CHAPTER- ONE

INTRODUCTION

1.1 Background

Nepal is a small and land locked country occupying the mountainous region of the southern himalayas. "It is located between 80^0 22' E and 88^0 12' E longitudes and 26^0 20N and 30^0 27' N latitudes, with a total land area of 1,47,181$km^{2"}$. It covers 900 km from east to west and 240 km from north to south. Elevations range from 60 masl at its lowest point, to 8,848 masl, the world's highest point, Mount Everest. More than 19 million people of different ethnic origins live in Nepal. According to 2001 census, the total population of Nepal is 23,151,423.

The environment includes the complex of physical, chemical and biological factors surrounding an organism or ecological community. Such factors act and interact with various species of organism i.e. a pollutant with respect to certain species. The separate definition of pollution and contamination often becomes difficult. These terms are difficult to define, specially in relation to so complex an organism as man. The simple fact that man or any other organisms life gives rise to environmental pollution by the release and buildup of metabolic excretion products unless such materials are utilized by the other organism to balance the ecology. Moreover, in the converting energy and matter into usable products man is frequently inefficient, wasteful and inconsiderate, thus giving rise to contamination of industrial origin. The modern problems of environmental pollution, then are essentially those rapid human population growth and expanding technology. (Encyclopedia Britanica; 1989:181). If man is aware, considerate and careful in such matter, environmental pollution can be reduced to very insignificant level.

Nepal is rich in the biological diversity due to its spectacular topography and central geographic location. Nepal began development planning in the early 60s, and Infrastructural development is still continuing. As a result, roads now link many interior remote area. This has enhanced new forms of

development activities such as tourism, in these areas. Stainton (1972) described 35 broad forest types found in Nepal distributed mainly according to altitude and orientation in the mountainous regions, and by soil type and moisture in the lowlands. One hundred and seventy-five species of wild mammals, 850 species of birds (Shrestha and Gupta 1993), 63 species of reptile (Majupuria, 1982), 20 species of amphibians (Malla, 1982), and 170 species of fish (Shrestha and Gupta, 1993) have been recorded in Nepal. These are more than 10,000 species of plants of which only 5,400 species have been identified (Upreti, 1985; Shrestha and Gupta 1993).

Pokhara valley is one of the most scenic places in the country. It lies in the Western Development Region of Nepal and famous for it's lakes: Phewa lake, Begnas lake, Rupa lake, Maidi lake, Khaste lake, Gunde lake, Deepang lake, and Kamal Pokhari. Among these eight lakes, the first three are important for their economic potential and biodiversity. Phewa lake is the second largest lake in Nepal after Rara lake in the Far Western Development Region (IUCN, 1997:2)

Pokhara is one of the most rapidly growing cities and also the second most visited tourist destination in Nepal. Its natural beauty and its spectacular views of the Annapurna range and Machhapuchhre peak (standing only 28km away) account for Pokhara's popularity as a tourist destination asides from its lakes. The growth of tourism in Pokhara and especially in the Phewa lakeside area of Ward No.6 of the Sub-metropolitan city has rapidly changed the life style of people and the environment. The increase in the number of hotels and lodges at the lakeside and changes in land use have affected the lake environment and its watershed .The once pristine areas surrounding the lake are gradually being subjected to the pressure of tourism activities incompatible with the fragile environment of the area and harmful to the ecology of the watershed. Concern for the environmental deterioration of the lake and its surrounding area especially due to the pressure of urbanization of the lake side and it's shore-line has been expressed time again and various studies have been undertaken regarding the management of the lake and it's watershed.

Environment Protection Study of Phewa lake 1993, prepared with the assistance of the Asian Development Bank is the most prominent of these studies. Despite these studies, however, the real issues of managing Phewa lake and its environment have not been practically addressed. There has been insufficient attention given to them at both the local and national levels.

Phewa lake is the biggest and most developed one of the Pokhara valley lakes. The shoreline of Phewa lake is becoming overcrowded by accelerated construction of the hotels and restaurants. Phewa, Begnas and Rupa lakes are important natural resources for the Pokhara valley. They contribute to the natural beauty of the valley and attract tourists from all over the world. Unregulated construction of houses and hotels and polluting discharge from the Seti Canal has degraded the water quality of Phewa lake, discouraging tourists from boating and swimming. A decrease in fish population occurred in 1994 due to the UES fish disease, suspected of being caused by water pollution. With the use of insecticides and chemical fertilizers for agriculture, there are appearing many problems in human health, environment, land productivity etc.

Pollution, in general, is an undesirable change in physical, chemical and biological characteristics of the air, water and land that may harmfully affect the human life, or that of desirable species, our industrial processes, living conditions and cultural assets (Odum, 1971). In particular, pollution is the addition to the environment of any substances or energy (e.g. heat, sound) at a rate that results in higher than natural concentration of that substance or energy form (Encyclopedia of Social Sciences; 1992:288).

1.2 Statement of the Problem

The technological innovations are the part of culture. Man is a culture building animal. He creates or originates new technology for the betterment of the life but sometimes it becomes a problem. The main source of livelihood used to be natural resources but now it has been changed into commercial goods. Excessive exploitation of the natural resources for the use of ever-increasing population is the main source of environmental pollution. In other words, the main root of the pollution lies not in the act of the nature itself but in

the act of careless development and use of natural resources by human beings in the name of making lie better.

The problems in the Phewa lake area relate basically to a rapid deterioration in the environment. Tourism facilities have been established in these areas, but serious environmental issues such as lake water pollution and solid waste disposal problems have emerged. The water pollution is increasing day by day, different kinds of grasses like "Water hycienth" are growing in the lake. Nowadays more than 22 different organizations or institutions are active to remove "Jal kumvi" from the lake, but they yet to succeed despite a huge budgetary investment.

The major sources of pollution are sewerage, disposal of solid wastes, washing clothes, run off from the farm land and sediments. The quality of lake water is contaminated, mainly from the direct discharge of sewerage, (Domestic, urban, and hotel/ restaurant) through, rain water sewers, Phirke Khola, and Seti canal. Domestic and other wastes have also been discharged directly into the lake especially from the hotels and restaurants. Mainly lake is polluted in Damside area, Hallan Chowk, Tal Barahi Temple and Pame side. Other causes of the lake's pollution are the wallowing of pigs and buffaloes and washing clothes by hotels, restaurants and local households. It is estimated that more than 100kg of soap and detergents are used daily while washing in the lake. Even the drinking water from natural springs and wells in the nearby area are found to be unfit for human consumption. The improper management and haphazard disposal of solid waste is a serious concern especially in the urban areas and around Phewa lake (Oli, 1997:20).

Pokhara is a developing city of the developing country, Nepal. Therefore, the pollution is also increasing in the city in several ways. Among many pollution problems like solid waste, sewerage, water, air noise, etc, the former three problems need the immediate as well as the long-term solution. First of all, the drainage system of the city should be planned scientifically. The lake and river must not be used to drop the sewerage. Immediate actions must be taken for the restriction of using these sensitive areas for throwing the garbage and sewerage of the city. The suggestions to initiate the garbage producing tax and the polluter tax are necessary, to implement in the Pokhara

city for the establishment of the environmental conservation fund from which the city can itself earn the self-sufficient fund for its sustainable development. The short as well as the long-term planning of the city can easily be fulfilled if such an environmental conservation fund is made. Cloth washing in the lake should be banned forever. If there is the break of rules, punishment should be given with high fines. Cloth washing stations should be made at several places at the seti canal after it is diverted from Khahare to the Pirke stream in order to flow it beyond the dam of Phewa lake (Lamichhane, 2000:120).

The constructions and operation of large number of hotels/ lodges are adding pollutants to the lake. The deforestation of the near by hills has led to the landslide. The debris from it has been sedimented in the lake. The lake is the common property of all but the boundary of this common property is not yet clearly demarcated. In all, the Phewa lake is witnessing a significant deterioration of its natural characteristics.

Thus to summarize, this study has mainly focused on searching the answers to these research questions:

1. What are the causes of pollution of the Phewa lake?
2. What is the religious and cultural importance of the Phewa lake?
3. What is the socio-economic importance of the Phewa Lake?
4. What is the attitude of people towards the importance of Phewa Lake?
5. Which activities of the people pollute Phewa Lake?
6. What are the methods to conserve Phewa Lake?
7. What can we do to control pollution of Phewa Lake?
8. What are the ways to control pollution?

1.3 Objectives of the Study

The general objective of the research is to find out the socio-cultural consequences of the Phewa lake water pollution. However, specific objectives of this study are

1. To explore the people's attitude towards the importance of Phewa lake.
2. To find out various causes of pollution in the Phewa lake.
3. To find out the ways and efforts of controlling pollution.

1.4 Definitions of the Terms

Anthropology of Natural Resource Management

A sub-field of anthropology dealing with the study of management of various natural resources in a culture or cross-culturally.

Consequences of Pollution

The negative impact on human ecology and people of Pokhara due to the Phewa's water pollution.

Human Ecology

A special study of sub-field of anthropology that deals with study of interrelationship between human beings and their environment.

1.5 Significance of the Study

Pokhara is one of the fastest growing cities in Nepal. Pokhara is not only the district headquarters but also the regional centre of the western region. It is also a major tourism centre of Nepal. Phewa lake is important natural resources for the Pokhara valley. It is the biggest of the lakes in Pokhara valley. It contributes to the natural beauty of the valley and attracts tourists from all over the world. But water pollution is one of the profounding problem of Phewa lake. This problem is increasing in its magnitude day by day. The shoreline of Phewa lake is becoming over crowded by accelerated construction of hotels and restaurants. Specially unregulated construction of houses and hotels and polluted discharge from the Seti River have degraded the water quality of Phewa lake. It also will help the reader to know the present situation of Phewa lake which is going to decreasing day by day.

Likewise, this study may be useful for the future researchers to get ideas about various facets of Phewa’s water pollution and it is also expected that the finding of this study will be useful to planners, policy makers and further researchers.

1.6 Limitations of the Study

As an academic, the study was undertaken limiting itself with in the walls of budgetary, temporal and spatial boundaries. Though it has studied the pollution of the Phewa lake and its effects on people and their culture. This is a case study of lakeside i.e. the section of the Phewa lake from Hallan Chowk to Fishtail Gate. In this connection, the findings and conclusion, drawn from this study many not be widely generalized. This study will be carried out exclusively in lakeside area, so it may not exactly be generalized in other area. This study is limited to the analysis of role of social practices of the inhabitants of the particular settlement on lake pollution and therefore, can not be taken as a report consisting of detailed chemical, physical, and biological analysis of the water.

1.7 Organization of the Study

The present research is divided into eight chapters, according to the nature of the study. It begins with the introduction and ends with the summary finding and conclusion. The first introductory chapter includes background of study, statement of the problem, the objective of the study, definitions of the terms, significance of the study, limitations of the study and conceptual framework. Relevant literature have been reviewed in chapter two, which deal with the theoretical overview and the review of related studies. The third chapter includes the methods adopted in this study and the fourth chapter presents the introduction to the study area.

Similarly, chapter five is about the people's attitude towards the Phewa lake and six chapter is about the pollution of Phewa lake and its causes chapter seven presents the ways and efforts of controlling pollution Likewise, the last or eight chapters includes the summary, findings and conclusion of the study. At last, schedule used in this study, list of key informants, pictures maps etc are presented.

CHAPTER -TWO

LITERATURE REVIEW

2.1 Theoretical Overview

2.1.1 Human Ecology

Human ecology is the study of relationship between humans and nature, which are intimately connected in a web of interactions. In the human ecology we see human as part of ecosystems not as actors having an effect on the environment 'Out there', but each one of us is a part of the environment.

Ecology is the study of biodiversity and it deals with the relationship and interactions of organisms with each other and with their environment. These interrelations become established as organisms respond in various ways to contact with one another and with the ever changing environment. Ecology is concerned about how these interactions determine the distribution of both plants and animals. An ecosystem is a network of energy and mineral flows in which populations of plants, animals and micro organisms perform different functions, which are complementary and integrate in a holistic way. The organisms may be assigned to three broad functions. The producers (Plants), the consumers (animals) and the reducers (micro organisms) which are essential to the operation of the biophysical processes. The plants are linked to photosynthesis and transpiration, where as animals and micro organisms consume, decompose and recycle both organic and inorganic materials. Ecology operates at the interface, where the carbon and hydrology cycles meet, and where water is the universal solvent that collects and transports minerals to growing plants and assists the process of decomposition indeed organic matter. It is also where heat is absorbed in bringing about a change of phase from liquid to vapour in the hydrological cycle.

Human ecology is the systematic application of ecological concepts, principles, theory and research methods to the study of human populations and communities. Human ecology examines the way in which human population and resource relationships affect the adaptation of human populations to desert

arctic, forested and other types of ecosystems. It also examines the role that the resource requirements needed to sustain a population play in determining local differences in subsistence, labor allocation, technology, reproductive behavior, residential distribution, household, composition and structure, community social and political organization inter population relationships and other social behaviors. Human ecology also examines contemporary ecological concerns that result from population growth and industrial development in light of the larger body of human ecological research. (Pradhan & Pradhan, 2006:13)

Human ecology is the science of relationship and interactions between people and their environment. In human ecology the environment is perceived as an ecosystem. As ecosystem is everything in a specified area the air, soil water living organism and physical structure, including everything built by humans. The living parts of an ecosystem microorganism, plants and animals. (including human) are its biological community (Marten, 2003).

Although human are a part of the ecosystem, it is useful to think of human environment inter-action as interaction between the human social system, everything about people their population and psychology and social organization that shape their behaviour. The social system is a central concept in human ecology because human activities that impact in ecosystem are strongly influenced by the society in which people live.

Generally, following approaches are believed as a significant in establishing human ecology as a distinctive discipline. Use another adverb if you can significant significantly, most of these approaches were developed by anthropologists (Upadhyay, 2003:148).

2.1.1.1 Environmental Determinism

It is believed that culture of a region is determined by the environment. Here the environment plays the prime role in the origin, structure formation, progress and change of a culture. As the role of environment is of prime importance, it is on driver's seaf, thus a prime mover. The supporters of environmental determinism believes that as environment originated at first

compared to the culture, its role is vital. It is a pivot around which a culture originates, develops and changes.

2.1.1.2 The Ecological Perspective

According to this concept, there occurs a constant interplay between nature and culture (Nurture). A relation of A = B, B = A exists between these. It gives high priestly to man and environment equation. According to this perspective, a power struggle continues between culture and nature. In some cases human culture exerts control on nature, where as in other cases nature controls human behaviour. Sometimes there occurs a perfect balance between these. In general, a relationship of "Give & Take" exists between nature and culture (Nurture).

2.1.1.3 Environmental Possibilism

According to this perspective cultures are not determined totally by the environment but there are certain component in environment, which helps in culture formation. The perspective of environmental determinant became weak in 20th century, which paved the way for environmental possibilism. Franz Boas, the father of American ethnology is regarded as the prominent supporter of environmental possibilism.

2..1.1.4 Actor Based Model

Actor based model holds the notion that the process of adaptation occurs not at group level but at individual level. Every creature will have to adapt with the environment for survival. According to actor based model the actors decision (verdict) is also vital for adaptation, which enables the actor to survive.

2.1.1.5 Ethno-Ecological Model

This model believes that local people know more about local environment. This approach is influenced by "Emic" approach.

2.1.1.6 Cultural Ecology

Some anthropologists are concerned mostly with the influence of environment on culture. In 1950's American anthropologist Julian Steward was one of the first to advocate the study of cultural ecology the analysis of the relationship between a culture and its environmental.

Cultural ecologists, such as Andrew P. Vayda and Roy Rappaport, wished to incorporate principles of biological ecology into the study of cultural ecology in order to make a single science of ecology.

Harris (1979) in his book "Cultural Materialism: the struggle for a science of culture". Cultural Materialism as conceived by Marvin Harris, is more apparently visible in his treatment of cultural determinism.

According to Rappaport (1970) "Everything of Human beings, his task and deed his working and thinking every thing depends upon his cultural beliefs and their consequences as well as in ecological events. It seems that Rappaport is a ritual 'operator'. He has done much work in the field of unquestioned ultimate truth of religious field of co-questioned ultimate truth of religions belief. He says "The unquestioned ultimate truth of religious belief, may have a major adaptive significance in human life."

According to Vayda (1968) "A crucial starting point is that it is not cultures that evolve. His most thoughts have come along with Rappaport and about culture they say-cultures, unlike human populations are not fed upon by predators, limited by food supplies, or debilated by disease."

According to Vayda (1996) biological ecology and its principles have their own place in the study of cultural ecology, and that there should be a science of ecology. He argues that the development of culture traits is affected by environment. Vayda's environmental features for study does carry or include other organism (eg. disease, microorganism) and also includes other human groups. American anthropologist Clifford Geertz (1968) applied this concept to explain the great demographic disparity that existed between Java and the outer Islands of Indonesia, another American anthropologist Marvin Harris (1966) used it to study about India's Sacred cattle (Ember & Ember, 2002).

2.1.2 Water Pollution

There have been many studies on pollution of Phewa lake. The majority of available literature is concisely reviewed in this chapter. The previous studies on water pollution were basically scientific elaborating the source and level of lake pollution. None of the studies touches the anthropological factors causing lake pollution, basically is a anthropological problem by its origin. The studies based on scientific approaches only vividly portary the present state of pollution but do not touch the grass-root of the problem, study has to be conducted on anthropological causes of the pollution and their remedy. This is the difference between the present study and the available literature on the lake pollution in lakeside.

Rapid and uncontrolled urban growth is one of the main causes of lake pollution. This type of growth causes overcrowding in cites and town, which along with the sewage and industrial waste disposal has polluted our water resources so much that rivers, streams and tap water are found to be containing polluted water. The quality of Phewa lake has been examined by several researchers.

The fact that pollution is a problem created by the human being itself is clearly explained in a report "A study on the environmental problems due to urbanization in some selected Nagar Panchayats of Nepal". The report states that the pollution problem is inspired by our increased number. To replace container made of clay wood, we have perfected the aluminum can, plastic bag, non of which decompose readily. In addition to an necessities and luxuries apew their waste products into the air, land and water at an ever increasing rate.

Clean protected and safe water is the basic need for healthy human beings. A safe water is one that do not harm the consumer even after the long period of time. Water is called safe when it is:

- free from pathogenic agents;
- free from harmful chemicals substance;
- pleasant to the taste; and
- usable for domestic purpose.

Water is said to be contaminated when it contains ineffective and parasitic agents, poisonous chemical substances, industrial and other wastes or sewage. The term polluted water is synonymous with contaminated water (Park and Park; 1989.358).

Human activity such as urbanization and industrialization itself is the major source of water pollution. The sources of pollution resulting from these are:

a. Sewage-Sewage is human and animal waste and is pollutant because it is carrier of harmful bacteria that can cause sickness or even death.
b. Industry and trade waste - It contains organic chemicals and toxic agents and therefore very harmful.
c. Agricultural pollutants pesticides and chemical fertilizers are washed away by the rain into the streams, rivers causing water pollution.
d. Physical pollutants- Heat, light and other radio-active substances also cause water pollution.

The water is polluted in other various ways, the most common are:

i. Sediment - Sediments, sometimes called soil, silt or mud is the greatest pollutant of water. Sediments are washed off by the rain from hill sides, road side ditches, gullies and city development area.
ii. Waste and feed lots- Manure, laden run off from a feed lot during a rain stream is a source of food to micro-organisms and will cause the depletion of dissolved oxygen in water.
iii. Chemicals - Chemicals are spread or sprayed on plants or an soil to kill insects, plant disease, weeds and weed-seed. A big, rain washes these chemicals along with the soil into rivers.
iv. Plain junk- Dumping of garbage, tins, cans, bottles and thousands of other kind of worn-out articles into streams, lakes and river pollute them.

The effect of water pollution may be categorized in the following six headings. (Dix; 1981:168)

a. Physical effect: suspended solid particles cause water turbidity resulting increase in water temperature and oily surface film restricting re-oxygenation of water.
b. Oxidation effect- oxidation is caused by a range of substance which significantly reduces the content of the dissolved oxygen.
c. Toxic chemical effect-This effect is caused by a range of substances and produce immediate or cumulative physical changes in plants, animals and human.
d. Chemical nutrient effect- This effect is the result of high concentration of nitraters and phosphates.
e. Pathogenic effect: It is caused by micro-organisms where bacteria and viruses are present in sufficient number to cause a healthy hazard.
f. Radionuclide effects- This effect is caused by the accumulation of radioactive substances in the food organism that produce change in human body.

2.1.3 Concept of Common Property

All common property resources share two important characteristics. First, exclusion (or control of access) of uses to these resources is problematic secondly, each user is capable of subtracting from the welfare of other users. Hence, common- property resources are defined as a "class of resources for which exclusion is difficult and joint use involves subtract-ability." This definition follows the one developed by feeny and colleagues reported by Berkes et al. (1989) and is similar to the ones in Ostrom (1986).

The most popular authors are concerned mainly with water, fish, forests and pasture. All of these resources are renewable all but One (water) living. However, there are other resources which show characteristics of common property. Oakerson (1986) included public parks, highways, and oil pools among commons.

In this view resources which are not amenable to private appropriation are called common property. But contrary to traditional view, "Common

property in this sense does not mean that the resource owned collectively by a group; it means it is not owned by anyone. It is a free good, for example, marine resource of the United States as being "owned by no one and belonging to everyone." (cf. Berkes, 1989:7).

2.1.4 Concept of Natural Resource in Human Ecology

Natural resource refers to any portion of the natural environmental such as atmosphere water, soil, forest, wildlife, land, minerals, and environmental assets. Though the resource are relative in that the same elements vary in importance from society to society. Natural resources are fundamental to life and are the basis of livelihood for human beings as well as animals.

Shiva (1997) viewed resource as "Those things which implied life, which rise gain, even if it has repeatedly been used and consumed." She also explained that natural resource becomes those parties of nature which were required as inputs for industrial production.

So this can be said that natural resource refers to all the natural gifts such as, atmosphere, water, soil, forest, wildlife. Land minerals and environmental assets. These are unpayable, unpunchable and most important basic necessities of human beings. Their importance is varied according to culture, people and geographical links. We can not simply explain the value of natural resource in or any cost is same everywhere.

2.2 Legal Framework for Lake and Watershed Management

There are a number of Acts, Policies and Regulation made in Nepal that address the issue of lake water pollution in various ways. Some of them have been reviewed here.

In accordance with the Water Source Act, 1992 "There are also certain an amolies regarding lake ownership as discussed in the preceding sections. Primarily, it is the Ministry of Water Resources that should have legal authority over the lake (cf. Oli, 1997:28).

In (1973), HMG adopted the Physical Development Plan of Pokhara, a plan consisting of a land use strategy which designated different areas, for different use and which established the frame work for the planned and orderly development of Pokhara (cf. Oli, 1997:29). The town plan implementation committee under the Town Plan Implementation Act (1972) was established to implement the land use plan. This plan designated the areas around Phewa lake as lakeside preservation area and Baidam was designated as a special conservation area (cf. Oli, 1997:29)

As per the Soil and Water Conservation Act (1982) any area with in the kingdom of Nepal can be included as protected watershed area if deems necessary for its protection. (cf. Oli, 1997:28)

The Water Resource Act (1992), and the Forest Act (IUCN 1993) have empowered the ministries with respect to ownership (1992:4) According to Department of Soil Conservation and Watershed management, HMG 1994, a great deal of natural soil erosion takes places in the Phewa lake watershed area because of its fragile geo-structure. Man made activities like agriculture and others have further increased soil erosion. In the watershed area, the rate of soil erosion was estimated to be 17. 37 cubic metres per hectre during (cf. Oli, 1997:20).

According to Phewa Lake Conservation Action Plan, (1997). Harpan Khola, with its large catchment and dynamic course during the heavy monsoons, causes havoc and accelerates land erosion and floods. Thus, Harpan Khola is called the "Sorrow of Phewa" not because it brings sorrow to farmers but because it is adding sedimentation to the Phewa lake every year at a tremendous rate, thus expanding agricultural fields (IUCN 1997:45)

2.3 Review of Previous Studies

Satterthwaite, (1997) has studied about pollution results from many substances, which are mainly created by the human activities . Many human activities are concentrated in the city owing to the urban expansion as a result of the population growth. The highest proportion of population in less

prosperous city obtains the effective drainage systems together with the lack of safe and sufficient water supplies and provision for sanitation and garbage collection (cf. Lamichhane, 2000:88)

According to the study of Feachem et al., (1980) The rural or the hilly settlers also deteriorate the environmental values of the lake by 15.15-79.40 percent by defecating at the riversides and in the open spaces. It is because their excrement also comes to the lake in the rainy seasons. The disease oriented pathogens and parasites that are found in four groups like viruses, bacteria protozoa and helminths have suffered the local population and the towards who come into contact with the lake water (cf. Lamichhane, 2000:89)

The first phase after the formation of the lake is termed as an oligotrophic state during which the lake is poor not only in the biological activities but also poor in the availability of nitrogen, phosphorus and calcium. Nevertheless, the content of oxygen is enough. The lake converts into the mestrophic state after the increase of the sediment, biological activities and the growth of phytoplankton as well as the amount of oxygen in the depth. Then it attains the state of eutrophication. In this state, the addition of natural and artificial nutrients to water bodies affects the water quality (Vollenweider, 1968) as there is the excessive growth of algae. Only the shortest supply of component will control its growth rate (Shu, 1982, Hecky,1988/cf. Lamichhane, 2000:91).

Rai (1955) in his study states that the lakes in Pokhara Valley were used by a wandering group of fisherman locally known as Jalahari, who eventually settled down in Pokhara valley along the lakesides. Presently, there are more than 60 fisherman families living around Begnas and Rupa lakes (Rai, 1955:15).

Lamichhane (2000) studied about the preservation of the lake and important for the development of tourism industry in Pokhara and even in Nepal.

Sharma (1996) in her thesis, "Water Pollution: A case study of Kathmandu Valley" found population growth as the major contributing factor

for water pollution in this area. Here, her study was focused mainly on the pollution of river rather than lake water pollution.

In his article "Human Encroachment of Phewa Lake and its Challenges" Parajuli (2062) writes about the increasing pollution of Phewa lake day by day by mixing of solid wastes on the lake (Parajuli, 2005:158)

Bhandari (2005) in his thesis, "The pollution of The Seti River in Pokhara, An Anthropological study" talks about the importance of the Seti River and impacts of its pollution. Here, his study has found the local people as the main agents who are responsible for polluting the Seti river. He used "Human Ecology" as the basic guideline for studying the Seti river as an important natural resources, its importance and pollution.

In his article, "Environmental Pollution and Awareness in Pokhara City", Parajuli (2000) writes about the increasing pollution of the Seti river due to haphazard dumping of solid wastes an its bank by Munical Authority and local people as well as due to disposal of sewage drainage and solid wastes into the river directly.

Sharma (2005) in his Thesis, "Socio-cultural impact of tourism on host community: A case of Pokhara and its Vicinity" discusses about the impacts on society and culture is complicated by the nature of more general social and cultural change.

Baral (2005) in his thesis, " Impacts of Conflict on Tourism Industry, A case study of Phewa Lakeside, Pokhara", asserts that about tourism industry is already back-warded at least one decade since the number of tourist visiting in Nepal. This study find out the cause and effect of problems, associated with the Phewa Lakeside of Pokhara.

RONAST (1988) explained that the Bagmati river andits tributaries maintain good chemical and biological quality until they enter the urban areas. The destruction of acquatic ecosystem at this point in the river is caused by untreated sewage of Kathmandu and Patan entering the river as well as untreated waste water discharges of industries. Industrial effluents are

discharged by various small and medium sized industries directly into the river or its major tributaries (Napit N.P. RONAST 1988:68-9).

Khatri (1986) carried out a study to examine the pollution parameters of both the Bagmati and the Vishnumati rivers in Kathmandu. Being a zoological study, he has focused more on finding the level of pollution of the two rivers bacteriologically as well as chemically. He has identified sewage and facess as the main pollutants of these two rivers. Thus, this study has not included much sociological and anthropological significance.

The publication "Environmental Pollution in Nepal' reviewed the studies mode in the past, particularly on water pollution problems in the Bagmati and its tributaries. It also covered the environmental pollution in Nepal regarding the air, water and noise as well. (NPC/IUCN.1991:67)

According to Oli (1995) "Pokhara Valley is suffering seriously from rapid development pressure. Due to heavy urbanization, the pollution level in its lakes, rivers and in the over all urban areas has increased. In order to reduce the environmental problems of the valley, the NCS Implementation Project has under preparation of guidelines and action plans. These policy instrument need to be applied for the sustainable environmental management of the valley. This wills argument the economic and environmental prosperity of the people and the whole valley. (NCS Nepal 1995:9 No 4)

Shrestha (2004) in his thesis "Conservation and management of Phewa lake ecosystem, Nepal". Talks about the current uses of conservation and management of a touristically important and environmentally degraded Phewa lake of Nepal from an integrated conservation and development perspective. In his study he highlights on salient environmental features and management strategies of this multiple use lake. The findings are based on a field level investigation, on need assessment and stakeholders analysis from multidisciplinary and participatory approach.

CHAPTER - THREE

RESEARCH METHODS

This chapter presents the research methods followed for this research study. The methods applied in the collection of different types of information has been mentioned and then method of presentation of analysis of acquired data have been incorporated.

3.1 Research Design

Research design is the plan, structure and strategy of the investigation conceived so as to obtain answer to research questioned and to control variable.

The present study has attempted to seek the various causes and sources of pollution and explain the findings. Anthropological approach has been adopted in this study. The study has tried to find out the pollution of Phewa lake in lakeside area. Thus both exploratory and descriptive type of research design were employed to gain the objectives. This study has also analyzed the attitude of people towards the Phewa lake and its cultural, symbolic and religious value.

The exploratory research design was used to understand various aspects of the problems or issues of this study while the descriptive research design has been used to describe the causes and effects of water pollution of the Phewa lake, and symbolic, religious and cultural significance of this lake and people's perception towards it. In this study any specific hypothesis was not formulated.

3.2 Rationale of Selection of the Study Site

Phewa lake, the second largest lake in the kingdom of Nepal, is the center of all attractions in Pokhara. On the whole, the study area of Phewa lake watershed covers about 122.53 km areas with its average geometrical length of 17 km and the width of 7 km. Phewa lake itself covers about 4.43 km^2 (443 ha) area with its 23.00 m maximum and 11.71m average or 10.05 m median depth. The length of lake is about 4 km and the width various from 100 m to 2 km. Phewa lake lies in the western part of Pokhara. The Phewa lake watershed area

covers about six village development committees (VDC) like Sarangkot, Kaskikot, Dhikurpokhari, Bhadauri-Tamagi, Chapakot and some portions of Pumdi-Bhumdi together with some administrative wards Pokhara Sub-Metropolis.

The pollution of this lake is becoming severe from lakeside area. We can see garbage, mostly plastics bags, paper bottles etc disposed indiscriminately in the lake shores. The quality of lake water is contaminated mainly from the direct discharge of sewerage (domestic, urban and hotel/restaurant) via drains, storm-water sewers, Phirke Khola and Seti Canal. The major sources of pollution are sewerage, disposal of solid wastes, washing clothes, run off from the farmland sediments, and Jal-kumvi.

For the purpose of this study, the section of the Phewa lake from Hallanchowk to Fishtail-gate has been selected as the study area.

3.3 Sampling Method

Sampling is a basic research skill in which whole the data of the study are dependent. A skillful method of sampling can provide more reliability and validity to the research finding. The population of the study included the households built within the distance of about 60 m to 300 m from the lake of research area. Out of 200 households from Hallanchowk to Fishtail-gate that are adjacent to the lake 100 households were included in the household survey. For this, after the formation of sampling frame, 50 percent of the households which equals to 100 were selected as respondents by following simple random sampling.

3.4 Nature and Source of Data

This research is based on household survey conducted in lakeside area of Kaski district. Both primary and secondary information have been employed in this study but primary data and information are extensively utilized . The primary data are of both qualitative and quantitative in nature. Some secondary data and information are also extracted from the different published sources as per the need. In the case of primary data, it was obtained through household

survey and interview method using structured interview schedule. Thus, the 100 respondents selected as sample and the key informant's were the sources of primary data. A few secondary data also have been collected from various published and unpublished sources as per the need of the study.

3.5 Primary Data Collection Techniques

On the basis of research objectives, questions and the type of data required for the study the following techniques were adopted to collect primary data.

3.5.1 Household Survey

In the first phase of the study, household survey was conducted. All the total 200 households in the universe were enlisted on the basis of the house number given by Pokhara sub metropolis office. Later, this list was used in order to pick the required number of samples by using simple random sampling.

3.5.2 Observation

The process of observation is a major tool to see the event/ changes by ones own eyes. It also helps to trangulate the collected information in seal way. Therefore, the observation was conducted during the study. The observation was focused to observe the pollution of Phewa lake it's socio cultural consequences of water pollution.

3.5.3. Interview Schedule

For primary data collection, interview was conducted with the sampled population. Well designed door to door and face to face household survey was conducted to acquire detailed information on attitude of Phewa Lake water was used for the purpose. The questions made in simple Nepali language were used to gather required data. A draft interview schedule in English version is given in appendix I.

3.5.4 Key Informant Interview

An interview is a major source of the data collection. For getting special insights on certain aspect and for collection more important qualitative data, key informant interview was also conducted with various persons from concerned parties such as Pokhara Sub-Metropolitan, local social workers, representatives of NGOs/ INGOSs, Phewa lake conservation committee etc. They had given the knowledge about cultural and religious importance of Phewa programs adopted for its conservation, long run vision of government and policy. (Sample checklist for key informant interview given appendix II)

3.6 Methods of Data Analysis

All the collected data from the field were analyzed both qualitatively as well as quantitatively as per their nature. The information collected from the field work were coded and entered to the computer using the statistical package for social science (SPSS). Collected information have been presented by using simple statistical tools like percentage, charts, figures, diagrams. These information were analyzed to find the causes, and the water pollution problem from anthropological point of view as far as possible.

3.7. Pre-test of Schedule

To make tools and make them more reliable and objective oriented, they were pre-tested in the Khahare area in Lakeside. Results from pre-test were tabulated and analyzed. This analysis helped to refine the questions in the schedule and to discover new aspect about the use value and pollution of Phewa lake. Some important inferences and insights obtained from this procedure were incorporated into the schedule before printing its final version for example, before pre-testing, most of the questions were of open nature by the inferences of pre-collection of desirable data Likewise, in some cases, the pre-test provided more options for the same questions which were previously unnoticed. And some questions which appeared to be difficult to draw answer from the respondents were reconstructed.

CHAPTER- FOUR

INTRODUCTION TO THE STUDY AREA - POKHARA

This chapter gives a general profile of the study area. In other words, this chapter deals with its physical and cultural settings. Moreover, it also presents the general demographic features of the respondents.

4.1 Physical Setting of Pokhara

Pokhara is located in the south western part of Kaski district. Pokhara valley which falls with in a relative subsidence zone between the Greater Himalaya and the Mahabharata Range. It is one of the most rapidly growing cities and also famous for its natural beauty. Spectacular views of the Annapurna range and Machhapuchhre peak account for Pokhara's popularity as tourist destination asides from its lake. The growth of tourism in Pokhara and especially in the Lakeside area of ward no 6 of the sub-metropolitan city has rapidly changed the life style of people and the environment.

Specifically, the study area lies about 1 km southwest of Pokhara town at an altitude of 793 masl with the lake water level, depending on the withdrawl of water for a power generation of 1,000 kilowatt (kw), irrigation, and water in flows. It extends about 4 km northwest to the southeast and is about 2 km at its widest part and only reservoir storage capacity is 46 million cubic metre. (IUCN, 1997:5)

4.1.1. Climate

The Phewa watershed area falls in a humid sub-tropical monsoon region. It is characterized by moderate temperature (mean temperature peaks at 25.5º C in July-August and falls to minimum of 13.2º C in January), heavy monsoon rainfall (mean total annual rainfall is 3,710 mm), and district seasonal variations. The summer is hot and wet and the winter is generally cold and dry. (IUCN, 1997:6)

4.1.2. Vegetation

The Phewa lake watershed area is located in the midland region of the country where warm and most condition are found for both of tropical and sub tropical plants. The major species found in the lower altitude of this region are Shorea Robusta, Schima wallichi, Castanopsis Indica, Alnus Nepalensis, Cinnamomum Zelylanicum, Dalbergia latiflora, Artemisia vulgaris and Dendrocalamus Hamiltoni, Pterocarpus Santalinus and Rhododendron arbareum etc. are grown in the high altitude. (IUCN, 1997:7)

4.1.3. Drainage

According to Lammichhane (2002) drainage pattern of the Phewa lake area is divided into four parts.

i) Harpan system

ii) The Andheri system

iii) The south flowing independent system and

iv) The north flowing independent system.

The Harpan Khola is the most prominent drainage system of this area, and contains 54. The Andheri Khola with its 32 tributaries joins the Harpan Khola at Thulakhet in Chapakot V.D.C. as the principle tributary of the Harpan Khola. Phirke, Sedi, Bagguwa etc, are the streams flowing towards the south and Tarikhet, Sasarko, Muhude, etc are the streams flowing towards the north.

4.2. Socio–Cultural Setting

Population has a unique composition of different caste people that is not been anywhere in Nepal. That's why many castes like Newar, Magar, Tamang, Damai, Kami, Brahmin, Chhetri, Thakali, Muslim, Tibetian etc. are living in Pokhara valley. Pokhara is one of the densely populated cities of Nepal.

Table 4.1 Ward-wise Population, Household, Sex and Population Size of Pokhara.

Ward no	Total population	Male	Female	Total household	Area
1	12,037	6,564	5,473	3,168	149.17
2	4,859	2,464	2,395	1,146	63.88
3	6,962	3,630	3,332	1,739	69.35
4	5,988	3,254	2,734	1,425	45.35
5	6,829	3,438	3,391	1,615	103.34
6	10,663	5,781	4,882	2,604	468.44
7	8,241	4,266	3,975	2,044	232.39
8	16,112	8,391	7,721	3,864	169.36
9	12,111	6,338	5,773	2,787	155.6
10	12,433	6,107	6,326	2,936	171.01
11	7,408	3,669	3,739	1,776	155.6
12	7, 369	3,501	3,868	1,769	213.03
13	6,739	3,078	3,661	1,460	768.41
14	2,314	1,154	1,160	520	NA
15	10,099	4,883	5,216	2,260	NA
16	10,068	5,117	4,951	2,496	NA
17	12,706	6,343	6,363	2,998	745.49
18	3,374	1,585	1,789	698	NA
Total	148,904	79,563	76,749	37,305	

Source: *Census 2001(Pokhara Sub-metropolitan city)*

4.2.1 Barahi Temple

One of the most important religious monuments in Pokhara, Tal Barahi is situated almost in the middle of Phewa Lake. The Barahi Devi is considered as the protector Deity representing the female force. This temple has earned so much name and fame that it has become a centre of attraction for not only Hindus but also for people belonging to different religion and culture. As the temple is located in the middle of a famous lake Phewa one who comes to see Phewa Lake does not miss to visit from both religions and materialist

approach/feeling. Tourist mainly visits the temple with a view to have a look into the panoramic Himalayas and mountains/ hilly areas of the Pokhara valley. The peaceful surrounding or typical structure of the temple does attract everyone towards the temple.

Devotees can be seen, especially on Saturday, carrying male animals and fowl across the lake to sacrifice to the deity.

4.3 Some Selected Demographic Features of the Respondents.

4.3.1 Occupation Distribution of the Respondents

One of the important variables of this study is occupation of the respondents. The collected data states that respondents were involved in different kinds of occupation. The occupation hold by the respondents have been marked in the table below.

Table 4.2: Occupation Distribution of the Respondents

S.N	Occupation	Frequency	Percent
1.	Trade/business	71	71.0
2.	Private service	23	23.0
3.	Farming	5	5.0
4.	Government service	1	1.0
Total		100	100

***Source** : Field Survey, 2009.*

The table no 4.2 indicates that maximum numbers of respondents were engaged in the trade / business, those who reported that they are in trade/ business were 71 percent out of the total respondents from the field study. While 23 percent of the respondents had reported that they are engaged in the private service. Likewise, 5 percent of the respondents reported of being engaged in farming. While 1 percent of the respondents had reported their involvement in government service. Therefore, most of the respondents of this area are engaged in the trade/business rather than others.

4.3.2 Caste / Ethnicity of the Respondents

It was observed that people of different caste / ethnic groups have tendency to live in cluster of their own community. However, table 4.3 shows that the people from different groups were also found to be living together in the study area.

Table 4.3: Caste /Ethnic Composition of the Respondents

S.N	Caste/Ethnicity	Frequency	Percent
1.	Brahmin	61	61.0
2.	Janajati	18	18.0
3.	Chhetri	15	15.0
4.	Dalits	5	5.0
5.	Others	1	1.0
Total		100	100

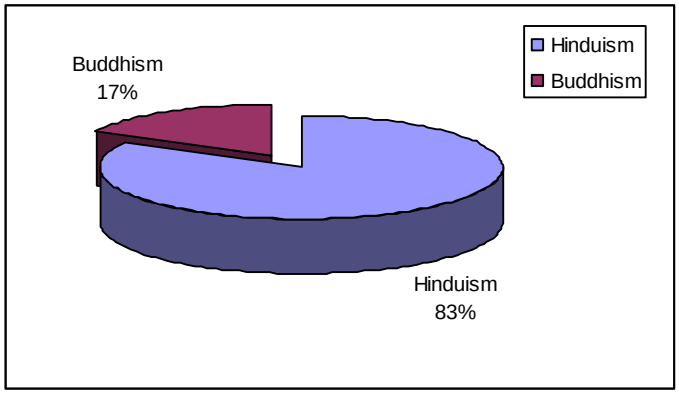
Source: *Field Survey, 2009.*

The table 4.3 clarifies that the 61 percent of the respondents were Brahmins while 18 percent were Janjati. Similarly 15 percent of the respondents were Chhetri, 5 percent Dalits and 1 percent others. It shows that high number of Brahmin are in this area and lower number of other group. This result shows that the settlements of Brahmin are very high in the study area.

4.3.3 Religious Composition of the Respondents

Nepal though declared secular state, still majority of the people in Nepal are reported of being the follower of Hinduism. And, religion is very important in the Hindu oriental state, because the term is related with the Hindu context. Here, the researcher tried to survey about the religious composition of the respondents the fact gathered were listed in the figure 4.1 below.

Fig. 4.1 : Distribution of the Respondents by Religion



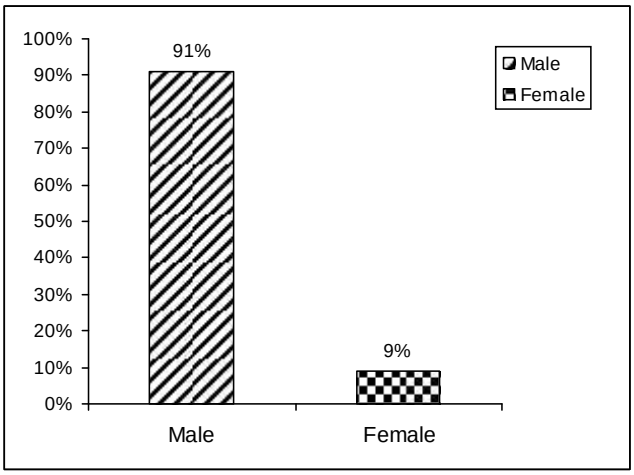
***Source**: Field survey, 2009.*

The figure 4.1 above illustrates that 83 percent of the respondents of the field survey were the follower of Hinduism, where as 17 percent of them were found following Buddhism. However, the number of people following other religion is lower than Hinduism.

4.3.4 Gender of the Respondents

The field survey was conducted to find out the in-depth knowledge of the respondents in research area . The figure no 4.2 below illustrated gender of the respondents.

Figure 4.2 : Gender of the Respondents



Source: *Field Survey, 2009.*

Figure 4.2 indicates that 91 percent of the respondents were male where as 9 percent of them were female. So, the number of male respondents is maximum higher than female respondents.

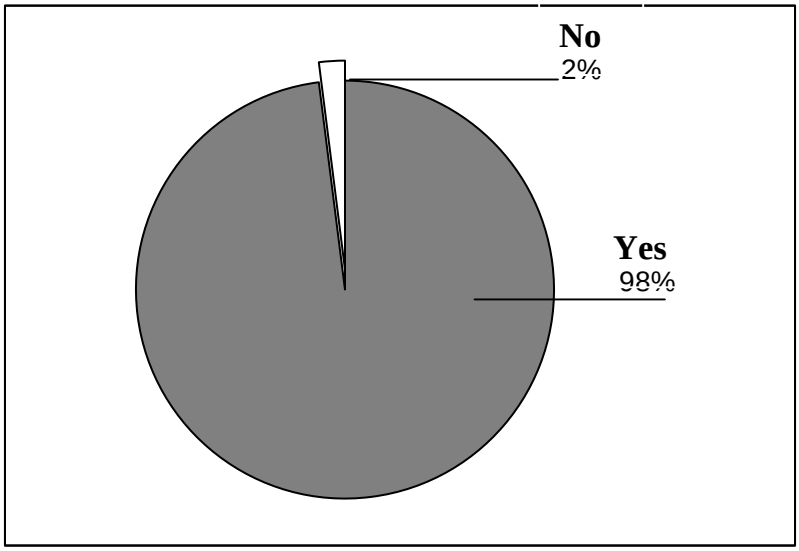
CHAPTER - FIVE

PEOPLE'S ATTITUDE TOWARDS THE IMPORTANCE OF PHEWA LAKE

5.1 People's View on Usefulness of Phewa Lake

In this study, people of this area expressed their attitude towards the importance of Phewa lake. Natural resources are fundamental things to life and are the basis of livelihood for human beings as well as animals. We can not simply explain that the value of natural resource in or any cost is same everywhere. People of this area are also more dependent upon the lake and its resources for making their living. They use lake's water for their own purposes. They use to visit the lake mainly for cloth washing, fishing, swimming, for bathing and visiting Tal Barahi temple. Lake water is used for irrigating agriculture fields and generating hydroelectricity. People mainly, visit these places for its scenic beauty. It is a well known and famous tourist area in Nepal. Tourism, which produces a large range of social and economic benefits, so it is a pollution free industry. It provides different types of employment opportunities, higher income, national and international understanding. Tourism can help the living standard of the people. Tal Barahi Temple is situated almost in the centre and slightly elevated island in the Phewa lake. It has become a center of attraction for not only Hindus but also for people belonging to different religion and culture. The peaceful surrounding or typical structure of the temples attracts everyone towards the temple. The enchanting lake is an idyllic playground. Brightly painted wooden boats and sailboats can be available on rent. The lake is neither deep nor particularly clean, but the water is clean, but the water is warm so swimming is pleasant if we don't think about the probable pollution the respondents were asked about the people's view on usefulness of Phewa lake to them. The following charts reflect its result.

Fig. 5.1. People's View on Usefulness of Phewa Lake



Source: *Field Survey, 2009.*

As shown by this figure 5.1 it is clear that out of total respondents 98.0 percent viewed the Phewa being very useful for various purposes, while 2.0 percent of the respondents have no response regarding usefulness of Phewa lake. So, here we can conclude that most of the people use Phewa lake for their own purpose.

5.2 Purpose of Using Phewa Lake

Phewa lake is very important for those people who live in near lake area. Human survival is totally dependant upon the exploitation of natural resource. In same way, lake also one of the natural resources and people who living around or near the Phewa lake are also more or less dependant upon the Phewa lake and its resources for making their living. People visit the Phewa lake mainly for washing, bathing, ritual activities, irrigation, fishing, boating natural beauty of scenery etc. local and foreign people visit Phewa lake. The peaceful surrounding or typical structure of the temple attracts everyone towards the temple. The following table classifies the respondents purpose of using Phewa lake.

Table 5.1 : Purpose of Using Phewa Lake

S.N.	Purpose	Frequency	Percent
1	Economic purpose	61	61
2	Environmental purpose	39	39
3	Socio-cultural purpose	33	33
		133*	

***Source**: Field Survey, 2009.*

** Frequency of responses is higher than the sample size since the question was of multiple response type.*

This table is showing that the Phewa lake has been very useful to 61 percent of the economic purpose. In case 39 percent have using Phewa for environmental purpose and 33 percent respondents use for socio-cultural purpose. Therefore, this table shows that the more respondents use lake for economic purpose than others. Phewa lake is also known as tourist area. Mainly local as foreigner people visit this place. Many people are involve in business sector. So, it is natural for Phewa being economically important.

5.2.1 Importance of Phewa Lake for Taking Sacred Bath

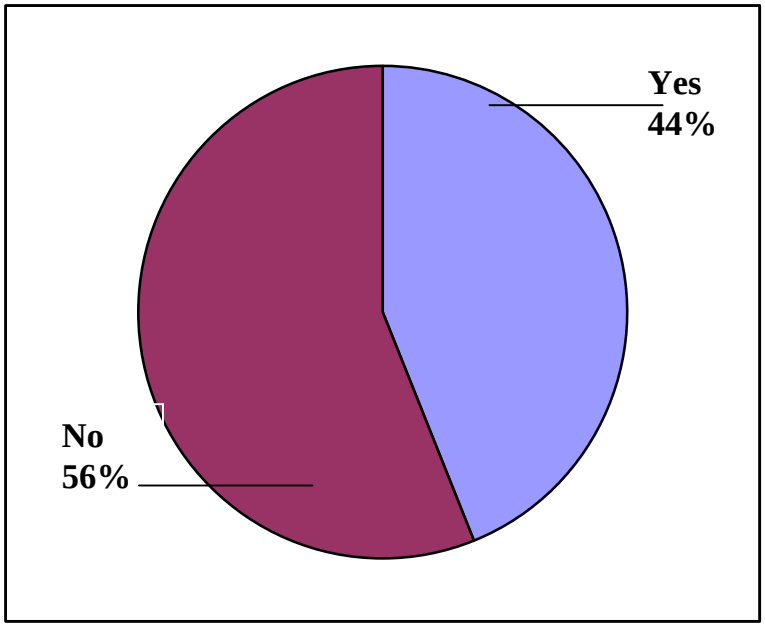
Phewa Lake is one of the important religious sites in study area. Tal Barahi is situated almost in the middle of Phewa Lake. The Goddess Barahi Devi is considered as the protector Deity representing the female force. Hindus within Nepal and abroad do visit Barahi to worship or pay homage with a view to meet their desire and non-Hindus pay a visit to the temple for a cultural and architectural study.

Daily Puja is performed with Puja Samagri (worship materials i.e. Dhup, Achheta, Abir, Phulpati etc) by a Pujari. As the Barahi is considered source of power (Goddess), goat, ducks, cock, etc animals are sacrificed to the Devi and pigeons are driven to fly, for the eternal peace. Such types of performance make the Goddess happy and pleased. All these performance and processes are practiced wishing every success in their life and having made the witness to the

Devi, specially, on the auspicious occasions of marriage ceremony and Bratabanda ceremonies.

Special Puja also is performed by particularly local people under ward no 5, 6, 7, and 8 of Pokhara sub-metropolitan City in Baishakh and Kartik (April/May-November/December) every year. The researcher attempted to know if the respondents visit this lake for religious bathing and ceremonies.

Fig 5.2 Respondent's Take Sacred Bath in Phewa Lake



Source: *Field Survey, 2009*

As the above figure reveals 56 percent of the respondent do not take sacred bath in Phewa lake, while 44 percent of the respondents take sacred bath in Phewa lake.

The researcher also asked the respondents about their frequency of taking sacred bath. The results have been shown in the table below.

Table 5.2 Occasion for Taking Bath in Phewa Lake

N=44

S.N.	Occasion	Frequency	Percent
1.	Sometimes	40	90.9
2.	No response	3	6.8
3.	Daily	1	2.3
	Total	44	100

Source: *Field Survey, 2009.*

According to this table, of all respondents who visit Phewa for sacred bath is 90.9 percent do it sometimes while 6.8 percent are no response and a few 2.3 percent of respondents take a bath, daily. Therefore, mostly a large number of people take bath the Phewa lake sometimes. Most of the respondents do so because they visit it to take holy dip during religious/ritual events which occur some time.

5.2.2 Use of Phewa Lake for Fishing

Traditionally, the lakes in Pokhara Valley were used by a wandering group of fisherman, locally known as Jalahari, who eventually settled down in Pokhara Valley along the lakeside. Nowadays fishing is found to be a rare activity in the Phewa lake. This is due to the fact that there is well-manage fishing system and Phewa lake is restricted area for fishing. Still 21 percent of the respondents were found to be visiting the lake for fishing. Among the respondents who fish in Phewa, their purpose of fishing has been shown below.

Table 5.3 : Purpose of Fishing

N=21

S.N.	Fishing	Frequency	Percent
1.	Household use	17	80.9
2.	No response	3	14.3
3.	Commercial use	1	4.8
	Total	21	100

Source: *Field Survey, 2009*

Table 5.3 indicates that maximum numbers of respondents were visiting the Phewa lake for fishing is 80.9 percent, fish for household purpose. While 14.3 percent did not respond only 4.8 percent of them do it for commercial use. But it must be said that, though in lesser amount, people do fishing in the lake.

5.2.3 Water for Household Use

Phewa lake is useful for many people on various purposes. Many people use this lake on various activities such as bathing, washing, swimming, irrigation etc. Lake water is used for irrigating a large area of cultivating field in research area. During observation the researcher also saw that lake is being used for washing clothes by the hotels and local which has increased lake pollution. Most of the respondents frequently maintain that they do not use this lake water for drinking and cooking proposes. Since they are aware of the quality of this lake water, it is being polluted nowadays. Thus, only a few people are found to be using water for this purpose.

Table 5.4 : Household Use of Phewa's Water

S.N.	Purpose	Frequency	Percent
1	Irrigation	59	59
2	Washing	43	43
3	Drinking	1	1
4	Others	13	13
		116*	

Source: *Field Survey, 2009.*

** Frequency of responses is higher than the sample size since the question was of multiple response type.*

As table 5.4 shows, the Phewa lake has been useful for 59 percent of the respondents perceived it being useful for irrigation purpose in the large area of cultivating field around research area. While 43 percent of the respondents were found to be using water for washing. Likewise, 13 percent of the respondents used it for other purposes such as cleaning, swimming, etc. Thus,

only a few 1 percent use this water for drinking purpose. Therefore, this must be due to the fact that the usefulness of the lake water is more for irrigation purposes.

5.3 Current State of Phewa Lake

Current state of the world's lakes is indeed alarming and people around the world will have to make concerted effort to reverse the trend toward degradation, management of a lake, which acts as an environmental indicator is very difficult as it requires resolution of important technological, financial and institutional issues and support from both public and the industry. In the study area, people mainly, give the answer in various ways. Nowadays, the present situation of lake is being polluted day by day.

The researcher also attempted to explore the current state of Phewa lake, the following table presents more explanation on this subject.

Table: 5.5 : Current State of Phewa Lake

S.N.	Current state	Frequency	Percent
1.	Worsened	83	83
2.	Bad	12	12
3.	Satisfactory	3	3
4.	Good	2	2
	Total	100	100

Source: *Field survey, 2009.*

According to this table of all respondents 83 percent of respondents think that the current state of Phewa lake's result is worsened. While 12 percent of respondents feel bad of the lake present situation of lake. Likewise 3 percent of the respondents gives satisfactory answer to the researcher and a few 2 percent gives good answer on it. Therefore, most of the respondents of this area gives worsened answer on the present condition of Phewa lake.

From this, it can be said that local people are very much responsible for increasing pollution of the lake. But this is not to say that concerned agencies,

mainly sub-metropolis, are not responsible for this. The garbage collecting vehicles of sub-metropolis do not reach in this area, according, to the people there, a key-informant concerned with lake conservation committee has also accepted this fact and said that there is an insufficiency of resources to be capable enough to collect garbage and wastes, control the sewage system, washing clothes in the lake, removed 'Jal-kumvi' from the lake are done but they are not success.

CHAPTER - SIX

POLLUTION OF THE PHEWA LAKE AND ITS CAUSES

Phewa Lake is the biggest and most developed of the Pokhara Valley lakes. The shoreline of Phewa lake is becoming overcrowded by accelerated construction of hotels, motels and restaurant. The researcher has attempted to investigate the main causes of this lake.

6.1 Causes of Phewa Lake Pollution

Pollution results from many substances, which are mainly, created by the human activities.. Water pollution is the most quality issue in Nepal. It is caused by disposal of solid and liquid wastes such as sewage, industrial effluents and agricultural residues. The most serious problem for Phewa lake is sedimentation which has long since occurred naturally as well as due to human activities. Some streams directly flow into the lake. Among them, the Phirke stream is major source of transporting the sediments as well as the garbage to the lake from the Pokhara city.

Since the study area is located at the mouth of the Harpan Khola and the pollution of the river starts from the study area. Because of the causes mentioned above. It can be said that the level of lake pollution in the study area is considerably high. People of this study area have different perception for polluted lake.

Naturally, Phewa lake is polluted by water hycienth. Excessive growth of hycienth, has covered the lake. The growing is not totally from nature, by the immoral human act. Similarly when the landslide, flood etc. occurs with heavy rainfall, it swifts the land and flows with different pollutants in it. When such polluted water mixes in Phewa lake, becomes the another natural cause of pollution in Phewa lake. The water which was previously safe to drink but now it is too polluted and useless. Due to the mixing of sewage and drainage pipe from hotels, lodges, and houses etc. the lake is being polluted, loosing its value. Water which previously had religious value, is now not suitable for bathing or

other household purposes. As it is polluted and contaminated. As one of the key-informants cited the lake is loosing its values. Since for the last 20-25 yrs due to its increasing pollution.

Generally, the waste product from houses, hotels, lodges, plastic bags, washing clothes, fishery activities, remains of dead bodies of animals were found at the study area which is the major causes of pollution in Phewa Lake.

Table 6.1: Causes of Phewa Pollution

S.N.	Causes	Frequency	Percent
1	Manmade cause	98	98
2	Natural cause	57	57
		155*	

Source: *Field Survey, 2009.*

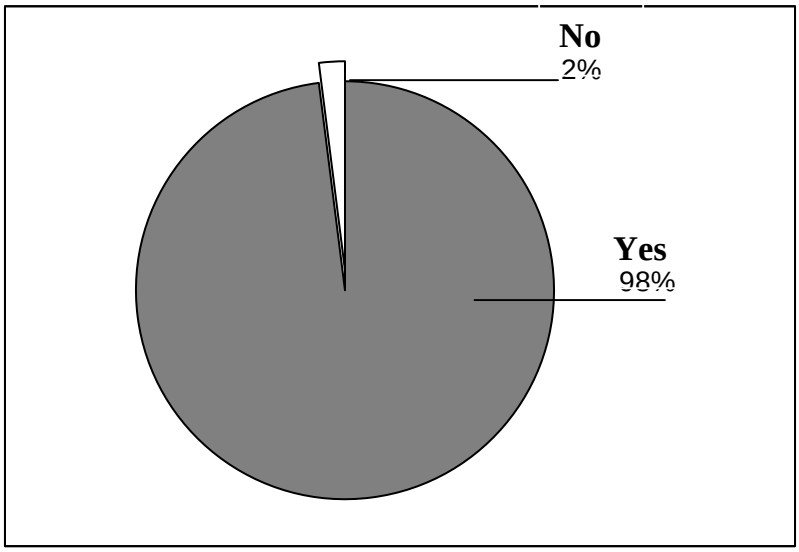
* *Frequency of responses is higher than the sample size since the question was of multiple response type.*

As the table above illustrates that 98 percent respondents believed that the manmade causes are polluting the Phewa lake while only 57 percent of the respondents believed that Phewa lake is polluted by naturally, particularly by water hycienth. Similarly when the landslide, flood etc. occur with heavy rainfall, it washes the land and flows with different pollutants in it. Here, the manmade causes include that dumping, disposal of dead bodies of animals, mixing drains, sewerage, disposal of solid wastes, washing clothes etc. in the Phewa lake. A systematic monitoring of the lake water quality is lacking and a recent study indicates that Phewa lake is deteriorating due to an increase in biological contamination. Therefore, mainly the lake is polluted by human activities.

6.2 Fishery as the Pollutant of the Lake

All the people who have seen the condition of the Phewa lake know that this lake is polluted. The researcher wanted to know if fishery is polluting the lake or not. Thus, the respondents were asked if they feel that Phewa lake is polluted or not. The following chart illustrates more about this.

Fig. 6.1 : Fishery as the Lake Pollutant



Source: *Field Survey, 2009*

The above chart explains that lake water is being polluted day by day from fishery. The figure shows that 98 percent of the respondents feel that it is polluted by fishery while only 2 percent do not feel so. The a vast majority of the respondents perceive fishery as the polluting agent of the lake.

6.3 The Households Drainage Ends as Polluting Agent

In Phewa lake, human faeces are directly or indirectly disposed not only from the urban sector but also from the hilly or the rural watershed areas and the lake water is made sudsy directly by washing clothes. The most serious problem for Phewa lake and its area is sedimentation, which has long since occurred naturally as well as due to human activities. Some streams directly flow into the lake. Among them, the Phirke stream is a major source of

transporting the sediments as well as the garbage to the lake from the Pokhara city.

The quality of lake water is contaminated mainly from the direct discharge of sewerage, via drains, etc. domestic waste water including the overflow from septic tank, is found to be directly discharged into the lake, especially from the hotels and restaurants. Other causes of the lake's pollution are the buffaloes and washing clothes by hotels, restaurants and local households. It means that drainage flows into the Phewa lake and make it polluted. The following table shows what the end of respondent households drainage end is.

Table 6.2: The Households Drainage End of the Respondent Households

S.N.	Source	Frequency	Percent
1	Septic tank	83	83
2	Phewa lake	13	13
3	No responses	4	4
	Total	100	100

Source: *Field Survey, 2009*

As the table above illustrates most of the respondents connect their household drainage at Septic tank. 83 percent of the respondent end their drainage at septic tank while 13 percent of the respondent end it at Phewa lake and a few 4 percent out of 100 respondents have no response. Therefore, out of 100 respondents 83 percent ends their drainage at septic tank and 13 percent at Phewa lake. They should be active seriously in this regard. Otherwise, any of the strategies to lessen this pollution cannot be successful.

6.4 Main Human Acts Polluting the Phewa Lake

Nowadays, Phewa Lake is being polluted day by day. Human waste disposal is another concern of pollution of land, air and water that subsequently led to the water borne disease. People who dependent on animal husbandry, poultry farming and some others, these houses do not have proper sewage

system and it pollute the lake. Activities of washing clothes, bathing, swimming, in lake also make Phewa pollution. It is estimated that more than 100 kg of soap and detergents are used daily while washing in the lake. Local people and hotels, restaurants are very much responsible for increasing pollution of the Phewa lake. People have been using it as a dumping site and sewer. The increase in the number of hotels and lodges in the lakeside and changes in land use have affected the lake environment.

Table 6.3: Main Human Acts Polluting Phewa Lake

S.N.	Human activities	Frequency	Percent
1	Mixing drainage and sewage	94	94
2	Dumping of solid wastes	78	78
3	Bathing and washing clothes	59	59
4	Others	17	17
		248*	

Source: *Field Survey, 2009*

** Frequency of responses is higher than the sample size since the question was of multiple response type.*

As shown by this table most of the respondents do human activities in Phewa lake. 94 percent of them said that mixing of drainage and sewage in the Phewa Lake is polluting it. While 78 percent of them viewed dumping of solid wastes and 59 percent said bathing and washing clothes in the Phewa lake as the factor for polluting Phewa. Likewise, 17 percent felt others. Therefore, most of the human activities are mixing drainage and sewage at Phewa lake and others are significantly contributing to its pollution.

CHAPTER - SEVEN

WAYS AND EFFORTS OF CONTROLLING PHEWA'S POLLUTION

7.1 Responsible Agency for Conserving Phewa Lake

Pokhara is one of the most rapidly growing cities and also the second most visited tourist destination in Nepal. Pokhara is a developing city of the developing country, Nepal. Therefore, the pollution is also increasing in the city in several ways. Like solid waste, sewerage, air, noise etc. First of all, the drainage system of the city should be planned scientifically. The lake and rivers must not be used to drop the sewerage. Immediate actions must be taken for the restriction of using these sensitive areas for throwing the garbage and sewerage of the city. The suggestions to initiate the garbage producing tax and the polluter tax are necessary to implement in the Pokhara city for the establishment of the environmental conservation fund from which the city can itself earn the self-sufficient fund for its sustainable development. Cloth washing in the lake should be banned forever. If there is the break of rules, punishment should be given with high fines. Cloth washing stations should be made at several places at the Seti canal after it is diverted from Khahare to the Phirke stream in order to flow it beyond the dam of Phewa lake. The lake's surrounding area is regarded as one of the most threatened wetlands in Asia and the World Conservation Monitoring Centre (WCMC) considered it to be too degraded already to merit any special conservation efforts.

The water pollution is increasing day by day; number of fish is being disappeared, different kinds of grass like 'Jal Kumvi' is growing in the lake. Nowadays many organizations or institutions active to remove 'Jal Kumvi' from the lake, but they are not success, many and uncountable budget are expensed in the name of preserve lake. The Pokhara Sub-metropolitan city has given priority to waste management. Altogether many employees are involved in these activities. Various NGOs and other social organizations are involved in raising public environmental awareness and sustainable development activities.

Despite these efforts in these areas, they are not implemented as a package programme of the local plan and are not coordinated to develop as an integrated system. Thus, Harpan Khola is called the ''Sorrow of Phewa'', not because it brings sorrow to farmers but because it is adding sedimentation to the Phewa lake ever year at a tremendous rate. Thus, expanding agricultural fields, it is not really practical to assume that the wrath of nature can be controlled, but through proper planning, management and engineering, the natural cause of sedimentation can be reduced to some extent or at the very least, efforts can be taken to reduce sedimentation.

The conservation of Phewa is not possible through only one sectors' effort so it demands a collective action from all concerned parties. The given table 7.1 shows the resulting the researchers inquiry about this matter.

Table 7.1 : Agencies Responsible for Conserving Phewa Lake

S.N.	Agency	Frequency	Percent
1	Phewa conservation committee	52	52
2	Pokhara sub-metropolitan	46	46
3	Hotels owners	36	36
4	All of above	26	26
		160*	

***Source**: Field Survey, 2009*

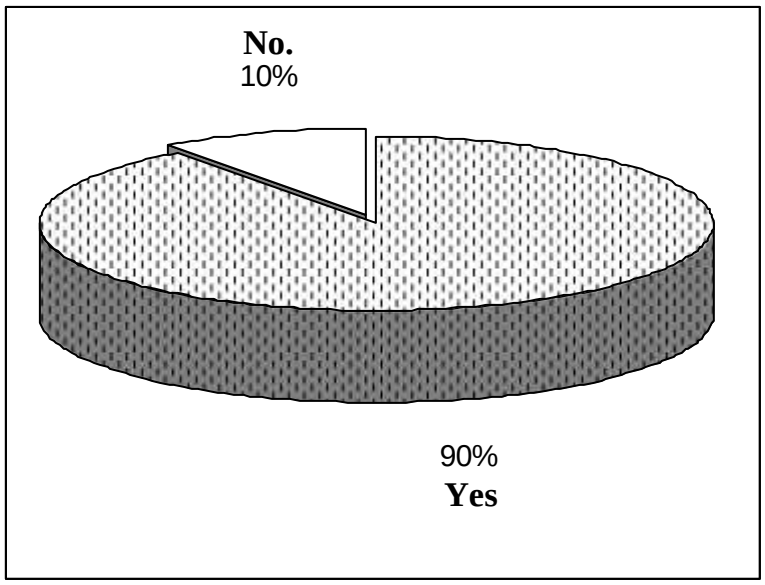
** Frequency of responses is higher than the sample size since the question was of multiple response type.*

This table is clearly showing that various agencies are responsible for conserving Phewa lake. This table is explaining that 52 percent of the respondents thought that Phewa conservation committee is mainly responsible for the preservation of the Phewa lake while 46 percent said Pokhara sub-metropolis and 36 percent viewed hotel owners likewise, 26 percent told all of above as being responsible for the conservation of Phewa. Therefore, this means all these agency are responsible for conserving Phewa lake. Among

these agencies mostly Phewa lake conservation committee is highly responsible for conserve the lake.

The researcher also attempted to know if the local agencies are involved in lake conservation. The following chart reflects its result.

Fig. 7.1: Local Agencies Involved in Lake Conservation



Source: *Field Survey, 2009*

This chart explains that local agencies must be involved in lake conservation activities. As out of total respondents, 90 percent viewed local agencies being involved in conserving the lake. While 10 percent of the respondents have no response of involve in conserve the lake.

7.2 Ways of Managing Own Households Waste

Human beings depend on the environmental resources for survival and development. Lake is polluting day by day from human activities. The generation of solid wastes in high amount causes land degradation. The hotels which are engaged in tourism business in this area are not taking any proper interest in the protection of the lake. Waste materials are produced from hotels, lodges and others are not collected in a proper way in this areas. The sides of road are polluted. Proper incentives are not taken for the disposal of garbage in

the proper way. The problems in the Phewa lake are related basically to a rapid deterioration in the quality of the lake environment. The concerned people have given their views in this context.

People of this study area who are mainly related to the Phewa lake, manage their households waste in various ways. They manage their garbage in a pit. Sometimes PSM collects their garbage from this area when it do not reach there then people throw them into the lake and lake become polluted. The researcher also made some observation, in which some institutions which are considered as one of the main agents for creating environmental awareness, are also found to be depositing wastes into the lake. To preserve the lake all people of this area active in this subject and play important role for reduce the pollution of Phewa lake.

The researcher also attempted to explore the ways of managing own household wastes. The following table presents more explanation on this subject.

Table 7.2 : Ways of Managing Own Households Wastes

S.N.	Ways	Frequency	Percent
1	Dumping in a pit	56	56
2	PSM collects	18	18
3	No response	16	16
4	Disposing them to the lake	10	10
	Total	100	100

Source: *Field Survey, 2009*

As table 7.2 shows, the household wastes has been managing in various ways. In the research area, out of 100 households 56 percent of the respondents manage their households waste by dumping in a pit, while 18 percent discharge it to the vehicle of PSM. In most of the places, in the research area, the garbage and waste collecting vehicles of PSM come to collect garbage and wastes once in two days. But it seems that still people find it easier to dispose garbage into the Phewa lake rather than waiting for those vehicles for such purpose, 16 percent are no response and 10 percent of the respondents dispose them to the lake and thus are playing the part of agents for polluting Phewa lake.

7.3 Ways of Keeping Phewa Clean

Due to rapid urbanization and development activities in recent years around Phewa lake, pollution and siltation of this lake is on the increase. In order to conserve the lake and its immediate watershed area, the NCS Implementation Project of National Planning Commission has prepared Phewa Lake Conservation Action Plan, with the Support of IUCN. Phewa is one of the most important natural researches. As Phewa lake is the sources of water for household purpose, irrigation etc. It has its own importance, to preserve the lake. To preserve the lake in various ways can be adopted. One of them is to remove 'Jal Kumvi". Excessive growth of Jal-kumvi is the main cause of fishery system and garbage. It is growing excessively and covering the lake. It would be controlled if garbage and sewage are not connected to lake. So, that it should be checked properly by the responsible person, or organization and the local people. People of this study area are mainly depend on Tourism industry Mainly hotels and lodges are built in this area, and it is the main source of polluted Phewa lake. The increase in the number of houses are most responsible for increasing pollution of the Phewa lake.

The researcher also attempted to explore of keeping Phewa clean in terms of various ways. The following table presents more explanation on this subject.

Table 7.3 :Ways of Keeping Phewa Clean

S.N.	Ways	Frequency	Percent
1	Management of wastes	98	98
2	Controlling the over growth of Jalkumvi	92	92
3	Managed fishery	66	66
4	Area controlling	50	50
5	Others	2	2
		308*	

Source: *Field Survey, 2009.*

** Frequency of responses is higher than the sample size since the question was of multiple response type.*

According to this table, various ways were suggested by the respondents to preserve Phewa lake.98 percent of the respondents thought management of wastes as a way of keeping lake clean. While 92 percent people viewed controlling of the over growth of Jal-Kumvi for this purpose. 66 percent of them suggested for fishery system. As the table shows, 50 percent of the respondents said that controlling the area of the lake and only 2 percent are others. As the way of keeping Phewa clean.

The researcher feels that the suggested measures from respondents can be crucial in keeping Phewa clean.

As natural resources, the Phewa lake has been very useful to the people in a number of ways. It has been a source of water for various purposes. Due to these reasons, the survival of the local people is more dependants on these important natural resources, the Phewa lake. Though it is useful for local and foreign people, but nowadays it become increasing day by day and being polluted from human activities and naturally. People accept that they themselves are a lot more responsible for its pollution in the research area.

CHAPTER - VIII

SUMMARY, FINDINGS AND CONCLUSIONS

8.1 Summary

Pollution is the most fundamental phenomenon in the sense it is the true essence of human ecology. Human being is more capable to know the pollution of Phewa lake and its importance. Lake is important natural resources for Pokhara valley. It contributes to the natural beauty of the valley and attracts tourists from all over the world.

The present research is primarily concerned with the "Socio- cultural consequences of Phewa lake water pollution." The study had the general objective of studying to find out the consequences of Phewa lake water pollution where as, following were the specific objectives of the research.

i. To explore the people's attitude towards the importance of Phewa lake.

ii. To find out various causes of Pollution in the Phewa lake.

iii. To find out the ways and efforts of controlling pollution.

The present dissertation is primarily an academic study that gives some very important information regarding causes of Phewa lake. It may help to formulate various new policies regarding the pollution of Phewa lake. Environmental condition is deteriorating due to different types of pollution e.g. noise, air, water etc. connected of sewage drainage in the lake has been noted and reported by the researcher. The study is mainly focused on the consequences of Phewa lake pollution.

In this study, Human ecology as the principle for studying the Phewa lake as an important natural resources is common property. It has focused on the people's attitude towards the importance of lake and causes of pollution. Likewise, the ways and efforts of controlling pollution are also focused. Water of Phewa lake pollution in this area is a burning problem. Population explosion can be considered the main factor for increase in pollution level. During this study, the literature on human ecology, natural resources, concept of common property has been reviewed. Likewise, legal framework for lake and watershed

management, review of preview studies on water pollution, river pollution and the lake pollution also have been reviewed. Similarly, the study has been made to find the case of direct and indirect activities of Phewa lake pollution which basically deals with the local people of this research area.

Furthermore, due to limited resource, budget, time, manpower etc. that remained as the main constraints for the researcher to make deep study of the study area.

The study is explorative and descriptive in the nature. The ward no 6 (from Hallanchowk to Fishtail-gate) of PSM city is selected for this study purpose. All the road line households of the study site were taken as the universe of the study. Which is built with in about 60 m to 300 m from lake. Since this area is responsible to pollute Phewa lake directly or indirectly. As we know that for the data to be reliable a relatively larger sampled size is required and thus 50 percent of the household in the sampling frame, which is equal to 100 households were picked up as a sampled by following simple random sampling technique.

The data were gathered from both primary and secondary sources. The nature of the data is qualitative as well as quantitative. Household survey, observation, interview schedule, Key-informant interview were the data collection techniques used for the study. For this purpose, the schedule prepared was firstly pre-tested and the result from this was used to refine the question in the schedule. The collected data have been analyzed by using computer program SPSS (for the windows). The results of the processed data have been shown by using various tables, chart, diagrams in order enable the readers to easily comprehended the situation. The key informants of this study are the personnel concerned with PSM, Phewa lake conservation committee, National Lake conservation committees. priest of the Tal Barahi temple etc. While 100 household sampled are the respondents.

Natural resources are fundamental to life and are the basis of livelihood for human beings as well as animals we can not simply explain the value of natural resource in or any cost is same everywhere. The Phewa lake is very

useful to people in a number of ways. People's attitude towards the importance of Phewa lake is very high. People of this area use lake's water for their own purposes. They visit lake mainly for washing, fishing, swimming, for taking a bath, to visit Tal Barahi Temple etc. Though it is one of the most scenic places, it is useful in many ways, mainly hotels and lodges and local people are found to be misusing this natural resource using it as a dumping site and sewer. The researcher found that the people are polluting in a number of ways. People accept that they themselves are a lot more responsible for its pollution than any others.

Water pollution in this area is a burning problem. Population explosion can be considered the main factor for increase in population level. The household drainage ends at Phewa lake. The quality of lake water is contaminated mainly from direct discharge of sewerage, via drains etc. domestic waste water including the overflow form septic tank is found to be directly discharged into the lake. People's activities such as disposal of garbage and sewage into the lake and others have been main causes of the pollution of Phewa lake. People in this area have initiated many activities towards the pollution control. The first of this kind is their attempt to remove Jal- Kumvi from the lake and control to throw garbage in the place. They must be collected in one place and dumped.

Many organization or institutions active to remove Jal Kumvi from the lake, but they are not success. The PSM has given priority to waste management. Altogether many people are involved in these activities but it reported that peoples participation is very low in these activities.

To keep the Phewa clean there are various ways to manage it. A great deal of effort has been made to conserve Phewa lake to prevent it from being polluted and to control depreciatory physical activities.

8.2 Findings

As an anthropological study, it has explored and explained the importance of the Phewa lake to the people living around its surrounding including the use patterns of the important resources that the Phewa lake has been providing. It has been found that the lakeside where Phewa lake is situated is the key source which can provide the recreational facilities. People especially the research area richer on the natural resources.

Similarly local people are the main agents who are responsible for polluting the lake. Human activities are the main source of being lake pollution.

- Out of total respondent, maximum 91 percent of the respondents were male where as 9 percent of them were female respondents.
- Out of total respondents 98 percent viewed Phewa lake for various purposes, while 2 percent of the respondents have no response regarding usefulness of Phewa lake.
- From the collected data 61 percent of the people use Phewa lake for economic purpose. In case 39 percent have using lake for environmental purpose and 33 percent respondents use for socio- cultural purposes.
- Out of 44 respondents 90.9 percent takes occasionally bath sometimes, similarly 6.8 percent are no response and a few 2.3 percent of respondents takes a occasionally sacred bath daily.
- From the collected data 56 percent of the respondent does not takes sacred bath in Phewa lake while 44 percent of the respondents take sacred bath on it.
- Significant 83 percent of the household's drainage end at septic tank while 13 percent of the respondents end at Phewa lake and a few 4 percent out of 100 respondents have no response.
- Maximum 80.9 percent of the people fishing for household purpose. While 14.3 percent are no response on purpose of fishing and only few 4.8 percent of them do it for commercial use.
- The highest level 59 percent of the respondents perceived it being useful for irrigation propose in the large area of cultivating field around research area.

While 43 percent found to be using water for washing, whereas 13 percent of the respondents use it for other purposes only a few1 percent use this water for drinking purposes.

- Majority of the respondents 83 percent gives the worsened answer towards the current state of Phewa lake where as 12 percent gives the bad answer, satisfactory 3 percent and only a few 2 percent gives the good response towards the overall current state of Phewa lake.
- Majority 61 percent of the people has been using Phewa lake on the economic purpose. Almost 39 percent have using Phewa for environmental purpose and incase 33 percent respondents use for socio-cultural proposes of the water of Phewa lake.
- Maximum 98 percent of the people feel that lake is polluted by fishery while only 2 percent do no feel lake water is being polluted day by day from fishery.
- Among out of 100 household 98 percent cause of Phewa Pollution is man made activities includes that dumping, disposal of dead bodies of animals, mixing drains etc. in the lake only 57 percent of the people believe that it is polluted naturally particularly by water hycienth.
- Garbage dumped at the lakeside is main cause to pollute Phewa lake. The households drainage also end at various places like 83 percent drainage ends at septic tank while 13 percent on Phewa lake and 4 percent are no response. Phewa lake is being polluted day by day from human activities directly or indirectly.
- Most of the causes of the Phewa lake pollution are human activities. People have been using it as dumping site. The increase in the number of hotels and lodges in the lake and changes in land use have affected the lake environment. Mostly 94 percent of the respondents mixing drainage and sewage into the Phewa lake is polluting it, while 78 percent of them are solid wastes. Similarly 59 percent people bathing and washing clothes and other activities are 17 percent.

- The various agencies are responsible for conserve the Phewa lake is 52 percent of the respondents thought that Phewa conservation committee is preservation the lake while 46 percent of the Pokhara sub - metropolitan and 36 percent viewed hotel owners. Likewise, 26 percent told all of above. According to respondents this agencies preserve the Phewa lake.
- To preserve the lake, we should manage household wastes on our own. Out of 100 respondents 56 percent of respondents manage their household's wastes by dumping in a pit, while 18 percent discharge it to the vehicle of PSM collect and 16 percent are no response. Likewise, 10 percent are dispose them to the lake. It shows that local people are very much responsible to pollute lake.
- To keep Phewa lake clean, there are various ways maximum 98 percent are managed wastes in the way of keeping clean while 92 percent people viewed controlling of the over growth of Jal-Kumvi. It is the main issue to pollute lake, 66 percent of them suggested for fishery system. Similarly, 50 percent are area controlling of the lake and other are 2 percent as the way of keeping Phewa clean.

8.3 Conclusion

Pokhara is the city of natural beauty. It is surrounded by mountains, which can provide the recreational facilities. Phewa lake is important natural resources for the Pokhara valley. It contributes to the natural beauty of the valley and attracts tourists from all over the world. Unregulated construction of houses and hotels are polluted discharge from the Seti river have degraded the quality of Phewa lake. Environmental sustainability is the key to sustainable preservation of Phewa lake. To conclude, water pollution of Phewa lake is a burning issue. The major contributing factor for lake water pollution in this area is the population growth, numbers of house are built without proper drainage system or sewage system. There is no provision for solid waste management, Jal-Kumvi, which has fully covered the lake. New hotels, lodges,

restaurants are built, huge money is being spent on the new construction but without any measures to prevent the pollution.

As the magnitude of consequences of Phewa lake water pollution in research area is very acute, controlling the pollution is also a real challenge. As the Phewa lake water pollution is caused by the local factors as well as national factors, both local and national measures requiring change in national policy should be applied to control the water pollution in this area

REFERENCES

Adhikari, Jaganath and Sharad Ghimire (2002): *A Bibliography on Environmental Justice in Nepal*; Martin Chautari Publishers, Kathmandu.

Adhikari J, and D. Seddon D (2002): *Pokhara, Bibliography of a Town;* Mandala Book Point, Kathmandu, Nepal.

Baral, Khumanath (2005): *Impacts of Conflict on Tourism Industry;* A Case Study of Phewa Lakeside, Pokhara, M.A. Thesis - Soc/Anth., Submitted to the Department of Sociology/Anthropology, PN Campus, Pokhara

Berkes, Fikret, (ed.), (1989): *Common Property Resources;* Ecology and Community-Based Sustainable Development, London: Belhaven Press.

Bhandari, Amrit Kumar (2005): *The Pollution of the Seti River in Pokhara;* An Anthropological Study, M.A. Thesis- Soc./Anth., Submitted to the Department of Sociology/Anthropology, PN Campus, Pokhara.

Dash, M.C. and P.C Mishra (2001): *Man and Environment*; Macmillan India Limited.

Dhamala, Jeetnath (1990): *The Problems of water and Environment Pollution*; A Study in Pashupatinath Area, M.A. Thesis-Soc./Anth.

Dix H.M. (1981): *Environmental Pollution;* The Institute of Environmental Science Series. Wiley (pp:168)

ICIMOD (2006): *Environment Assessment of Nepal Emerging Issues and Challenges;* ADB.

Honigmann, John (1997): *Handbook of Social and Cultural Anthropology -2,* Rawut Publication- Jaipur and New Delhi.

HMG. N (1992): *Water Source Act (1992)*

HMG. N (1992): *Forest Act (1992)*

HMG. N (1973): *Physical Development Plan (1973)*

HMG. N (1972): *Town Plan Implementation Act (1972)*

HMG. N (1982): *Soil and Water Conservation Act (1982).*

HMG. N (1994):*Department of Soil Conservation and Watershed Management (1994).*

Karki, Madhav Bahadur (2003): *An Analytical Approach to Natural Resources Planning in Phewa Tal Watershed of Nepal;* MSC Thesis.

Khatir, T.B.(1986): *The Study on the Water Pollution of River Bagmati and Vishnumati of Kathmandu Valley;* M. Sc. Thesis-zoology.

Kothari, C.R. (2002): *Research Methodology;* Wishwar Prakasan, New Delhi.

Lamichhane, D.B. (2000): *Phewa Lake Watershed Area;* Studies on Settlement and Environmental Appraisal.

Napit, N.P. (1988): *Pollution Problems of Pashupati Area;* Proceedings of Seminar on Environmental Issue of Pashupati Area: RONAST, Kathmandu (pp. 68:9).

Oakerson, R.J., (1986): *"A model for the Analysis of Common Property Problems;* In Proceedings of the conference on Common Property Resource Management, National Academy Press, Washington, DC. (pp.13:30)

Oli, Krishna Prasad (ed.) (1995): *National Conservation Strategy Implementation Project;* Guidelines for Phewa Lake Conservation, Kathmandu.

Oli, Krishna Prasad (1997): *Phewa Lake Conservation Action Plan;* National Conservation Strategy Implementation Project, A collaboration Between the National Planning Commission and IUCN- The World Conservation Union, Kathmandu.

Oli, Krishna Prasad ed. (1997): *Environmental Study of Nepal's Begnas and Rupa Lakes;* National Conservation Strategy Implementation Project IUCN (pp.2).

Ostrom, E., (1986): *Issues of Definition and Theory*; *Some Conclusion and Hypothesis*; in Proceding of the conference on Common Property Resource Management and Development, International Centre for Economic Growth, San Francisco.

Parajuli, B.K. (2062): *Human Enroachment of Phewa Lake and its Challenges;* Janapragyamanch, Pokhara (pp. 158).

Parajuli. B.K. (2000): *Environmental Pollution and Awareness in Pokhara City;* A Sociological Perspective, In occasional Papers in Sociology and Anthropology, Central Department of Sociology and Anthropology, Tribhuvan University, Kirtipur.

Pradhan, Puskar K and Bandana Pradhan (2006): *Environment and Natural Resources;* Concepts, Methods, Planning and Management, (pp.13).

Sharma, Bharat P. (1990): *Economics of Cage culture of Carps in the Lakes of Pokhara Valley;* M.A Thesis-Soc./ Anth. T.U. Kathmandu.

Sharma, Mahima (1996): *Water Pollution: A Case Study from Kathmandu Valley:* M.A. Thesis-Soc./Anth. submitted to the Department of Sociology /Anthropology T.U. Kathmandu.

Sharma, Ramji (2005): *Socio-Cultural Impact of Tourism on Host Community; A Case of Pokhara and its Vicinity;* M.A. Thesis-Soc./Anth. Submitted to the Department of Sociology/Anthropology, PN Campus, Pokhara

Shiva, Vandana (1997): *Resources in the Development Dictionary*, A Guide to knowledge as power, New Delhi, orient Longmon.

Shrestha, Prushuttam (2004): *Conservation and Management of Phewa Lake Eco-System, Nepal*; An unpublished Submitted to Department of Botanay, Patan Campus, T.U. Kathmandu.

Shrestha, T.B. (1989): *Development Ecology of the Arun River Basin in Nepal;* ICIMOD.

Upadhayay, Prakash (2003): *Models of Culture*; Samjhana Publication: Pokhara (pp 448-149).

Upadhayav, Rajeev (2004): *Impact of Tourism on Environment*; A Case Study of the Adjoining Settlements of the Phewa Lake Watershed Area; M.A. Thesis- Geography.

Appendix - I

QUESTIONNAIRE SCHEDULE

"Socio-Cultural Consequences of Phewa Lake Water Pollution"

An Anthropological Study of Lakeside

Sample No:

1. General Introduction: Date:

1.1 Name of the household head : _____ 1.2 Occupation: _____

1.3 Name of the respondent: _____ 1.4. Caste/Ethnicity: _____

1.5 Religion: _____

S.N.	Questions	Answers	Skip
2.	Do you use Phewa lake for any purpose?	1. Yes b. No	
3.	If yes, for what purpose do you use Phewa Lake?	1. Socio-cultural purpose b. Economic purpose c. Environmental purpose	
4.	How is the water of Phewa lake?	a. Drinkable b. Useful for washing and cleanning c. Useful for irrigation d. Not useful for any purpose	
5.	For what purpose do you use water of Phewa lake in your household?	a. Drinking b. Washing c. Irrigation d. Others	
6.	Do you take holy (ritual) bath in Phewa lake?	1. Yes b. No →	8
7.	If yes, when ?	a. Every day b. Teej c. Occasionally d. Mourning ritual d. Others	
8.	Do you know there is an ecological role of Phewa lake in maintaining balance in ecosystem?	a. Yes b. No	
9.	Do you use the lake water for irrigating your land?	a. Yes b. No	

10.	Do you collect fish from Phewa lake?	a. Yes b. No →	15
11.	How often do you collect fish from Phewa lake?	a. Everyday b. Occasionally	
12.	What is the purpose of your fishing?	a. To sell in the market b. For own consumption	
13.	If sale, how much do you earn from selling fish everyday?	a. Rs. 500-1000 b. Rs. 1000 - 2000 c. Rs. 2000 - 3000	
14.	Is it sufficient for your family to live?	a. Yes b. Just supportive.	
15.	Do you have professional fishery system?	a. Yes b. No →	20
16.	If yes, how many 'cage' do you have?		
17	How much have you invested for fishery?		
18.	How much do you earn by this fishery annually?		
19.	What do you expect form government for the betterment of fishery in Phewa lake?		
20.	Do you think Phewa lake is polluted by fishery?	a. Yes b. No	
21.	What should be done to reduce pollution in Phewa lake by fishery?		
22.	Do you have any boat for rent in Phewa lake?	a. Yes b. No →	25
23.	How much do you earn by giving boat in rent?	a. Daily Rs 100 - Rs.500 b. Daily Rs. 500 - Rs. 1000 c. Daily Rs. 1000 - Rs. 1500	
24.	Are you satisfied with the current income?	a. Yes b. No	
25.	Do you know, what is water pollution?	1. Yes b. No	
26.	What do you think, Phewa lake is being polluted day by day?		
27.	If yes, can you say the cause of this pollution?	a. Garbages b. Human activities c. Naturally d. Others	

28.	What is the major human activities responsible for polluting Phewa lake?	a. By mixing drains & sevage b. By mixing solid wastes c. By washing clothes & bathing d. Others (specify) …….	
29.	Is Phewa lake being polluted naturally?	a. Yes b. No.	
30.	Is it good to pollute Phewa lake?	a. Yes b. No	
31.	How can we make it clean?	a. Reducing Jal Kumvi b. Well- managed of Garbage c. Well managed of fishery system d. Others	
32.	What is your opinion about the present situation of Phewa lake?	a. Good b. Bad c. Satisfactory d. Worse	
33.	How can we improve its situation?	a. Managed Jal-Kumvi v. Managed Garbage c. Managed of Area d. Others	
34.	What kinds of pollution are produced from your house?	a. Dead bodies of plants & animals b. Garbage c. Drains & sewage d. Others	
35.	How do you manage these pollution?		
36.	Do you have sewage system connected in your house?	a. Yes b. No	
37.	Where does your drainage end?	a. To streams b. To Phewa lake c. To septic tank 4. Other place (specify) .	
38.	How was Phewa lake water in Past ?	a. Drinkable b. Useful for sanitation c. Irrigation d. Others	
39.	Do you think individual can contribute to reduce pollution in Phewa lake?	a. Yes b. No c. Not possible	

40.	Do you think, which is the main organization to conserve the lake?	a. Lake conservation committee b. Pokhara sub-metropolitian city c. Hotel organization d. Others	
41.	Do you know whether local organization have any role to control pollution?	a. Yes b. No	
42.	What type of activities have been conducted by local institutions?		
43.	What type of programmes have been conducted by the government for controlling pollution?		
44.	What can we do to control pollution of Phewa lake?		
45.	What should be done for its conservation?		
46.	Do you have any suggestion to government or related group about Phewa lake.		

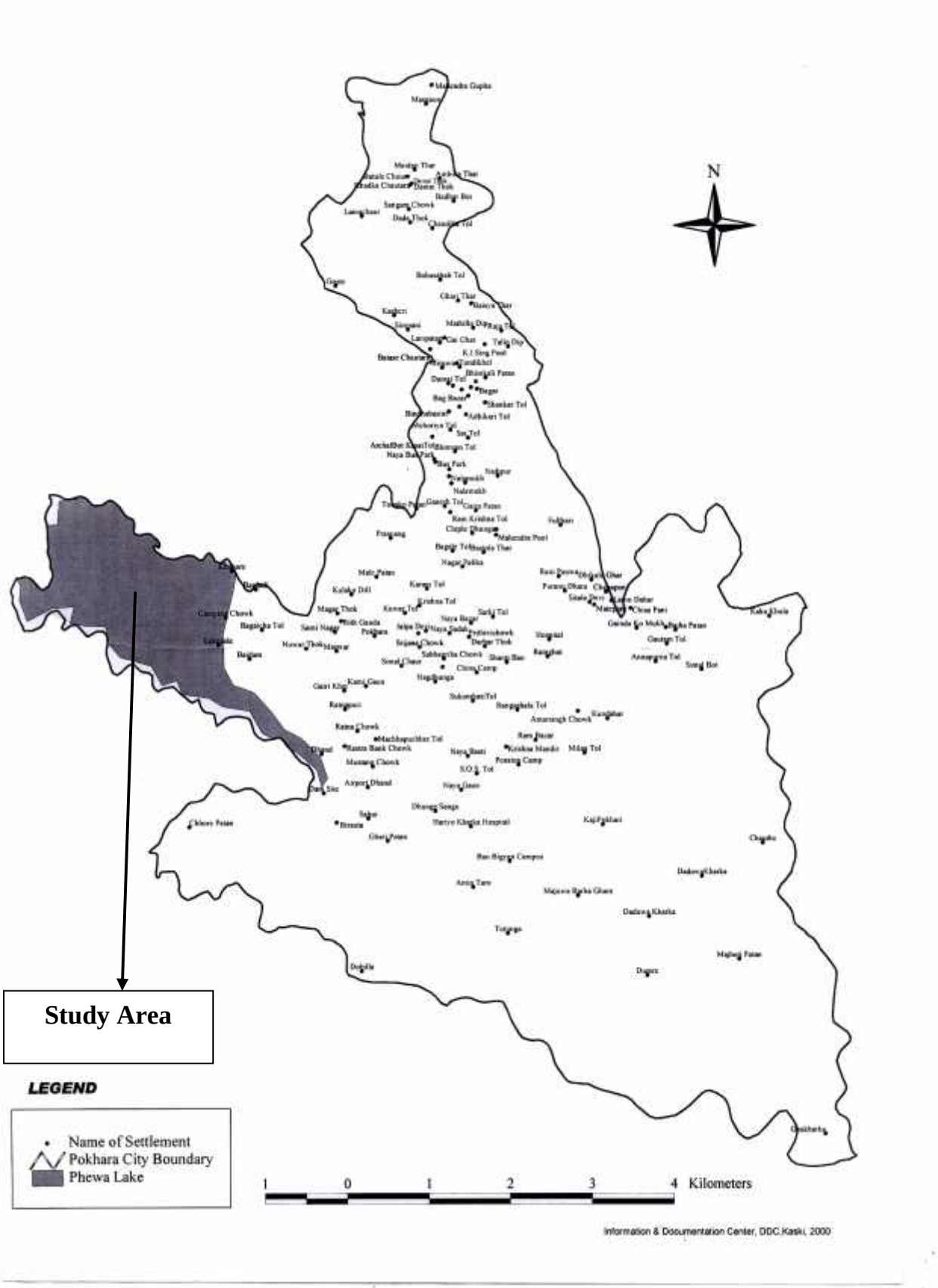
Appendix - II

Key Informant

S.N.	Name	Post	Address
1.	Hemraj Pahari	Chairperson	Phewa Lake Conservation Committee.
2.	Govinda Raj Pahari	Chairperson	Western Hotel Organization.
3.	Jalakpani Tiwari	Chairperson	National Lake Conservation committee
4.	Netra Narayan Bhandari	Chairperson	Trekking Equipment shops Association TESA
5.	Nawaraj Adhikari	Vice Chairperson	Treekking Equipment shops Association TESA
6.	Chudamani Adhikari	Priest	Tal Barahi Temple
7.	Laxmi Narayan Shretha	Chairperson	Social Organization
8.	Hikmat Bahadur Kunwar	Chairperson	Ward No. 6, Lakeside, Pokhara
9.	PSM	Member	Phewa Trust

Appendix - III

Study Area



Appendix - IV

Photo Gallery

Lake is polluted by washing clothes and bathing.

Sewage system connects into the lake.

Water is used for household purpose.

Garbage is thrown every where in the lake.

Lake is covered by Jal-kumvi

Children are fishing in the lake.

Overflow of drains into the lake.

Lake is polluted by animals

Peoples are swimming in the lake.