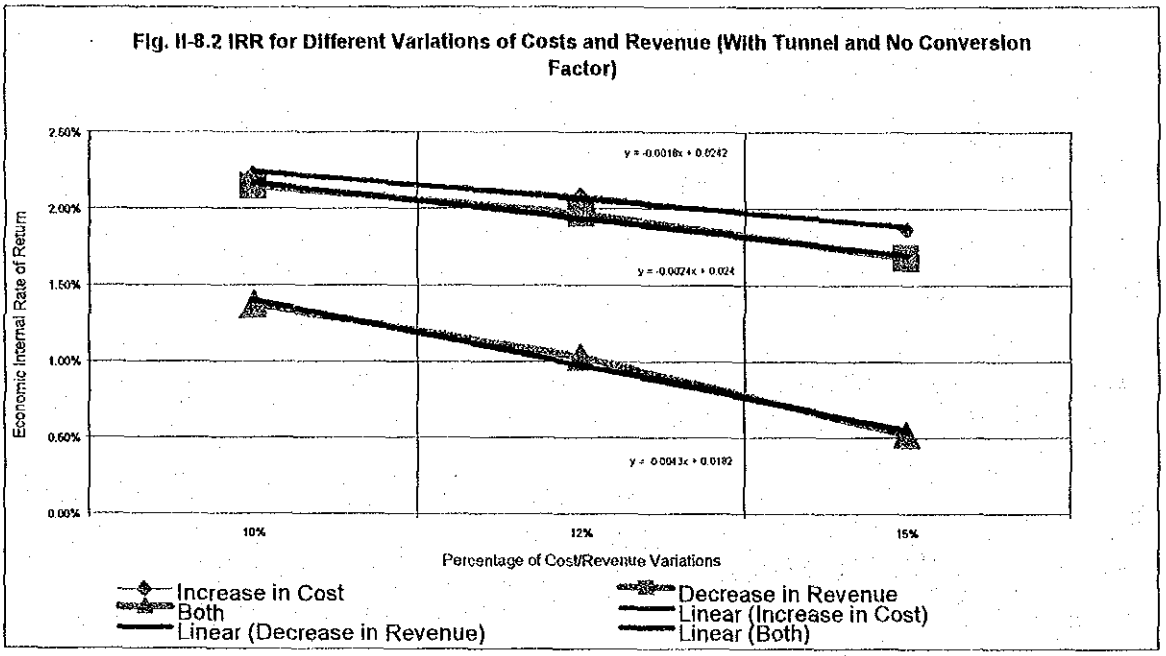
Summary of Economic Analysis of Sewerage System	NPV (in '000 Rs.)	EIRR	B/C Ratio
Table 8:1-A: Economic Analysis of Sewerage System (With Tunnel), Without Conversion Factor	(245,568)	2.15%	0.54
Table 8:1-E: Economic Analysis of Sewerage System (With Tunnel), With Conversion Factor	(186,565)	3.22%	0.62
Table 8:2-A: Economic Analysis of Sewerage System (Gravity with Cut and Fill), Without Conversion Facto	(25,194)	6.43%	0.93
Table 8:2-B: Economic Analysis of Sewerage System (Gravity with Cut and Fill), With Conversion Factor	(8,318)	6.80%	0.97
Table 8:3-A: Economic Analysis of Sewerage System (With Mechanical Treatment Facilities), Without Conversion Factor	(522,581)	-	0.35
Table 8:3-B: Economic Analysis of Sewerage System (With Mechanical Treatment Facilities), With Conversion Factor	(484,925)	-	0.36

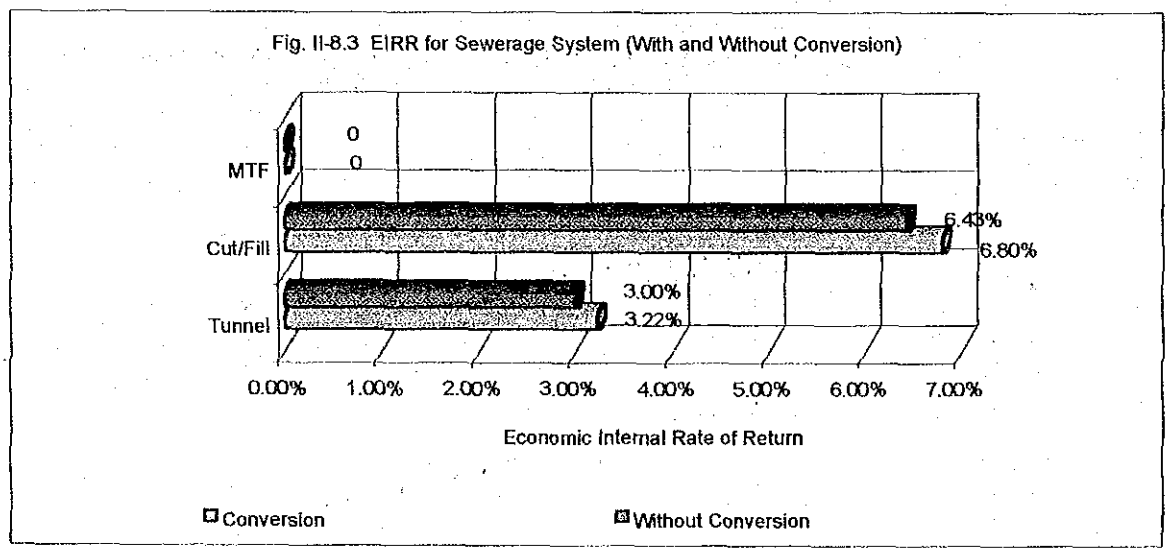
Sensitivity Analysis of Sewerage System (With Tunnel and Conversion Factor)	Case			
Table 8:1-F: With 10% Increase in Cost	1	(266,872)	2.23%	0.55
Table 8:1-G: With 10% Decrease in Revenue	2	(245,568)	2.15%	0.54
Table 8:1-H: With 10% Increase in Cost and 10% Decrease in Revenue	3	(267,093)	1.58%	0.51

Sensitivity Analysis of Sewerage System (With Tunnel and Without Conversion Factor)	Case			
Table 8:1-B: With 10% Increase in Cost	1	(266,872)	2.23%	0.55
Table 8:1-C: With 10% Decrease in Revenue	2	(245,568)	2.15%	0.54
Table 8:1-D: With 10% Increase in Cost and 10% Decrease in Revenue	3	(299,398)	1.37%	0.49

Fig. II-8.1 EIRR for Different Variations of Costs and Revenue (With Tunnel and Conversion Factor)







The result of economic analysis has indicated that the mechanical treatment facilities, as provisioned in the requested Grant Aid are not feasible. The gravity with cut and fill has relatively high internal rate of return and high B/C ratio, but it has to bear more risk during construction period. Many technical and social problems may crop up due to deep excavation in town area rendering risk to nearby buildings, and may lead to delay in the project. Thus the sewerage treatment system with tunnel option is found to be most suitable.

The sensitivity analysis of the tunnel option has been carried out to assess the implications of 10% variations in cost and revenue on internal rate of return, B/C ratio and NPV. It is found that even with 10% increase in cost and 10% decrease in revenue, the project is found to have positive EIRR. Thus, it is recommended for implementation.

8.4 TECHNICAL EVALUATION

Out of total population of Phokara Sub-metropolis, 49,561 numbers reside within the watershed of Phewa Lake. There is no scientific sewerage system constructed so far in this area and majority of people are largely dependent of conservancy method of sewage management. In absence of proper and sanitary sewerage system, most of the households directly dispose their wastewater into the Lake or through local streams. Similarly, in recent years, storm-water drainage has been constructed in the city and they drain into the Lake. These drains also carry wastewater illegally connected to them by households.

All these systems discharge BOD_5 of about 3966 kg per day into the Lake. Under such circumstances, there is an urgent need of implementing sewerage system to check the pollution intrusion from the city area.

In order to select most suitable and desirable sewage management plan for the service area, various alternatives have been prepared and evaluated in terms of initial investment, cost for operation and maintenance, technical, socio-economic relevance and environmental impacts.

The suggested sewerage system to manage sewage includes:

- Construction of trunk sewer line from Gaira Chautara (with diversion of dry season discharge of Seti Canal in to the proposed system) to Phusre Khola (total length 5.088 km) along the eastern shore of the Lake.
- A tunnel with total length of 1.286 km will be provisioned, where the excavation depth for laying sewer pipes is more than 5 m
- Construction of diversion structure and regulating intake structure across Phirke Khola at it's confluence with Bulaundi Khola. It will allow only pollution free water of the Khola during wet season due to dilution into Lake and divert dry season polluted water into trunk sewer through a lateral sewer. The lateral sewer will join trunk sewer near Shahid Chowk.
- Construction of junction box with gates at storm-water drain and a connecting pipe to trunk sewer. The gate will be regulated to allow only pollution free water of the drain into Lake in wet season and polluted water during dry season will be diverted to the trunk sewer.
- Construction of cascade type structure (110 meter in length) at disposal location to treat the sewage through oxidation and disposed into Phusre Khola.

The life span of the sewerage system is over 25 years and it's design discharge is for the year 2027, which is 0.85 m^3/sec including ground water intrusion and industrial disposal.

Upon the completion of the sewerage system, 90 % of the pollution load contributed from the urban area in to the Lake will be removed, which is 3570 kg/day of BOD_5. Such high rate of reduction of pollution load in to the Lake by diversion sewer will drastically improve the quality of water environment. The same has also been proven by simulation study (refer **Annex 1** and **Chapter 2** of **Part II** of this Report).

The quantitative evaluations of various alternatives has suggested cut and fill alternative to be the most viable among the identified alternatives in terms of initial investment and subsequent operation and maintenance cost. Besides, load removal ratio is same as the sewerage system with tunnel alternative. However, the difficulties in construction in city area and associated risks such as slumping

of bank during the deep excavation for laying sewer pipe makes this alternative with high risk factor. It is thus, the sewerage system with tunnel alternative has been identified as most suitable one.

8.5 ENVIRONMENTAL EVALUATION

The environmental investigation during the Study indicates that the overall project appears to be well planned to achieve maximum benefits by improving the water quality of Phewa Lake. The improved water quality will increase benefits from tourism related and other income generation activities, which will enhance the socio-economic status and quality of life of the people living in the Study Area. Based on the findings of the Study, the sewerage system with tunnel alternative has been judged as environmentally feasible, with impacts that can be mitigated.

The assessment results can be summarized as follows:

- The proposed project as a whole has positive environmental impacts and enhance the physical, biological and socio-economic environmental situation of the Lake and its watershed area
- Construction activities for sewerage system may disturb to the people living near the construction site. Such impacts can be mitigated by applying careful construction methods and proper management of construction activities
- During the construction period, the business along the Lakeside area may be affected. This can be mitigated by applying suitable construction methods to complete the work in shortest possible time
- Connection of wastewater to public sewerage system will significantly improve the water quality of Phewa Lake
- The beneficial impact of the project outweigh the adverse impact which are of negligible nature
- Current environmental investigation is an initial one. A full scale Environmental Impact Assessment in accordance with the prevailing Environmental Protection Regulation (EPR), 1997 (first amendment 1999) is recommended before detail design

8.6 OVERALL EVALUATION

The proposed sewerage system project with tunnel alternative is feasible in terms of technical, economic and environmental aspects. The proposed project will reduce more than 90 percent of pollution load. It is also economically viable as economical analysis indicates that the EIRR of the proposed project is 3% and B/C ratio 0.6 (at 7% discount rate).

In conclusion, the proposed project is found to be technically, economically and environmentally feasible for implementation.

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CHAPTER 9

CONCLUSION AND RECOMMENDATION

The Development Study on Environmental Conservation of Phewa Lake in Pokhara, Nepal

CHAPTER 9
CONCLUSION AND RECOMMENDATION

9.1 CONCLUSION

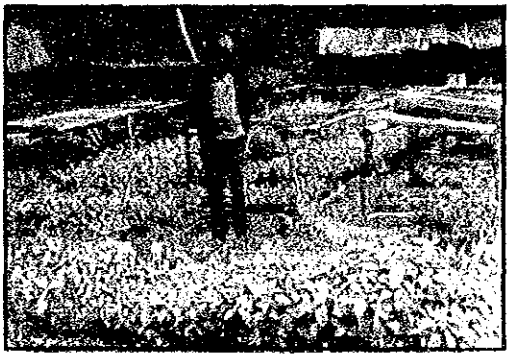
Considering the various factors attributed to degrade the water quality of Phewa Lake, disposal of untreated urban sewage has been identified as most severe one. The Study also indicates that the urban sewage management could greatly enhance the water quality of the Lake by decreasing the pollution load in it by more than 90 %. The finding of the Study can be concluded as follows:

- Construction of diversion sewerage system along the eastern Lakeshore with tunnel alternative, and disposal of sewage beyond the Lake into Phusre Khola after oxidation through a cascade structure is most suitable alternative,
- Household wastewater and sewage, and highly polluted dry season discharge of streams such as Phirke Khola, Seti Canal and storm-water drain needs to be diverted away from the Lake into the trunk sewer. The discharge of these streams should be allowed to flow in to the Lake only when the pollution level in them is within acceptable limit due to dilution during the wet season,
- The total cost of the project for construction is NRs. 486 million,
- The proposed project is financially feasible with 3% EIRR, and B/C ratio 0.6 with discount rate of 7%,
- The project is technically feasible, which has 90 % pollution load reduction capability from the lake water,
- Although the project is feasible in terms of financial, technical and environmental aspect, the amount required for the investment is relatively high and local institutions such as District Development Committee and Pokhara Sub-metropolis cannot afford to manage such a huge amount from their internal resources. The external funding thus needs to be explored from HMGN level. In this context, Ministry of Population and Environment and Ministry of Local Development should take the initiative.
- To make the operation and maintenance of the system sustainable, the required cost can be generated locally by charging the users against the services rendered.

9.2 RECOMMENDATION

- The proposed sewerage system should be implemented immediately with the initiation of detail design,
- Ministry of Population and Environment and Ministry of Local Development of His Majesty's Government of Nepal should take initiative to explore the resources from external funding,
- Local institutions such as District Development Committee and Pokhara Sub-metropolis shall be made involved through the proposed Phewa Lake Environment Conservation Committee during the course of project implementation,

- Suitable tariff shall be levied to the users of the sewerage system to generate operation and maintenance fund together with possible capital recovery,
- A full scale EIA shall be conducted along with the detail design of the system so that the mitigation measures can be incorporated in it,
- A software program with environmental awareness and education shall be implemented together with the sewerage system project so that people will stop discharging their household wastewater and sewage into natural streams and open urban drains. People will be encouraged to connect their household sewage and wastewater into the proposed sewerage system.



PART - III

FEASIBILITY STUDY FOR COMMUNITY EMPOWERMENT PROGRAMME FOR PHEWA LAKE CONSERVATION

CONTENTS

CHAPTER 1

EXISTING CONDITIONS

The Development Study on Environmental Conservation of Phewa Lake in Pokhara, Nepal

CHAPTER 1
EXISTING CONDITIONS

1.1 STUDY AREA AND ITS SOCIO-ECONOMIC CONDITION

The rural watershed of Phewa Lake include 6 VDCs namely Sarangkot, Kaskikot, Dhikurpokhari, Bhadaure Tamagim Chapakot and Pumdi Bhumdi. However, only Sarangkot, Kaskikot and Dhikurpokhari are included in the Study Area and were primarily studied. Other 3 VDCs were being studied by collecting the secondary information and data. The six VDCs includes 7,645 households with total population of 44,131. The urban portion of Study Area include ward 1 – 9 and 17.

The population density accounts for 258 persons per km^2. The density accounted for agriculture and forest land is respectively 912 and 586 persons per km^2. The average population growth rate in Kaski District is 3.84 %, a high rate of growth compared to that of other hill districts in Nepal.

The area has been ethnically mixed. The Brahmin and Chhetri caste groups is the dominant segment of the population, followed by occupational castes, Gurung, and others.

The predominant occupation is agriculture, followed by service, small business activities, and both agricultural and construction labor. The local economy is characterized by increasing population, worsening land-man ratio, largely subsistence agriculture followed by mounting compulsion for supplemental source of income and employment. The majority of the households are unable to meet their food requirements for most of the part of year from their own production. More than 70% are suffering from food deficit for more than 9 months. Despite potentiality for income generation activities, lack of infrastructure and support services and lack of community empowerment and awareness generating efforts has stood to be the major obstacle.

The average family size in urban area, as to the national census in 1991 was 5.47. However, 2001 census has reported it at 4.05 in urban area and 4.75 in rural area 4.75. In 1991 the population growth rate was 5.5%.

The level of literacy is low among the socio-economically backward groups in the Study Area. Female literacy is low relative to the male.

1.2 EXISTING NATURAL AND ENVIRONMENTAL CONDITIONS

The natural and environmental conditions of Phewa Lake have been deteriorating. It is presented in detail in the Chapters of Part I of this Report.

1.3 COMMUNITY EMPOWERMENT METHODS / SYSTEM

The Study has identified Community empowerment as a process to achieve the community development and ultimately the Phewa Lake conservation. A number of community development and empowerment activities were reviewed during the field study. Some of the findings are listed below:

- There is lack of efficiency, predictability, transparency, and accountability in development institutions involved in community empowerment program.
- Most of the program were welfare-oriented with the target groups as passive beneficiaries.

- The focus group participants in the field study reported that the community development approach, which considered the whole community as the target group has not made a significant impact on the poorest of the poor.
- The participation of the target people varied according to the nature of the program components implemented.
- The propensity of implementers to get participation and the potential of the target group to participate were also determining factors.
- Most of the community development program were implemented without adequate participatory planning and with inadequate monitoring, follow-up and support systems.

The participant local communities during in the field study provided a number of suggestions and feedback. The following methodological recommendations are based on these field findings:

- Effective institutions should be built for implementing community empowerment programme.
- The program should use specific target-oriented approach focusing directly on disadvantaged groups. The approach requires a process of empowerment, consciousness-raising, leadership development and management skills.
- It is essential for the process of developing relevant skills, knowledge, attitude among the members of the community to be initiated by the community itself.
- The ability and competencies of the community leaders or development workers is of specific importance to involve the community in:
  - identifying the issues and needs
  - prioritizing the needs
  - establishing the goal and specific objectives
  - generating alternative strategies and planning to address them
  - tracking down the most appropriate strategy and planning, and
  - evolving the projects to implement the strategy and plan
- Once the implementation of the planned program has commenced, it needs to be coordinated and monitored, and evaluated constantly.

CONTENTS

CHAPTER 2

REVIEW OF EXISTING PROGRAMS

CHAPTER 2
REVIEW OF EXISTING PROGRAMS

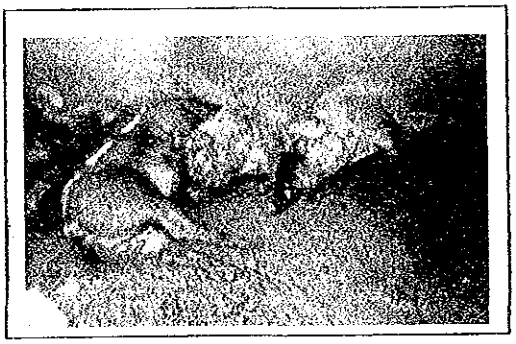
2.1 GENERAL

The Study identified three major components integrated into sustainable community empowerment and development: 1. Environmental Conservation, 2. Economic Development and 3. Social / Community Development. This review attempts to highlight the remarkable achievements, shortcomings and future outlooks on the identified components at Study Area.

2.2 EXISTING PROGRAMS

The following are the major existing programs in the Study Area.

2.2.1 Community Development



- A number of community development programs in the Study Area have been noted where the community development approach has provided a high level of participation for the members of the community in all aspects pertinent to development process. An example from Maula, Kaskikot VDC is encouraging. The community members of Maula village became so motivated after assessing the situation by themselves on the harms caused by pigs on environment and health that almost all community members replaced the profitable pig farming with less profitable hand spinning wheel (Charkha) for the sake of conservation of environment and health improvement. There are other examples, which can be utilized in planning appreciative promotion of community development efforts.
- In Pokhara Sub-metropolis (PSM), the number of women groups and community-based groups have been formed for local environmental education & improvement. These are listed in following **Table III-2.1**.

Table: III-2.1: CBOs & Women Groups Taking Volunteer Responsibility

Ward	No. Tole	Ward Environment Committee Members	Volunteer CBOs/TECs	Volunteer NGOs	Volunteer Women Groups	Active Volunteer Local Organizations
1	28	23	20	4	7	31
2	13	17	7	1	4	16
3	9	11	6	2	4	12
4	8	17	9	2	4	15
5	11	9	5	3	9	16
6	14	21	12	3	2	17
7	9	9	2	1	4	8
8	18	9	12	3	18	33
9	21	13	7	3	4	14
17	19	17	9	2	6	17
Total	**150**	**146**	**89**	**24**	**62**	**179**

- The existing Community Development Programs in the Study Area are listed in following **Table III-2.2.**

The ADB-funded Environment Education Program of PSMC has initiated mobilization of these community groups and women groups. These groups have already actively supported the public awareness campaigns. They were involved in planning the campaigns and in actively implementing and adopting the message into action at the household and community levels.

2.2.2 Income Generation Initiatives

A number of income generating activities in Phewa watershed areas have been noted, some with successful examples and others with lesser levels of success. Some of the income generation activities/processes, feedback of the present process, and feasibility for future intervention are listed below in **Table III-2.2.**

Table III-2.2: Review of Existing Community Development Programs

Program	Current Practice	Activities/Process	Feedback	Feasibility
1.Horticulture	Production for self consumption. Left over are for selling.	▪ Optimum uses of traditional technology ▪ Also partially applying modern technique as advised by technician. ▪ **SEDA, a local NGO** is helping in Shera, Dhikurpokhari VDC. ▪ Chaur for vegetable production.	• Little income • Lack of technical knowledge • Difficulty for irrigation • Those vegetables which requires less water for their production are grown in places where there is less water available and those requiring more water are grown in fields where water is abundant.	▪ Fields remain idle during winter season ▪ Lots of leisure time ▪ Help available from local Agriculture Dev. Center of HMGN ▪ Closer market place (Pokhara) ▪ Various NGO's active in the area with their expert technical help. ▪ HMGN has adopted a policy of investing Rs. 75,000.00 and IDE has adopted a policy in aiding in drop irrigation in the areas covered under Pocket Packaging Program. • No problem for market for oranges even when produced in mass scale. • Comparatively higher price for orange in Pokhara than other parts of the country. • Quite effective in soil conservation.
	• Orange (Tangerine) farming is carried on in area facing towards Himalaya at southern part of Phewa Lake. • Feeble horticulture in other areas.	• Commercially successful orange farming is on in the area facing towards Himalaya at southern part of Phewa Lake in Pumdi Bhumdi, Chapkot and in Bhadaure Tamagi VDCs. • In some other places, oranges, mangoes and lychees are planted.	• After 1 – 2 harvest, orange tree gets diseases killing the tree. • The plant is often destroyed due to hailstorm. • Orange yields good crops in fields facing north toward Himalaya than the fields facing south. • Other species of fruits, which are feasible on mountains, also give good yield. • Source of good income generation • Technical training is required.	

Program	Current Practice	Activities/Process	Feedback	Feasibility
2.Animal Husbandry	• Practice of possessing local breed of animals in large numbers. • Gradually attracted towards hybrid animals	• Social practices of leaving the cattle publicly for free grazing purpose. • An unsuccessful attempt was made to control the stray animals in the year 2000.	• Expensive transportation cost for milk marketing. • Indoor farming essentially requires hybrid weed. • Milk holiday causes loss to the producers. • Facility for immediate medical treatment of animal is required. • Required to produce large amount of milk • help to raise the living standard of farmers is needed • Social unity due to formation of group • Hybrid cows are more susceptible to diseases than hybrid buffaloes	▪ Milk is being collected through various co-operatives aided administratively, technically and financially by DDC, commercial banks and local district authority. ▪ Animal Health Office is assisting on hybrid weed production and hybrid animal farming. ▪ Success of hybrid weed production (Stylo, Reocenti, Jai, Berule, Amriso, Badhar, Dinanath etc.)
3.Fisheries	Fish farming in Phewa by constructing cage.	• Only Jalaharis (occupational fishermen caste) are engaged in fish farming in Phewa Lake. • Annually millions of fish fries are introduced in Phewa Lake.	• Market promotion is required. • During flood, fishes are swiped away as the gate of the dam is opened to drain extra water.	• Phewa area consists of large size of land and adequate water. • Production of fish from Phewa Lake is insufficient in meeting the market demand. • Fishes produced here are of high quality and can be exported by producing them including expensive Salmon fish in large quantity. • The fishes are expensive and more profitable than the fishes produced in Terai.
4.Manual Wheel Spinning	• In Maula with the help of local club and project from Germany.	Spinning of wool acquired from local merchants on wage basis. Measurement is made by weight.	• The income can rise if training for spinning and weaving is provided along with the increased investment • Wages rate is considerably low.	• As the place is situated at the tourist routes, it has potentially good market. • Local resource persons are available for providing training.
5. Rope and Belt Making	Currently only few elder people are involved in this job.	Mostly the people purchase them from market. The producer has no local marketing system.	• The materials are commonly used in the villages. Promotion of skill of making the materials will enable the villagers for enhanced income. • Jute farming has become out of practice.	• As people are willing to stop the practice of free grazing of their animal publicly, those items will be extensively used for tying the animals.
6. Household Goods	Different kinds of baskets	Extensively used in rural areas.	Materials are commonly used in rural areas. But there are limited	Good household and tourist item

Program	Current Practice	Activities/Process	Feedback	Feasibility
From Bamboo			market in urban area. Market promotion is required.	
7. Poultry Farming	▪ People residing closer (adjacent) to municipality are attracted toward hybrid poultry farming. ▪ Local breeds are raised for this purpose in rural areas.	• Commercial poultry farming is being carried out with the support of Women Development Section and Agriculture Development Bank. • Local breed in fewer number is farmed freely (not in captivity) almost in every villages.	▪ Chickens often died due to the lack of technical knowledge and know-how (disease, food and nutrition, lack of medicine). ▪ At least 500 chickens are required for commercial poultry farming. ▪ Farming of 200 chicken produces profit of Rs. 1000.00 a month ▪ High quality chicken and feed is required. Presently they are quite expensive. ▪ Difficult to compete with cheaper eggs imported from India. ▪ There is high demand for Nepali eggs. ▪ People have fear to go for poultry farming by taking loan because of high risk factors.	▪ High demand in Pokhara ▪ Comparatively higher price of eggs and chicken in Pokhara than other cities in the country. ▪ Agriculture Development Bank provides loan assistance. ▪ Hatchery and feed industries both provides technical advises.
8.Handl crafts	Great interest to undertake the business.	Lack of training and technical, management and marketing skills.	There is demand from tourist for local handicraft.	▪ Raw material available ▪ Being tourist destination ensures the market. ▪ People are interested. ▪ There is high demand for training.
9.Mush room Farming	Current practice in Kurmi Danda, Bhadaure Tamagi and test farming in Dhikur Pokhari.	• Production farming with the assistance of Li-Bird and Agriculture Development Office. • Sarangkot VDC has allocated budget in this fiscal year for trial production of mushroom.	• Due to the lack of technical knowledge, mushroom often did not germinate resulting in the rotting of straw and loss. • Quality training and seed is required. • Investment of about Rs. 30,000 provides the return of about Rs.50,000	• Climatic condition suitable. • Excellent market exists • Very good profit • Local raw materials (straw, mud and water)
10. Sewing, Knitting	Not trained on modern technique. Traditional sewing	Traditionally service caste people Damai, the occupational tailor caste, are mostly engaged in the job.	• Skill training on cutting and sewing and investment on modern machine to Damais are required.	• Get employment in own village. • Possibility of Commercial production of garments.

Program	Current Practice	Activities/Process	Feedback	Feasibility
	techniques used.		• Rural people go to Pokhara for better sewing of their clothe, • The skill helps in household saving even if involved in sewing only family clothes.	
11. Training on Foreign Employment	• Inadequate skill before leaving the country. • Going to other country without any kind of skill. • Going for other country by taking loan.	• Traditionally skilled people get high paid job in foreign countries. • Unskilled and uneducated people have to be satisfied with low paid hard works. • Local interest rate for loan is very high (Rs. 5 a month).	• Going foreign with good skill helps find job and higher income. • Those going with no skill is unable to earn even their initial travel and other expenses. • Lack of employment in the country.	▪ High demand for foreign employment for carpenter, mason, electrician, waiter, etc. ▪ Many people are already on foreign employment, ▪ People are willing to go with definite skill.
12. Enhancement of Traditionally In-herited Skill	Job performed through traditional technique and tools.	• Major traditional skills include goldsmiths making ornaments of gold and silver; blacksmiths making iron utilities; tailors sewing clothing; Sarki sewing shoes; etc..	• Tailors and Blacksmiths get approximately 15 to 20 kg of raw rice per house for their service in a year implying extreme unfair exploitation. • Traditional skill should be enhanced with modern skill to uplift their living standard. • Goldsmith has higher income. • More income can be earned, if goods are produced by using their own raw materials. • People need financial assistance for initial investments.	• Being tourist destination area, market for traditional skill is feasible. • There are also local demands for the traditional skills in both rural and urban areas.
13. Coffee Farming	Recent common farming practice.	• With the help of Agriculture Services Sub Center, coffee farming is carried out as commercial cash crop. • There is coffee collection center at Bamdi, Chapakot. • Good coffee farming observed in Kaskikot.	• Can be produced in damp land. • Crop can be harvested for many years with one time plantation. • High price is earned for little work. • Technical knowledge should be widely publicized. • Management of market is required.	▪ Possibility of good harvest. ▪ Atmosphere is appropriate. ▪ Agriculture field is not required for its farming. ▪ The farming can be carried out in bare and marginal lands. ▪ It helps in soil conservation.
14. Bee Farming	Very few people either as group or individual are engaged in this farming.	• Amrit Bee Farming Group in Sedi is engaged in this farming with the help of Agriculture Branch Office and Pokhara Chamber of Commerce and Industry • Rs. 1000 for purchase	• No toxic chemicals should be sprayed in and around a radius of 1 to 1.5 km. • Spare bee house has to be kept along all the time. • 16 – 25 kg of honey is produced a year. • There is no difference in	• Abundant flowering plants such as painyoo, rhododendron, mustard, and other species as feed for bees. • If planting various species for flowering during rainy, dry and winter seasons is carried out in local community forest; problem for grazing of bees

Program	Current Practice	Activities/Process	Feedback	Feasibility
		of bee house and Rs. 1200 for purchase of hive. • Group farming is done in Ward No. 1 and 2, Bhargi, Chapakot. • Bee farming on individual basis in Dhikurpokhari. • Sarangakot VDC has organized mass awareness and providing 25% financial aid on bee farming.	purchase price in market between subsidized and non-subsidized production. • In the months of Feb. and March, bees separate (1:4). If adequate attention is paid they get separated twice a year. • Bees have to be protected from wall-lizards, cob-webs, ants, sparrows, wax-butterflies, Khapate insects. • Careful and extensive examination of the bee house has to be made every week.	during those seasons will be overcome. Currently the problem is solved by feeding the bees with sweetened water.
15. Ginger, Turmeric, Cinnamon, and Amriso Farming	• Ginger and Turmeric is grown for household consumption only. • Amriso (broom weed) is being grown for distribution in various nurseries.	• Good harvest of ginger is observed in Dhikurpokhari. • Cinnamon farming was made in Thado Khola Community forest. • Commercial production of broom and plant through nursery in Dharapani, Dhikur Pokhari.	• Market problem for ginger • Unavailability of market for cinnamon. • Very good income from Amriso farming. Comparatively more income by making broom and then selling them. • Can be used as green feed (weed/grass) to the cattle. • Very useful and effective in soil conservation.	• If market promoted for ginger, turmeric and cinnamon, good income can be made. • The crops yield good harvest. • Can be produced in community forests.
16. Seed Production	• Very high demand for seeds but produced in only few localized areas.	• Commercial production is being carried out in Ward No. 7 & 8 of Bhadaure Tamagi, Kudmi Danda and Ward No. 4 of Harpan. • 10 to 12 members in a group planted seeds for 40 days in 28 ropanis of land. • Seed production program is also being carried out in Thapakot - 7, Ainseluchaur and Khorpakha.	• Excellent production. • Individual producer has earned upto 20 – 25 thousand rupees in a single season. • Required to provide timely technical knowledge and advises on seed production to the local farmers. • Agro-technician is required until local farmers acquire full knowledge on their fields. • Induction of pilot program on seed production is suggested for other different areas.	• Agriculture Services Center will work as negotiator with local businessmen for market management. • Can be produced in other places • Seed Promotion Project is providing required assistance. • Seeds with a rebate in price up to 20 – 40 % are distributed to the local farmers.
17. Reform in Traditional Agriculture Technique	• Practices of traditional agricultural techniques.	• Field used for paddy is used once a year for paddy only. Mostly farming is done only during rainy season. During winter season	• Un-optimized uses of land. • Due to use of chemical fertilizer, soil has become acidic. • Suitable crop has to be researched by conducting soil	• Introduction of On-the-Spot Training for farmers and pilot program for agriculture will possibly result in commercialization of agro sector. Farmers are interested

Program	Current Practice	Activities/Process	Feedback	Feasibility
		field remains idle. • High uses of chemical fertilizer than compost • ¾ of land of Phewa plain is toiled by tenants for 50% partnership in production.	test. • Suggestion for commercial farming. • Lack of proper attention of concerned authority of HMGN on disseminating agricultural technology. • Businessmen from outside the village own most of the lands. 50-50 production sharing system has resulted in reduction of production. • Liberty to free grazing for cattle, unscientific agricultural technique, difficulty in irrigation and 50 – 50 production sharing systems are *major constraints of agricultural* development.	for the commercialization of agro-products.
19. Herbs Farming	Herbs like Selu, SilTimur, Badimal, Parawanawet, Dhokro, Saur, Jamuna, Kemuna, Kammari, NagBeli, Dhairo, Tihare Flower are available.	• Around 7 – 8 trucks of Nagbeli are sold per year for the price of Rs. 2 per kg. • Currently ban on selling of Nagbeli. • Herbs are used for home remedy of various illnesses like cough, cold, backache, fever etc..	• Selling Nagbeli for a cheaper price led in ban. High quality materials are sold for low price. • More effective in domestic uses if used after knowing full potential and characteristic of each herb. • Reduces medical costs • Selling herbs can generate income. • Preservation is equally required along with collection.	• Refinery facility is required. • Helpful in rural income generation and soil conservation.

2.3 LESSONS LEARNED FROM PAST PROGRAMS

Lessons learned on the environmental conservation issues from the review of the past programs include the followings

- In the past programs for the environmental conservation of Phewa Lake, the rural communities were provided little incentives and motivation for their contribution. There was general feeling among the rural communities that why they should contribute more for Phewa conservation when urban people are major polluters and direct beneficiaries of the Lake.
- The program intervention initiated in small area works better than the wide intervention in the very beginning stage. The experiences of small intervention at pilot scale help and encourage the stakeholders to gradually expand the program area to cover the adjoining areas. The ADB-funded Public Environment Education Program of Pokhara Sub-Metropolis has successfully set this type of approach.
- It has been proved that the community rules and norms set by themselves with the provision of development of CBOs to manage and monitor them works efficiently, effectively and in a sustainable way.

Provided that the community groups come to an agreement on community environmental rules with the minimum 75 percent households, they have ***moral*** fears of the results of abusing the socially accepted norms and rules. The community members strictly follow the rules when set by them and not imposed upon them. ADB-funded Public Environment Education Program of Pokhara Sub-metropolis and Community Forestry of Department of Forest are the best examples.

- Community-based and locally-originated management practices are easily adopted by communities.
- Community forestry is successful.
- Few programs on community-oriented environmental health and hygiene improvements activities identified by the Study are very scattered and lack the concentrated behavioural approach. In some cases, only formality type of program is implemented. In other cases, where the *behavioural approach* is used, the environmental and health improvements in the community have been realised.
- Appropriate systems for solid waste and wastewater management were found inadequate in both rural and urban areas.

In rural area, no remarkable waste management programs have been noted. However in urban area, the ADB funded Public Environment Education and Staff Training Program of Pokhara Sub-Metropolis have the programs of solid waste management system development and public education and mobilization for the waste management. The evidences have indicated that some of the program approach and strategy were successful.

The sample survey in rural area gave the following result on sanitation facility as presented in **Table III-2.3** and **Table III-2.4.**

Table III-3.3: Sanitation Facilities in Rural Area

S.N	VDC	Place	Toilet Facility						Total Surveyed
			Permanent		Temporary		None		
			No	%	No	%	No	%	
1	Kaskikot	Pame	36	52.9	4	5.9	28	41.2	68
2	Kaskikot	Dandakhet	15	42.9	17	25	3	44	35
3	Kaskikot	Maula (Dalit Community)	0	0	35	58.3	25	41.7	60
4	Sarangkot	Khapaundi	4	26.7	2	13.3	9	60	15
5	Sarangkot	Fishermen (Jalari)	9	25.7	-	-	-	-	35
6	Dhikurpokhari	Bhakari Danda	16	14.3	96	85.7	0	0	112
		G. Total	**80**		**154**		**65**		**325**

Source: Field Study

Table III-2.4: Sanitation System in Households of Rural Study Area

Type	Rural											
	Bhadaure		Chapakot		Pumdi Bhumdi		Dhikurpokhari		Sarangkot		Kaskikot	
	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
Flus & Pub. Sewerage	-	-	40	6.7	7	0.6	13	1.2	-	-	3	0.3
Flush Pvt. Tank	133	20.3	80	13.5	350	29.7	150	14.2	43	4.1	80	8.4

Type	Rural											
	Bhadaure		Chapakot		Pumdi Bhumdi		Dhikurpokhari		Sarangkot		Kaskikot	
	HH	%	HH	%	HH	%	HH	%	HH	%	HH	%
Flus & Pub. Sewerage	-	-	40	6.7	7	0.6	13	1.2	-	-	3	0.3
Simple Toilet (Pit)	320	48.8	120	20.2	427	36.3	539	51.1	267	25.4	553	58.3
Public Toilet	-	-	-	-	-	-	3	0.3	-	-	3	0.3
Others	203	30.9	353	59.5	393	33.4	350	33.2	740	70.5	310	32.7
Total	**656**	**100**	**593**	**100**	**1,177**	**100**	**1,055**	**100**	**1,050**	**100**	**949**	**100**

Source: Kaski District Profile, 2000

2.4 EVALUATION

Following conclusions are drawn from the assessment of the community empowerment and development programs in the field:

- Weak social and economic infrastructures including health, education, drinking water, transport, energy, problems relating to land quality have led to inadequate access of poor households to the means for escaping poverty.
- The constraints have to be removed by developing a system of need identification, planning, programming and implementation from the bottom-up modality and not top-down.
- Access to the systems is important. Public should be involved in the system development. The group approach is preferable. The approach should be to formulate a workable poverty reduction strategy on the basis of the results of the poverty situation analysis.
- There are many local resources and programs, which have not yet been identified and or utilized for the local benefits, should be optimally used.

CONTENTS

CHAPTER 3

PLANNING BASIS

The Development Study on Environmental Conservation of Phewa Lake in Pokhara, Nepal

CHAPTER 3
PLANNING BASIS

3.1 TARGET INHABITANTS

The target inhabitants of community empowerment program include the local people living under the **income poverty** and **human poverty**. The income poverty has been defined in terms of inadequate consumption or income. The communities with livelihood problems, without basic needs required for living, and inadequate income for daily meals of family members and compelled to endure the lives of hunger and malnutrition are defined as the income poor and disadvantaged communities. The Nepal Living Standard Survey in 1996/97 and the Ninth Five Years Plan of Nepal has estimated the head-count index of poverty at 42 percent at the national level.

Table III-3.1: Percentage of Population Below the Poverty Line

S.N.	Location	Income Poverty*			Human Poverty**
		Total	Poor	Destitute	
1.	Urban	23	13.2	9.8	23.9
2.	Rural	44	26.4	17.6	41.4
3.	National Average	42	24.9	17.1	-

Source: *Ninth Five Years Plan, **National Human Development Report, 2001

However, the Ninth Plan Mid-term Review 2001 estimates the head-count index of poverty at 38.1 percent and the national human development report 2001 estimates the incidence of poverty at 37.7 percent.

This Study has also carried out a sample well-being ranking exercise of local inhabitants in rural Pame, Kaskikot VDC through participatory community exercise to identify the poverty status at the project site. However, for the purpose of quantitatively estimating the target inhabitants for Community Empowerment Program, the national poverty data is taken as basis.

The first major target inhabitants of the community empowerment program will be the people under the income poverty to be followed by the human poverty. The human poverty encompasses the lack of capabilities, inability to participate in decision making, and inability to participate in the life of communities.

The national human development report, 2001, estimates Human Poverty Index (HPI) for Nepal at 39.2. Human poverty in rural area is 41.4 and urban area 23.9. Human Poverty in urban area is 23.9 and in rural area 41.4.

Table III-3.2: Target Inhabitants of Community Empowerment Program (CEP) and Environmental Education Program (EEP)

Place	HH*	Popn.*	Family Size*	Income Poverty**				Human Poverty**		Target Inhabitants	
				Destitute*	Poor	Total	HH	Popn.*.	HH		
Dhikurpokhari	1,702	8,097	4.75	1,425	2,138	3,563	750	3,352	705	6,915	1,455
Kaskikot	1,522	6,597	4.33	1,161	1,742	2,903	670	2,731	630	5,634	1,300
Sarangkot	1,433	6,631	4.62	1,167	1,750	2,917	631	2,745	594	5,662	1,225
Chapakot	641	3,252	5.07	572	858	1,430	282	1,346	265	2,776	547
Pumdibhumdi	1,590	7,901	4.46	1,390	2,085	3,475	779	3,271	733	6,746	1,512

Place	HH*	Popn.*	Family Size	Income Poverty**				Human Poverty**		Target Inhabitants	
				Destitute	Poor	Total	HH	Popn.*	HH		
Bhadaure	766	3,999	5.20	704	1,056	1,760	338	1,655	318	3,415	656
Rural Total	**7,654**	**44,131**	**4.74**	**6,419**	**9,629**	**16,048**	**3,450**	**15,100**	**3,185**	**31,148**	**6,635**
EEP Urban Target	8,368	46,029	4.05	4,510 (9.81)	6,076 (13.2%)	10586	1925	-	-	-	-
CEP Urban Target: Ward 6		**7,446**	**4.05**								

*Source: *National Census, 2001 **Estimated*

The target inhabitants will also include the community groups to be targeted depending on the nature of the programs. Communities' participatory well-being ranking exercise will help identify the actual target group.

CEP Target Area Inhabitants: The urban inhabitants targeted for community empowerment program include the Ward 6 population under the poverty group and immediate population under the poverty group along the Seti Canal and Phirke Khola. Other urban catchment areas including Ward 2 – 5, 7 – 9 and Ward 17 of PSMC are proposed not required to be included as CEP target inhabitants as the community development in these wards have little influence over the Phewa conservation. They are proposed to be included as major target inhabitants of EEP.

The rural inhabitants, proposed to be targeted include the inhabitants in all 6 VDCs of the watershed of Phewa and its catchment areas. The empowerment and development of these communities is important for enabling them to contribute to the environmental conservation and improvements of Phewa Lake.

The total estimated number of target populations and households under the poverty categories in urban and rural catchment communities for community empowerment program therefore will be 41,540 from 5,375 households.

EEP Target Area Inhabitants: EEP is proposed to be included as a very important component of CEP. The proposed target area inhabitants of EEP include all urban catchment wards from 1 to 9 and 17 and all 6 watershed area VDCs. Only Ward 6 inhabitants are proposed to target for CEP in urban area.

3.2 POPULATION TO BE SERVED

Although the community empowerment program would specifically target the poor communities, the served population will be overall population of the Phewa Lake watershed and catchment areas as presented in **Table III-3.3** as all population will get either direct or indirect benefits out of the Phewa conservation and community development initiatives.

Table III-3.3: Targeted Population of Community Empowerment Program

VDC/Municipality	Female	Male	Population	Household	Hhld Size
PSMC	76,795	82,309	159,104	39,260	4.05
PSMC Phewa Catchment Wards	38,394	41,154	79,552	19,630	4.05
PSMC Ward 6			7,446		
Sarangkot	3,455	3,176	6,631	1,433	4.62
Kaskikot	3,390	3,207	6597	1,522	4.33
Dhikurpokhari	4,352	3,745	8,097	1,702	4.75
Chapakot	1,792	1,460	3,252	641	5.07
Bhadaure Tamangi	2.055	1,934	3,989	766	5.20
Pumdi Bhumdi	4,130	3,771	7,901	1,590	4.97

Source: National Census, 2001

In urban community, the community empowerment program will target the people under the poverty line around the immediate Phewa Lake catchment areas including Ward 6 and embankment of Phirke and Bulaundi Kholas and Seti Canal, who are contributing directly towards pollution of Phewa.

CONTENTS

CHAPTER 4

COMMUNITY EMPOWERMENT TOOLS AND SOCIAL CAPITAL

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4.1 EXISTING SITUATION

The community empowerment implies enabling people to understand the reality of their environment, reflect on the factors shaping the environment, and take steps to effect changes to improve the situation. It is a process that assists people to:

- self-assess on where they are now
- realize where they want to go
- develop and implement plans to reach the goals

Most of the existing community empowerment programs in the Study Area are still found to be using the approach of top-down modality in need identification, planning, programming and implementation. The existing social tools and capitals were found very little recognized and utilized. In some cases, they have been utilized on ad-hoc basis. However, this Study has adequately surveyed the existing potential social capital at the Study Area that can be effectively utilized for carrying out the proposed CEP.

4.2 NECESSARY TOOLS AND SOCIAL CAPITAL FOR COMMUNITY EMPOWERMENT

Social capital among the rural and urban population of Study Area is the trust, reciprocity and mutuality that link the multi caste ethnic, multicultural, multi-religious and multilingual communities. To the process of community empowerment, necessary tool and social capital in the Phewa watershed area, which can be utilized, include the following:

- **Motivated People**: There are more than estimated 10% of people who are aware of the environmental situation and want to do something, but not being able to do because of lack of understanding and methods of being involved and contribution to be made. Almost everybody met during the field study said that they want to get involved in Phewa conservation, but not being involved and not being able to involve effectively in it. The use of process-oriented approach is appropriate tool of involving such motivated group of people.
- **Societal Institutions**: If the community is to be empowered, it will be community initiative and productive activity on the part of the community themselves. Societal institutions can allow the people to achieve empowerment and efficient and sustainable functioning of empowerment. In most cases in Phewa Lake watershed area, such institutions are yet to emerge. This has prevented the potential gains from the considerable past advances achieved thus far in empowerment from being realized. Institutions have to be in place and to be working effectively for the particular goal of Phewa conservation to be achieved. In some cases, they are already existing

but not being properly and purposefully mobilized. Awareness building and capacity building will help them towards the mainstream of environmental improvement activities.

- Awareness building and capacity building activities will help take them to the mainstream of the environmental improvement activities.

The rural *marginal* people and urban *slum* inhabitants, who own a small plot of land or have no clear title to their land have problem to provide collateral asset and obtain credit at an interest rate low enough to permit expansion in household income via commercial activity or intensification of production activities. Societal institutions, which can replace collateral, are therefore necessary for community empowerment program.

- **Community Partnership:** Community partnership enables environment necessary for community empowerment. There are tools of stimulating community partnership. Awareness and societal institutions must certainly be part of this.
- **Feeling of Ownership and Level of Motivation:** Provided that the community development approach is appropriately used, the feeling of ownership of the program and motivation level could grow with effective and sustainable participation in its operation and maintenance. Community forestry is good example in which community management is strong.
- **Gender Sensitivity:** Women's empowered involvement has proved to be effective in environmental improvements and community development. A large number of women groups exist in both the rural and urban communities in the project sites.

Table III-4.1: No. of Women Groups Identified in Urban Phewa Catchments Areas

Urban Ward (PSMC)	No. of Toles	No. of Women CBOs
1	28	7
2	13	4
3	9	3
4	18	6
5	11	9
6	14	2
7	14	2
8	18	17
9	21	3
17	19	4
Total	165	57

In rural areas, there are adequate number of women groups, women's saving groups, and women's user groups. They require to be profiled. The gender sensitivity program will enhance the participation of women equally with the male involvement as part of gender mainstreaming in all Phewa Lake Conservation and local environmental improvement works.

- **Commitment of Participation:** The community groups consulted during the field study have reported on realizing the importance of participation and contribution in the environmental improvement efforts. Rather than using surface level participation approach, commitment-oriented participation has proved to be effective in promoting the participation in environmental improvements initiatives. ADB funded environmental education has successfully used similar approach in waste management and sanitation facility improvements at pilot scale. Social tools of achieving the commitment of target people in local environmental improvements are available and functioning in certain parts of the Study Area.

- **Social Norms and Values**: The folk tradition, religious customs, values and norms and cultural occasion are the deep social tools and social capital which can play important role in environmental conservation initiatives, provided that they are meaningfully explored and utilized appropriately. It has been observed that all the community members strictly follow the norms if set by the community members itself.

- **Harmonized Community Compositions**: There exist the systems of labor exchange among the farmers. Religious tolerance and trust with mutual reciprocity in fare and festivals and family relationships are the basic social capital. The social co-operation in rural areas is bound by family relationships. There are various institutional dimension, transactions, market and contracts among different communities. They, for example, are users groups, fare and festivals etc. The religion and the '*Parma* (labor exchange) institutions' have been bound with the various groups in communities. These social tools and social capital have traditionally kept solidarity among the settlers.

  Urban people are based upon system of secondary, impersonal and highly formalized relationships, while rural people are bound on personal intimate and informal relationship. In both the various rural and urban Study Area, local political and social institutions exists and found playing important role in resolving conflicts. In general, there is a tremendous feeling of tolerance among the diverse people which itself can foster community empowerment.

  The rural and urban ties of individual exist. In many cases, rural people are dependent on urban commodities i.e. cosmetics and in other cases, urban people on rural commodities mainly the food items. There is common understanding of the need of rural urban harmony for mutual development. The Phewa Lake conservation initiative can function as a common tool for harmony among rural and urban community for environmental conservation of the Lake and its watershed areas.