CHAPTER I

INTRODUCTION

1.1 Background

Majority of the Nepalese population residing in the rural areas of the country lie below the poverty line and are very far away from the basic minimum requirements. Drinking water is also one of the basic minimum needs of all human beings and provision of convenient, safe, clean and adequate drinking water is the declared commitment of Government of Nepal. Most of the people have the opinion that government should provide free water supplies because water is freely gifted by nature. But, it should be remembered that everything has a cost for production. Supply of water also incurs cost. It has been realized that the development of Water Supply and Sanitation Sector brings in enhanced socio-economic benefits and public health improvement. Population growth, rapid urbanization and industrialization are imposing rapid growth on demands of water supply and it pressurizes the government for the development of water resources. The growing imbalance between the demand and supply of safe drinking water has brought about several problems like shortage of drinking water, population and environmental degradation. As a result a high incidence of water related diseases causes significantly low productivity in many parts of this country. In the Terai lowland in the southern belt of the country, arsenic content has degraded water quality. The World Water Forum held in Japan has warned of the impacts of arsenic in Nepal. Unreliable water supply infrastructure has also affected public health. Outdated leaking pipelines lay parallel to the sewer lines are easily contaminated, leading to gastroenteritis. Inadequate access of safe water supplies with poor environmental sanitation and personal hygienic practices are the main causes of water borne disease in rural as well as in urban areas of Nepal. It gives rise to diarrhea, dysentery, hepatitis and parasitic diseases and exorbitant anemia and malnutrition has been found among the children. These diseases frequently take an epidemic form causing sudden heavy demand of health services, which have only limited resources to combat these outbreaks.

Some national and international governmental and non-governmental agencies are being involved to deliver safe drinking water and sanitation in both urban and rural areas. These NGOs and INGOs have been playing and effective role in the drinking water and sanitation sector through the implementation of water supplies projects which are usually integrative in nature and incorporate with the high level of people's participation. The most active providers of services in WECS (Water and Environmental Sanitation) sectors are the Department of Water Supply and Sewerage (DWSS), Local Authorities (DDCs and VDCs), External Support Agencies (ESAs), Non-Governmental Organizations (NGOs), CBOs and user's committees.

Rural Water Supply & Sanitation Fund Development Board (RWSSFDB), with the grant aid of World Bank and DFID is working in the field of the drinking water supply scheme in rural areas of Nepal. A similar program of drinking water and sanitation was carried out in Harsahi/Tandi VDC of Sindhuli district. This water supply scheme is a gravity type, located in ward numbers 1, 2 & 7. The scheme provides water supply facility to 238 households. The main source of water is stream water. The program was implemented by district level NGO- Rural Development Society (RUDESO), Sindhuli in 2005 A.D.

In this study, an attempt will be made in micro-level to focus on some of the social and economic characteristics of the study area. The social part of the study will mainly discusses about caste/ethnicity structure, health status, educational status, family structure, households and average family size. Likewise, the economic study of the study area will focus on income generating activities, sources, incomes, and various other aspects related to the economy of the study area.

1.2 Statement of the Problem

Enough has been said and written about the country's water resources. Water is definitely the biggest resource in Nepal and it should have been harnessed a long time ago for the benefit of the Nepalese economy and society. Water can be used for various purposes like in irrigation, power and navigation and safe drinking water which in turn results in economic growth. Water is a resource that is found in abundance and is scattered all over the country. Harnessing it for safe drinking water, energy and irrigation equitably can genuinely be an instrument for socio-economic development. It helps to generate additional employment in agriculture and off farm activities, supports extension of education and health facility to remote areas and helps to protect the environment.

Being a second biggest country in terms of water resources, Nepal is in poor economic condition and has other domestic problems. Households generally use water from more than one source in order to meet their various domestic water requirements. The fact that households generally use water from more than one source should not, however, be construed to imply that water availability is not a problem. It is, but more so during specific times of the year than in others. Although spring sources do have water throughout the year, availability varies considerably. During the rainy season (i.e., the months of June, July, August and September), nearby spring sources have ample water.

Water schemes are constructed in the villages of Nepal and they are yet to be seen whether the expected outcomes of the schemes are achieved or not. There might be some adverse impacts brought by the drinking water. Or, the water schemes may not be sufficiently designed or people's participation has discarded.

Drinking water facility was made available in the ward number 1,2 and 7 of Tandi and Harsahi VDC of Sindhuli district before 3 years. Prior to this scheme, people were dependent on river/stream/well and *Kuwa* for fulfilling their need of drinking water. Now, they have tap water facility. A local NGO called RUDESO had implemented the drinking water and sanitation project with the support of Rural Water Supply & Sanitation Fund Development Board (RWSSFDB).

It is now felt required to assess the impacts brought by the drinking water program on the local people. This study aim at answering the following questions:

- What are the social impacts brought by the drinking water project?
- How has the drinking water project helped the local people to raise their income?
- What are the changes that local people have experienced in their health condition following the new drinking water scheme?
- Is the water sufficient and equally distributed?
- How has the drinking water managed/maintained?

1.3 Objectives of the Study

The general objective set for the study is to evaluate the socio-economic impacts upon the beneficiaries of the drinking water scheme in the study area.

The specific objectives of the study are as follows:

- To explore the socioeconomic impact of the drinking water project on the local people.
- To assess the improvement in health condition of the local people following the drinking water and sanitation program
- To examine the local people's participation on the project management.

1.4 Significance of the Study

Water is recognized as one of the most important basic needs of the people. Provision of safe drinking water in adequate quantities is the present requirement of the people. Public water supplies are in operation to meet the increasing requirement of the consumers. Subsequently the quality of drinking water has become a prominent issue in these days. The government policies are to ensure sustainability and ownership by the users groups in the community.

It is realized that the development of safe drinking water supply, both in terms of quantity and quality enhances socio-economic benefits and public health improvement.

Regarding the significance of the study, the study will depict the people's participation in the scheme, benefits so far received by the local people after the completion of the scheme, willingness to pay for the operation of the water schemes, and the probable socio-economic impact evaluation of drinking water scheme in Harsahi/Tandi VDC of Sindhuli district. This study will help to find socio-economic impact of the water supply and sanitation program in the community. It is hoped that the results of the study will be helpful for formulation of strategies and policies while constructing water supply scheme in other areas. This study will also be helpful to researchers, students and interested persons who are willing to carry out further research in the same area or other area of similar characteristics.

1.5 Limitation of the Study

The present study will be based on and limited to the drinking water beneficiaries of ward number 1, 2 and 7 of Tandi/Harsahi VDCs of Sindhuli district. The study will be very specific like that of case studies. So the conclusions drawn from this study will be mere indicative rather than conclusive. The conclusions might not be generalized for the whole. But, the inference might be valid to some extent to those areas, which have similar geographic socio-economic and environmental settings. Moreover there are also other constraints like financial constraint, time constraint, resource constraint etc.

1.4 Organization of the Study

The first chapter is the introductory chapter, which discusses about the background information, statement of the problem objectives etc. Literatures related to drinking water and development has been reviewed on the second chapter under the heading of ' literature review'. Third chapter is all about the research methodology applied for this research. Chapter 4 & 5 are the analysis of data. Chapter five is about the introduction of the study area also discusses about the impact of the drinking water on the local people and chapter five is the summary, conclusions and recommendations.

CHAPTER II
REVIEW OF LITERATURE

Water is infinitely renewable and bountiful resource, water, today defines and confines development aspirations-human, social and economic in many parts of the water. Water is a basic essential for all living beings and an important factor for social and economic development. So it has great values in human life.

The existing situation of water supply system in some of the towns in Nepal is not as desired (MHPP, 1989). It has highlighted the needs and investment required for the water supply. It has pointed out several shortcomings and also forwarded many proposals for reforms. These include need for more water treatment plans upgrading the existing supply networks and proposals for the control of contagious water borne diseases.

WHO guidelines for drinking water quality sets out the health criteria for those drinking water pollutants and other constituents that were examined with a view to recommending guidelines values. In addition, it also provides information regarding the detection of contaminations in water and measures for their control. It contents a review of the toxicological, epidemiological and clinical evidence that was available and used in deriving the recommended guidelines values (WHO, 1991).

Water, the prime need of human is being deteriorated day by day. Due to the increasing global population and livestock, there is more and more water demand on the one hand and on the other it shows the further gradual deterioration in the quality of drinking water. Further analysis indicate that the total global water consumption during the period 1900-2000 is likely to increase ten-fold and this trend is likely to extent well into the twenty-first century. As human population and activities increases, more and more waste products are contaminating the available sources of surface as well as ground water. Among them the major contaminant are untreated or partially treated sewage, agricultural chemical and industrial effluents. There are seriously affecting the quality of available source of water. Thus, water quality management is becoming increasingly an important concern all over the world (Biswas, et al 1993).

Water Resources Act (1992) had been enacted to address the need to make arrangements for rational utilization, conservation, management and development of water resources in Nepal, and to make timely legal arrangements for determining beneficial uses of water resources, preventing environmental and other hazardous effects there of and also for keeping water resources free from pollution. This impact prioritizes the water use as drinking water, irrigation, other agriculture use, hydropower, industrial uses, navigation, recreational uses and other used (HMG/N, 1992).

Water Resources Regulations (1993) was developed to exercise the power conferred by Water Resources Act 1992. These regulations provide detailed guidelines for the implementation of Water Resources Act 1992

The developing countries and the international aid community are facing formidable challenges in the water supply and sanitation sector. Rapid population growth and urbanization are pressing the physical capacities of infrastructure and the natural limits of the ecosystems. Government budgets are strained with conflicting and competing demand for investments resources. Many public institutions in the sector suffer from weak management and lack of an incentives structure to motivate genuine reform. And many initiatives in the sector fall short because they are inflexible, non participatory and unsustainable for a variety of reasons (World Bank, 1993).

The Centre for Research on Environment Health and Population Activities (CREHPA, 1996) had evaluated the program conducted jointly by Nepal Red Cross Society and Japanese Red Cross Society. The main objective of the evaluation was to access the impact of drinking water and sanitation program on the community in the project area of the Terai and Hilly districts. The performance of DWSP activities in terms of hardware and software components, involvement of women and program sustainability was analyzed in that evaluation. The evaluation was based on Participatory Rural Appraisal (PRA) and was found to be satisfactory.

Discussion on the plan of action was carried out to enable the people to breakaway from the vicious circle of poverty to a better quality of life through various strategies (NCRS, 1996). Accordingly the first priority should be given to ensure maximum impacts on health through access to knowledge about personal, domestic and environmental hygiene with the involvement of women. The plan works to increase maximum involvement of communities in the diagnosis problems for planning, implementation and maintenance of water supply schemes and sanitation components. It helps community to obtain sufficient quantity of safe drinking water for personal, domestic and environmental hygiene purpose.

An impact study (Chettry, 1997) based on the Minimum Evaluation Procedure (MEP) framework was carried out in 1997 on Second Water Supply Sector Project (SWSSP) that was implemented by the Department of Water Supply and Sewerage (DWSS) in three out of the five development regions of Nepal during the period 1990-1995. The study sample comprised of 13 schemes with an average population of 700 per scheme. The study focused on: functional status, causes of breakdown, quality and quantity of water used after and before the project, reduction in physical hardship, sanitation, system of operation and maintenance, user committee, the socio-economic characteristics of the area, the impact of the project on the health, economy and society. The result of the study revealed that the functional status and the socio-economic characteristics of the sample were different but in all the 13 schemes, positive impact was found on health, economy and society after the implementation of the schemes.

With the support of Asian Development Bank (ADB), HMG/N has been implementing rural water supply programs in different parts of the country from the last one and half decade. The coverage of drinking water in the country has been really increasing. The programs supported by ADB has initiated from the third phase onwards. The socio-economic components such as ethnicity, income level of affordability and cost sharing have been considered in the selection of schemes. The most important factor was the community participation and that was taken as the topmost requirement for the initiation of rural drinking water projects in the country. Also the training centre built under the third ADB rural water supply sector loan project support to the sustained development of water supply and sanitation sector (ADB, 1998).

Everybody is aware of the fact that the mismanagement of water resources is putting human health and sustainable social and economic development at risk. Explosive growth of urban centers, rapid industrialization, increasing water demand for additional food production, lack of sanitation facilities has all contributed to the progressive depletion and degradation of the fresh water resources. Therefore to safeguard the sustainable supply of safe drinking water, a holistic approach needs to be promoted through integrated Water Resources Management. Not only that, training regarding the water supply and sanitation should also be provided for capacity building both at institutional and individual level. In the context of the challenging task of providing all Nepalese with water supply provision of basic service level by the end of the Ninth Plan, i.e. by 2002, the Human Resources Development (HRD) has a major role to play for enabling the partner agencies like VDCs, NGOs, CBOs and the private sector to take the envisaged tasks and replicate the skills and knowledge on a national scale (Pyakuryal, 1998 a).

The environmental degradation of water resources if a common phenomenon and has a serious consequences on WSS services. A preventive approach through protection and conservation of water resources should be an important aspect of system design and management and shall avoid costly subsequent to rehabilitate and treat water from a polluted source. Water has both social and economic value. It is a social necessity and a basic right for all. It does have an economic value because the supply of water and safe disposal of waste has a cost and the systems can be maintained of sustained only if these costs are recovered. So to make the concept of water as an economic commodity operational, shift in emphasis from supply to demand management principles needs to be adopted. The efficiency of water use should thus be optimal minimizing water losses during transport, storage and use. The involvement of the stakeholders for its management at the lowest appropriate level is thus emphasized (Pyakural, 1998 b).

Water resources in the past were allocated on a first come, first served basis, and for an indefinite period of time. Water was previously limited only to agriculture use but with growth in population, demands on water resources have increased for various other uses. Now time has come to be more selective in allocating this precious resource. The traditional water use handed down does not allow periodic assessment of water use to see if these users are still providing socially beneficial services not it anticipate shortages in our water supply, and hence do not foresee the need to set priorities among water users. But prioritizing water uses along cannot answer the problem of water as a finite resource. Sound management and efficiency in utilization can only address the problem of water as a scarce resource (Shrestha, 1998).

The survival of mankind can be said to be dependent upon the interactions between the three life supporting components of water, sanitation and environment which are inter-dependent to one another. Life owes its existence and obtains its sustenance and growth from these components. Hence the quality of life is closely linked to the qualities of these components. But today man is continuously interfering and causing damages to his own absolutely necessary life support systems: Water, Sanitation and Environment. Therefore, if man has to achieve sound health, happiness, progress and prosperity, he has to protect, preserve, utilize appropriately and sustain these components (Thapa, 1998).

Many developing countries have found no satisfactory utilization of water resources mainly because of their poor economic conditions and their domestic problems. The demand for freshwater is increasing due to the rapid growth in agriculture, industry and urban development. Together with the potential impacts of global warming and climate change on earth’s water cycle, the future availability of freshwater appears more precarious then ever before. Even in countries that currently have sufficient fresh water supplies, increasing demands, pollution and over exploitation put such supplies at risk. These and other issues all point to the urgent need to improve management of out water resources (UNICEF 1998).

Water supply and sanitation sector are facing great challenges in developing countries. The first challenge is to complete the “Old Agenda” of providing household services. Although considerable progress has been made, much remains to be done. A billion people still lack access to and adequate supply of water and 1.7 billion do not have adequate sanitation facilities. So to fulfill the old agenda, the cost of providing services are raising substantially because of rapid urbanization, mismanagement of water resources and the low efficiency of many water supply organization. The second challenge is the "New Agenda" of environmentally sustainable development. The situation is higher in developing then developed country and deteriorating rapidly due to the fact that these countries have fewer financial resources and weaker institutional capability to protect the environment (World Bank, 1998).

More than half of the water used for drinking, washing and irrigation crops comes from under the ground. This subterranean water is known as ground water. It is generally taken for granted that the groundwater drawn from wells is omnipresent and will always be available and clean and safe to drink, but experts are reporting that groundwater sources can dry up through overuse, or become contaminated as a result of pollution, poor sanitation or salt water intrusion. This increasing danger to "Groundwater: the Invisible Resource" was the main theme of world water day on March 22, 1998 and is slowly being emerged in political, economic and personal affairs (WMO, 1998).

No one can dare to produce and pollute the natural resources beyond the set of standards, which will have significant adverse impact on environment or public health and civic life. This statement clearly states that the need of standards to control pollution in natural resources including water is still lacking. The Ministry of Population and Environment (MOPE) has hired four consultants for the development of national environment quality standard since 1998 but has not able to come up with a concrete policy of standards. Only the activities such as preparation of document on water quality surveillance and monitoring, establishment of Drinking Water Quality Criteria/Standards, study of chemicals in drinking water, preparation of action plan for the development of national drinking water quality has been done so far. Issues on water quality are another important factor. There is the need to create awareness on water quality improvement, promotion of ecological sanitation for ground water control, setting up arsenic testing mechanism, setting up standard reference water quality testing laboratory, testing of health related chemical parameters, developing consistent communication strategy to increase awareness among the local communities etc (DWSS, 2001).

In national context, twenty years long term concept of drinking water service has been implementing from ninth plan with classification of basic, medium and high level supply for 15 percent, 60 percent and 25 percent of the people respectively on the basis of water supply quantity, quality and accessibility. The target of the ninth plan was to benefit 100 percent of the population but at the end, result showed that only 71.6 percent of the population could be benefited from drinking water facility. Therefore due emphasis has been given with the effective mobilization of local user's community for the operation and maintenance of drinking water supply system in Tenth Plan (2002-2007). Plan document reveals that the major outcomes from the development of drinking water sector would be, 1) Consistent community driven approach operational sector wide 2) About 3.8 million people have access to safe and sustainable drinking water services. 3) Increased opportunity for enrolment of girl child in schools due to time saved in fetching water 4) Reduced water borne and water washed diseases (NPC, 2002).

At very first sight, water and girls' education don't seem to be linked. Girls can go to school just like boys. But in most countries whereby far fewer girls attend school, girls are kept from going to school because on them falls the role to fetch water for household. They need to take care of younger children when they fall ill with water borne diseases (in Nepal over 72% of the disease burden!). As long as families are connected to a water tap or pump nearby and water pollution is not controlled, families will have to sacrifice time and suffer diseases. Also, often girls have to help collect fodder. The farther it is away, as rainfall becomes scarce; less time is left to go to school. Only when both are addressed is there hope that girls can go to school and get educated. In the school itself, drinking water and water to clean hands and oneself, as well as proper toilets are conditions for especially adolescent girls. Then also education about hygiene in the school makes sense, preparing girls and boys to be responsible as children and as future parents. Development can should promote gender equality and improve water management. Water and development, yes they are crucial for girls' education (Spruijt, 2002).

An annual report of UN emphasized that ready access of safe drinking water for domestic use is vital for good health and for food security. It is also important for overall economic development. Women in rural Africa and Asia still walk and average distance of six km for the nearest water source. This time could be spent on more productive or profitable activities such as family's crops or livestock enterprises often their only source of water is a stagnant seasonal pond, a polluted river or a poorly maintained well, which are often contaminated with germs- bacteria, parasites and viruses. They can cause diarrhea, which is the leading killers in small children in most developing countries (UN, 2001).

Water is considered as a basic indispensable for the survival of human beings. Nepal is rich country of water resources but unfortunately there is an acute drinking water problem in the country (Sundas, 2002). She also sighted that major problem of drinking water mainly in urban areas are 1) inadequate supply by higher demand 2) poor maintenance and repair of the pipe lines and the resources 3) need to address water source protection more systematically 4) lack of reliable information relating drinking water problem 5) legislation not enforced 6) lack of awareness.

Hygiene and Sanitation are important. Without proper hygiene and sanitation, people get sick and children die. In fact the situation is so bad in Nepal that more than 90 percent of people have worms, under five children have more than 4 cases of diarrhea each year causing approximately 28000 children's death every year: cause that could have been easily prevented by better hygienic practices and provision of clean drinking water. Improved water supply and sanitation facilities help, but their introduction does not have a health impact by itself. Proper practices are the most crucial. According to the WHO, 80 percent of infectious diseases in developing countries like in Nepal is related to inadequacies in these two areas. Children are denied their basic right to grow, live and survive with dignity because of communicable diseases related to inadequate hygiene, sanitation and water supply facilities. Environmental Sanitation, Safe Hygiene Practices and Household Water Security are hence the underlying conditions for the survival, protection and development of children (UNICEF, 2002).

Water supply system in urban areas needs to be efficient along with the control of leakages. It has been analyzed that water supply facilities cannot be fully extended by the government effort along. Policy initiatives have taken to involve local community, NGOs and private sector for the extension of such facilities. For the sustainability and the service dependability, concept of community management has been introduced to implement projects in the rural and semi-urban areas. Accordingly minimum 20 percent of the cost should be borne by the community and in case of the project targeted to the backward class of people, 10 percent contribution will suffice. To ensure desired services from the facilities thus completed and the positive impact on public health sanitation and health education program are to be integrated with such scheme for which funds will be embarked. Water quality improvement, promotion of service standard and its dependability are the other elements of the policy initiative (Economic Survey, 2003/04).

The Year 2003 was recognized as the “International Year of Fresh Water” and the World Water Day was celebrated on March 22 of the same year with the slogan “Water for Future”. Some facts which were revealed on that day are 1) 1.1 billion people, roughly one-sixth of world’s population, lack access to safe drinking water and 2.4 billion or 40% of the world’s people lack access to adequate sanitation services 2) some 6000 children die every day from diseases associated with unsafe water and poor sanitation and hygiene-equivalent to 20 jumbo jets crashing-everyday 3) unsafe water and sanitation cause an estimated 80% of all diseases in the developing world 4) water use has grown at twice the rate of population during the past century. The Middle East, North Africa and South Asia are chronically short of water 5) in developing countries, as much as 90% of waste water is discharged without treatment. Thus if present consumption patterns continue, two out of every three persons on earth will live in water stressed conditions by the year 2025 (ENPHO, 2003).

Environmental health risks associated with the lack of safe drinking water and poor sanitation facilities in Nepal is considered very high and available information show increasing morbidity and high mortality cases associated with water borne diseases. Although provision of safe drinking water and sanitation facilities have been given high priority in each of the Five Year Plan period, the achievement however, has always been far less than the set out target. Then Tenth National Plan (2002-2007) as in the past has set out a very ambitious target of providing safe drinking water to all the population by the end of plan period. It is not known whether the target will be achieved or not but the death toll as well as health costs associated with the morbidity cases due to water borne diseases will continue of the present institutional and financing mechanisms are altered towards greater decentralization, community involvement and pricing mechanisms those ensure sustainability of the completed projects, reduce burden on the government, and ensure safe drinking water and sanitation facilities fairly and equitably to the larger segment of the population (Tiwari, 2003).

There are many ways individuals can deal with water problems. Some techniques like rain water harvesting for daily use Solar dis-infection (SODIS) for purification of water, Ecological Sanitation (ECOSAN) for conserving water and recycling nutrients from waste, and building of constructed wetland for treatment of waste water are few of the examples that can be done by every individual or small communities. These techniques are low cost, affordable and sustainable techniques. Everybody will be in win-win situation (Shrestha, 2003).

Increasing water demand, shortage of clean drinking water and pollution of water resources are common phenomenon of urban development. Kathmandu is the best example where people are struggling to get adequate water to meet the daily requirements and at the same time facing problems of polluted water bodies. Kathmandu has already exhausted much of the easily available water resources in the valley and is now pumping out fossil water which is irreplaceable. Kathmandu dreams of Melamchi water but not too many have given thought to the cost and hardship of bringing water to Kathmandu. Melamchi will bring an additional 170 MLD of water increasing the drinking water quantity to about 300 MLD. But more water also means more wastewater. About 80% of the water consumed ends up into rivers and other receiving water bodies as wastewater. This consequence is not thought seriously. Even the mega project like Melamchi has allocated just a mere 4% of the total budget for wastewater management. But this does not mean that the waster water volume should be kept increasing into the rivers. There must be some authority for addressing the issue. Though the national sanitation policy exists, it is more applicable for the rural settings. Sanitation coverage is not just access to toilet facilities and expansion of sewer lines but it must be integrated with the treatment and safe disposal of the wastes. Furthermore, for sustainable development and management of natural resources, the water and sanitation should be given equal priority and should be taken as an integral component of urban development (Shrestha, 2005).

Literature review is one of the most important parts of any research work. For this, different books, journals previous research works, reports, acts, articles, plans and policies, other published and unpublished documents related to the subject will be reviewed.

Every year, March 22 has been celebrating as world water day. In 2002 we have celebrated the Tenth world water day. But in reality, many rural parts of Nepal have been suffering for safe drinking water. At the end of Ninth Plan, the government claimed that roughly 71.6 percent of the populations were benefited from drinking water facility. It is found that more than 40 I/NGOs are involved in providing drinking water in remote areas of Nepal. Due emphasis has been given with the effective mobilization of local user's community for the operation and maintenance of drinking water supply system in Tenth plan. The plan covers the broad issues of development of water supply in rural areas. It adopts an ambitious target of providing safe drinking water to all by the end of the plan.

A book entitled " Plan of Action: Drinking Water and Sanitation Program" published by Nepal Red Cross Society have discussed the plan of action to enable people to break away from the vicious circle of poverty, to a better quality of life through various strategies. The first priority will be given to ensure maximum impact on health through access to knowledge about personal, domestic and environmental hygiene with the involvement of women. The plan will work to increase maximum involvements of communities in the diagnosis of problems for planning, implementation and maintenance of water supply scheme and sanitation component. It will help community to obtain sufficient quality of safe drinking water for personal, domestic and environmental hygiene purpose. (NCRS, 1996).

Integrated Water Resources Management in Asia the Pacific, Water Resources Series No.75, (1995), a book published by UN constants and article titled "Nepal: Drinking Water Supply and Sanitation-Sector Issues and Approaches" (P.88). In this article many aspects related with drinking water are described. Among these aspects some are more important then others. Such as settlement patterns and choice of technologies development strategies, needs of community actions, standard design criteria, instrument and roles of private sector and NGOs (related with drinking water) are described primarily.

World Bank Annual Report of Water and Sanitation Program identify that the challenges facing developing countries and the international aids community in the water and sanitation sector is formidable. Rapid population growth and urbanization are pressing the physical capacities of infrastructure and the natural limits of the ecosystems. Government budgets are strained with conflicting and competing demand for investment resources. Many public institutions in the sector suffer from weak management and lack of an incentives structure to motivate genuine reform. And many initiatives in the sector fall short because they are inflexible, non participatory and unsustainable for a variety of reason.

WHO has published Guidelines for Drinking Water Quality, Vol 2 (1991). This second volume sets out the health criteria for those drinking water pollutants and other constituents that were examined with a view to recommending guidelines values. In addition, it provides information regarding the detection of contaminations in water and measures for their control. It contents a review of the toxicological, epidemiological and clinical evidence that was available and used in deriving the recommended guideline values.

A book entitled Water for Rural Communities: Helping People Help Themselves, (1988), written by John Brisco and David de Ferranti published by World Bank explains important aspects of rural communities water access status and gives a future outlook. Mainly, this book deals various topics such low cost technologies, role of women, benefits and cost and how international community can help etc.

CHAPTER III

RESEARCH METHODOLOGY

The research methodology has been designed so as to solicit the appropriate datas and their analysis. The methodology for the study is primarily a descriptive and explorative type. Both qualitative and quantitative analysis has been carried out for the fulfillment of the research objectives.

3.1 Rational of the Site Selection

The study has been carried out in the ward number 1, 2 & 7 of Tandi/Harsahi VDC of Sindhuli district. Tap drinking water facility was made available in the village 3 years before. Being the study an assessment, the area having drinking water facility has been selected as a study site. On the basis of research problem, two wards of the Tandi/Harsahi VDC, where RUDESO has carried out the drinking water scheme with the support of Rural Water Supply & Sanitation Fund Development Board (RWSSFDB), have been selected.

3.2 Research Design

This study has been carried out on the basis of exploratory research design because the study has focused on to evaluate the impact of drinking water scheme on the local people, benefits of the scheme to the local people and their participation. Moreover the study find out the caste/ethnicity structure, health status, educational status, family structure, households and average family size.

3.3 Nature and Source of Data

The study is based on both primary and secondary data. Primary data was collected through developing a set of questionnaire and testing among the users' group to know the present status and people's view on drinking water and its socio-economic impacts. The secondary data is collected from different organizations related to drinking water.

3.4 Study Universe and Sample

The universe of the study is the beneficiaries' households of Tandi/Harsahi VDC of Sindhuli district. Out of 238 households, 40 households have been sampled. The sample households have been selected on the basis of systematic random sampling.

3.5 Methods of Data Collection

To generate the primary data, semi or unstructured interviews and observation methods has been applied. Similarly interview has also been taken with the concerned community. Informal discussions at *Chautara* also been incorporated for the verification of the data acquired from the questionnaire.

3.5.1 Household Survey

House hold survey has been conducted in the study area. Structured questionnaire has been used to generate the realistic and accurate data from HHs survey of the scheme beneficiaries' households. The questionnaire has been developed to solicit the required information according to objective of the study.

3.5.2 Key Informant Interview

The primary data has been collected from key informants using the semi or unstructured interview method. The interview has been taken as cross checking for data obtained from household survey.

The informant has been interviewed on the impact of scheme on health and hygiene, sanitation, environment, economic status, workload, other income generating activity etc. This information has been taken from scheme area social workers, school teachers and students and project beneficiaries.

3.5.3 Observation

Each household selected in sampling has been visited and scheme has been observed. The data thus obtained are recorded while observing the household environment, kitchen rooms, cleaning posts etc. The previous data has been taken from RUDESO & RWSSFDB.

3.6 Data Analysis and Presentation

All the collected qualitative and quantitative information has been stored out and tabulated and analyzed using simple statistical tools and techniques such percentage, ratio and average. Maps and diagrams has also been used to clarify the study and make it more descriptive. After analyzing the necessary information, conclusion and recommendations has been made.

CHAPTER IV
ANALYSIS OF DATA AND PRESENTATION

This chapter discusses and tries to interpret the data acquired following the methodology adopted above. Analysis of the data of both type: qualitative an quantitative has been made on this process. Diagrams and simple statistical tools such as percentage and mean has been used to interpret the data.

4.1 The Patha Khola Drinking Water and Sanitation Project

Drinking water facility was made available in the ward number 1, 2 and 7 of Tandi and Harsahi VDC of Sindhuli district before 3 years. Prior to this scheme, people were dependent on river/stream/well and *Kuwa* for fulfilling their need of drinking water. Now, they have tap water facility. A local NGO called RUDESO had implemented the drinking water and sanitation project with the support of Rural Water Supply & Sanitation Fund Development Board (RWSSFDB).

The maintenance and operation of the drinking water now is being taken by the drinking water user's committee.

The project had also carried out various trainings related to health and sanitation, some of them include importance of sanitation, information on transmittable diseases, importance of toilet, nutrition and malnutrition, JEEVAN JAL, immunization etc.

4.2 Caste Distribution

The social composition of any place is prime factor for the development of that particular place. In Nepal, there are many places where people of different caste and ethnicity live together and share their happiness and sorrows. The caste distribution of the respondent is shown below.

Table 4.1: Caste Distribution

Category	Number	Percentage
Danuwar	30	75
Musahar	4	10
BiKa	2	5
Tamang	1	2.5
Sarkee	1	2.5
Mager	1	2.5
Sunuwar	1	2.5
Total	40	100

Source: Field Survey, 2008

Caste diversity is clear in the area, 7 castes are found among the respondents. Danuwars are the castes which have the larger number (75%) of the households in the community while number of Brahmins is not existent.

4.3 Educational Status

Education is a source of consciousness paving the way for development. While conducting the survey for educational status of the people, the level of education was divided as bachelor and more, intermediate level, S.L.C, literate and illiterate. Those who can read and write but hasn't has not got the school education is described here as literate and those who can't even read and write has been considered as illiterate. The educational status of the people is shown in the table below.

Table 4.2: Educational Status of the Respondent's family members

Category	Number	Percentage
Literate	110	44.18
Illiterate	42	16.87
1-10 grade	91	36.55
SLC	3	1.20
IA	1	0.40
BA	2	0.80
Total	249	100

Source: Field Survey, 2008

Literate population in the community is very high, with more than 80 percent of the total population being literate. However only 1.2% of the total population have gained the SLC level of education while there are 0.4% and 0.8% have passed Intermediate and Bachelor level of education respectively.

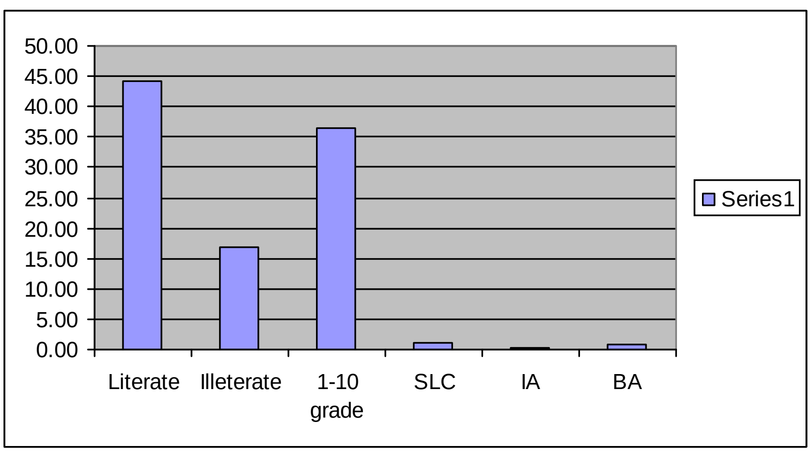

Figure 4. 1: Educational Status

Only 16.87% of the total population has been seen to be illiterate in the study area.

4.4 Occupational Distribution

Occupation is one of the major factors to find out the status of the inhabitant. Four different categories, service, agriculture, business and labour kind of occupation has been taken to find out the level of occupation of the respondents. This is shown in the table below.

Table 4.3: Occupational Distribution of Respondents

Category	Number	Percentage
Service	1	0.42
Farmers	65	27.54
Business	1	0.42
Labour	73	30.93
Unemployed	8	3.39
Student	88	37.29
Total	236	100

Source: Field Survey, 2008

While calculating the occupational structure of the village, the active part of the population has been taken in to account.

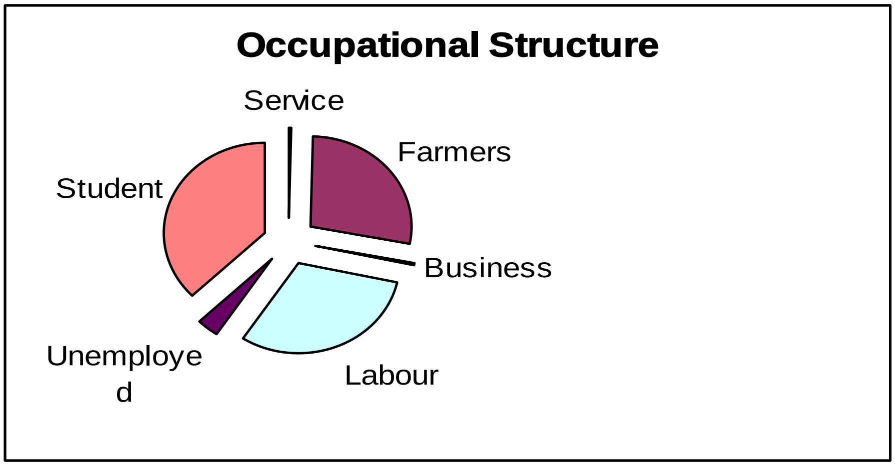

Figure 4. 2: Occupational Structure

27.54 percentage of the total population are engaged in the agriculture sector. Very minimum percentage of the total population is engaged in the service sector (0.42%). About 37% of the total population is student.

4.5 Livestock Rearing Pattern

The study area is an under developed area where most of the people had reared one or more livestock in their house. Those livestock were also one of the sources for income level. The livestock pattern of the respondent is shown in the table below.

Table 4.4: Livestock Rearing Pattern

Category	Before DW	After DW	Percentage Increase
Cow/Ox	20	84	320
Buffalo	2	32	1500
Goat	17	104	511.76
Pig	1	4	300
Total	40	224	460

Source: Field Survey, 2008

The data shows a tremendous increase in the rearing of livestock following the drinking water facility in the village. More of them, buffalo has been increased by 1500 percent followed by the goat 511.76%. Pig farming has also been initiated in the village.

22 households responsed that they had nothing as a livestock in their house prior to the implementation of the drinking water project while after the project only 2 households have nothing reared in their households.

4.6 Other Sources of Drinking Water

It is relevant to explore that if the households are still using the other sources of drinking water to meet their drinking water requirements or for other purposes of the water requirements except the irrigation.

Table 4.5: Other Sources of Drinking Water

Status	Number of HH	Percentage of HH
Yes	9	22.5
No	31	77.5
Total	40	100

Source: Field Survey, 2008

Only few households, about 23% replied that they have been using other sources of drinking water such as well or river. Majority of the households (77.5%) of the total households relay on the new drinking water source (tap).

4.7 Average Consumption of Drinking Water

It is expected that following the sufficient and easy source of drinking water, the consumption of the water also increases. This has also been evidence in the case of the Dudhauli as well.

Table 4.6: Average Consumption of Drinking Water

Categories	Gagri
Before Project	7.63
After Project	16
Increase in Consumption by %	109.84

Source: Field Survey, 2008

Prior to the drinking water project in the village, average consumption of drinking water per household was 7.63 Gagri, while following the drinking water facility in the households, it has been increased by 109.84% and the average consumption per household is reached to be 16 Gagri.

This increase of the consumption is a good example of the impact that house holds keep their house sanitatized and there is sufficient water for their consumption.

4.8 Time to Fetch Water

Following the convenient drinking water facility in the village, it is also expected that the households will have saved their time to fetch the water from the source. Prior to the drinking water tap in their neighborhood, local people had to walk a long way to fetch the water, either from river or from far located natural spring or well.

Table 4.7: Time to Fetch Water

	Before Project	**After Project**
0-10 min	0	37
10-20 min	0	3
20-30 min	4	0
30-40 min	36	0
Total	40	40

Source: Field Survey, 2008

36 out of 40 households used 30-40 minutes to fetch the water prior to the project while 37 out of 40 households use only 0-5 minutes to fetch the water from the constructed nearby tap.

There are only 3 households that take 10-20 minutes of time to fetch the water from the new source (tap).

Table 4.8: Average Time to Fetch Water

Categories	Minutes
Prior to project	27.65
After project	4.18

Source: Field Survey, 2008

The average time to fetch water has also been drastically declined. Prior to the drinking water project in their community, they had to walk long way to bring the water, more often to the river side natural spring and far located well. The average time to fetch water prior to the drinking water project was 27.65 minutes while after the project it is only 4.18 minutes.

4.9 Use of Saved Time

Use of saved time from any development endeavor is important to analyze. The project like drinking water project definitely helps to save the local people's time to fetch water. This drinking water project in Dudhauli village also has also sufficiently contributed for the decreased time to fetch water.

Table 4.9: Use of Saved Time

Category	Number	Percentage
Household work	6	15
Daily labor	12	30
Taking care of livestock	5	12.5
Study	6	15
Kitchen garden	7	17.5
Farming	4	10
Total	40	100

Source: Field Survey, 2008

Most of the households (30%) have been using the saved time for daily labor. This is possible because the households do not have to allocate responsibility of drinking water to a member of the family. Others (17.5%) have started to work more for the kitchen garden located in their house. This has been more eased with the availability of water for the kitchen garden.

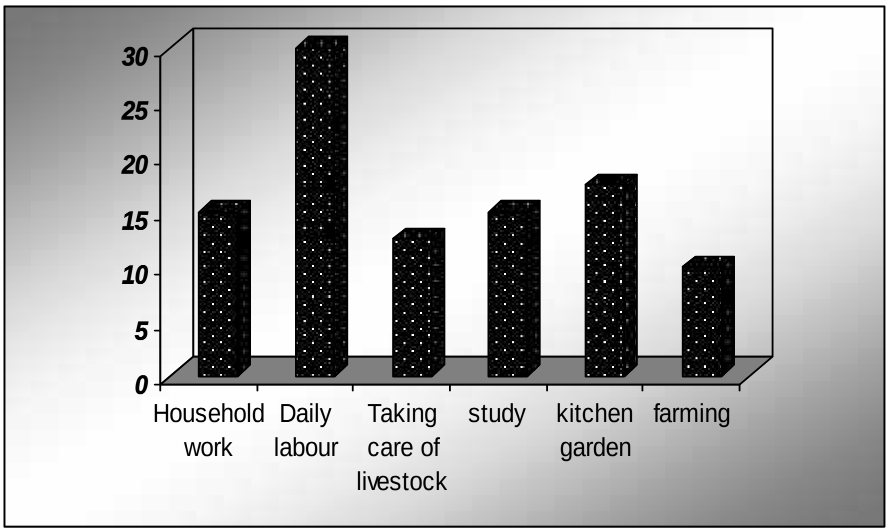

Figure 4.3: Use of Saved Time

15% of the total responded have realized that the saved time has been used for study by the children. They said that their children have the responsibility of fetching water from the source. Only 10% of the households are utilizing the saved time for farming activities.

4.10 Responsible Person for Fetching Water

It is relevant to assess here the responsibility of fetching water in the family. This helps to analyze who has mostly benefited from the project like drinking water.

Table 4.10 : Responsible Person for Fetching Water

Category	No of HH	Percentage
Women	34	85
All members of Family	6	15
Total	40	100

Source: Field Survey, 2008

Not like an exception, similar to other Nepalese community, women are the major responsible person for managing drinking water in the family. In Dudhauli too, 85% of the households' drinking water is brought by the women member of the family. Where as only 15% of the total respondents said that all members of the family are responsible for fetching water.

4.11 Status of Drinking Water in the Village

Many drinking water projects in Nepal are facing with the problem of sustainable operating, or with the irregular distribution of drinking water in the village.

Table 4.11: Status of Drinking Water in the Village

Category	Number	Percentage
Adequate and reliable	37	92.5
Irregular	1	2.5
Not Sufficient	2	5
Total	40	100

Source: Field Survey, 2008

But the majority of the respondents of Dudhauli village said that the present water system is sustainably operated and the water is enough to meet the local demand of drinking water. 92.5% of the total respondents responded to this statement.

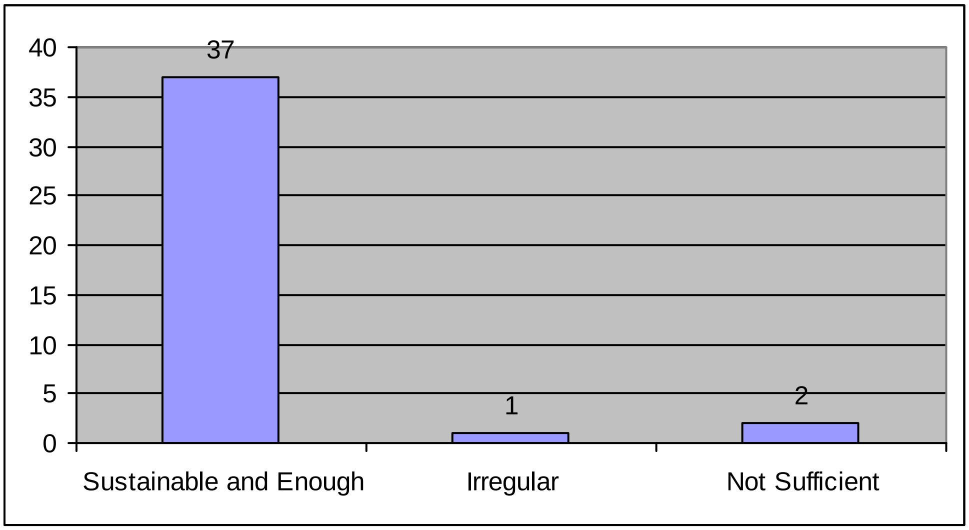

Figure 4.4: Status of Drinking Water

While only 2.5% of the total respondents experienced that the present drinking water facility is irregular. And for 5% of the households, the water system is not sufficient to meet their demand level.

4.12 Quality of Water

The quality of water is very important from health and hygiene point of view. The drinking water projects aim at providing the safe drinking water to the community. This is one of the major objective of drinking water project to provide and sincere to safe drinking water and not only the tap water available in their neighbor.

Table 4.12: Quality of Water

Category	Number	Percentage
Good	38	95
Not bad	2	5
Unhygienic/bad	0	0
Total	40	100

Source: Field Survey, 2008

95% of the total respondents experienced that the present drinking water is healthy and safe. While 5% of the households think the water is not bad.

4.13 Diseases Prior to the Project

Because of the unavailability of the safe drinking water and know how, there are numerous diseases that people are victimized. Many Nepalese have to loss their life due to the diseases caused by the unsafe drinking water.

Table 4.13: Diseases Prior to the Project

Disease	Number of response	Percentage
Diarrhea	21	28
Dysentery	13	17.33
Fever	13	17.33
Tape worm	8	10.67
Abdominal	7	9.33
Skin disease	5	6.67
Typhoid	4	5.33
Pneumonia	2	2.67
Jandis	1	1.33

Eye disease	1	1.33
Total	75	100

Source: Field Survey, 2008

Diarrhea is the disease that kills life of people and mainly caused by the unsafe drinking water the unhygienic practices in the households. But still, the reason for Diarrhea is basically attributed for the unsafe drinking water. 28% of the total response is diarrhea that was the major disease in the village prior to the project.
But following the project, the respondents said that they have not got any health problems to the extent that was prior to the project**.**

4.14 Toilet in the Households

The project also has the toilet construction activity in the community. The project worked for awareness raising for the use and construction of toilet.

Table 4.14: Toilet in the Households

Category	Number	Percentage
Yes	16	40
No	24	60
Total	40	100

Source: Field Survey, 2008

This is surprising to see that only 40% of the total households have toilet built in their house. Still majority of the households (60%) do not have toilet.

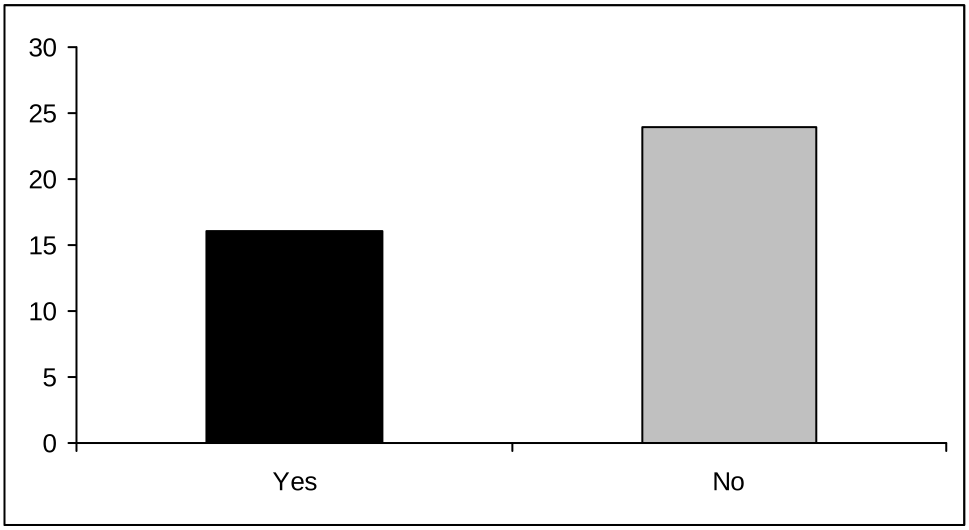

Figure 4.5: Toilet in the Households

4.15 Year of Construction of Toilet

A question regarding the years of construction of the toilet was developed to see whether the toilet is an impact of the project. Since the project is initiated 5 years before, most of the toilet works progressed in the village is due to the project as majority of the toilets are built within the 4 years of time.

Table 4.15: Year of Construction

Category	Number	Percentage
Before 3 yrs	9	56.25
Before 4 years	6	37.5
Within last 1 year	1	6.25
Total	16	100

Source: Field Survey, 2008

The data above shows that the about 56% of the toilets in the village are constructed within the period of 3 to 4 years. While 37.5% of the households have built the toilet before 4 years.

4.16 Sufficient Water in the Toilet

Once the toilet is constructed in the households, it is equally important to see the clieanliness part of the toilet. There has been numerous cases in Nepal that the toilet construction it self is not sufficient to improve the sanitation condition of the settlements. Due to the insufficient water availability for cleaning the toilet from time to time, the hygienic part is not improved.

Table 4.16: Sufficient Water in the Toilet

Category	Number	Percentage
Yes	15	93.75
No	1	6.25
Total	16	100

Source: Field Survey, 2008

The households in the community responded that the new water project in the village has also provided sufficient water for cleaning the toilet from time to time. About 94% of the household responded that they have sufficient water to clean their toilet while only about 6% household has the problem of water to clean the toilet.

4.17 Difference between having and not having a Toilet

An open question was made to find the villager's experience/knowledge about having and not toilet in their households.

Table 4.17 : Difference between having and not having a Toilet

Having toilet	Not Having toilet
sanitation	uncomfortable living
no shy and fear	lack of sanitation
Time saving	loss of time
Easy during night	un easy during night
Easier to elders and children	un easy patients, elders, and children
improvement in health	

Source: Field Survey, 2008

People have experienced that the toilet construction in their households have made the sanitation situation very sound. They also have feel free of shy and fear for defecating their biological waste; especially women have got a lot of relief on this matter. Similarly, toilet has saved their time, otherwise they had to walk for more than half hour for this purpose. They feel easy even during night, easier to children and elders.

4.18 Use of Drinking Water for Irrigation

Following the tap water facility in the village, it is expected that the households will initiate the kitchen garden in their house yard as water sufficiency for organizing the kitchen garden is met.

Table 4.18: Use of Drinking Water for Irrigation

Category	Number	Percentage
Yes	38	95
No	2	5
Total	40	100

Source: Field Survey, 2008

This fact has been proven with the data in the case of Dudhauli village. Not surprisingly, 95% of the households have used the waste (the water once used) in their kitchen garden. Only 5% of the total respondent said that they have not used water for irrigation purpose.

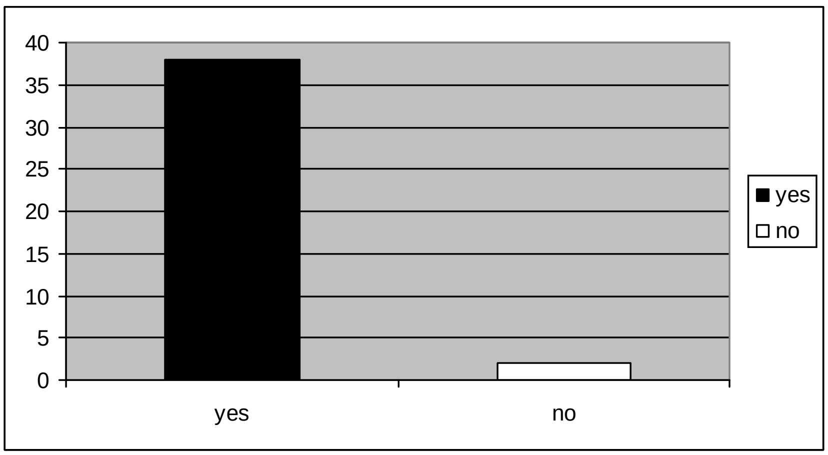

Figure 4.6: Use of Drinking Water for Irrigation

4.19 Other Use of Drinking Water Except for Drinking

Although it is said that the water project is mainly purposed to meet the drinking water requirement of the village, it is apparent that the water available is used in various purposes. And thus the community is benefiting from other aspects of the water availability.

Table 4.19: Other Use of Drinking Water Except for Drinking

Category	Number	percentage
Showering	40	36.36
Wash cloths	40	36.36
Drinking for Cattle	30	27.27
Total	110	100

Source: Field Survey, 2008

This analysis has been made on the basis of preference ranking. Among all the responses, 36% of the responded for they use the water for showering beside drinking water. This also means that their other priority for water in the village is for shower together with the major objective of drinking. Similar percentage of responses falls under the washing cloths and 27% of the response fall under the drinking water for cattle.

4.20 Feel of having Tap Water during the Social/Religious Events

When there are social or religious event in the village or households, the demand of water is excessively high. To meet the increased seasonal demand of water, villagers has to set a separate group to work on it.

Table 4.20: Feel of having Tap Water during the Social/Religious Events

Category	Number of Response	Percentage
Time saving	3	7.5
Very easy	24	60
Feel relief	8	20
Fast	1	2.5
Happy	4	10
Total	40	100

Source: Field Survey, 2008

60% of the responses fall under the category of easiness of having drinking water facility in the village. They have identified it to be very helpful during the period. About 8% of the responses experienced that it is saving time during those events.

4.21 Benefits of having Drinking Water Facility

An opinion and experience soliciting question on benefits of drinking water facility in the village in general was asked.

Table 4.21: Benefits of having Drinking Water Facility

Category	Number	Percentage
Time saving	25	49.02
Improved health conditions	23	45.10
Income through livestock rearing	2	3.92
Sanitation improved	1	1.96
Total	51	100

Source: Field Survey, 2008

50% of the total response ranked the time saving part of drinking water facility in the village to the top priority.45% of total responses ranked the health part to be second prioritized area among the various benefits of drinking water facility.

4.22 Diseases Caused by Unsafe Drinking Water

As a part of the drinking water project, various sanitation and hygiene related trainings and activities were carried out. This is also because drinking water and sanitation should go hand in hand as they are positively correlated.

It is apparent that the community people are well aware of the diseases caused by the unsafe drinking water. 35% of the total responses fall under the diarrhoea being the disease caused by unsafe drinking water. 14% fall under dysentery, and 10% on tape worm. Similarly, there are other diseases has been listed by the respondents which include fever, typhoid, skin diseases, pneumonia, jaundice, eye problems, cough and abdominal problems.

Table 4.22: Diseases Caused by Unsafe Drinking Water

Category	Number	Percentage
Diarrhoea	31	35.63
Dysentery	13	14.94
Tape worm	10	11.49
Fever	8	9.20
Typhoid	6	6.90
Skin disease	4	4.60
Pneumonia	3	3.45
Jaundice	4	4.60
Transmittable disease	2	2.30
Eye disease	2	2.30

Cough	1	1.15
Abdominal	3	3.45
Total	87	100

Source: Field Survey, 2008

4.23 Learning from Trainings

As there were many trainings on sanitation were organized in the village, it is essential to find out how many of them they still remember or which has still influenced them.

Table 4.23: Learning from Trainings

Category	Number of response	Percentage
Environmental sanitation	12	30
Importance of Toilet	9	22.5
Nutrition, Malnutrition	3	7.5
Transmittable disease	7	17.5
Hygiene	8	20
Importance of drinking water	1	2.5
Total	40	100

Source: Field Survey, 2008

Of the total, 30% respondents remembered environmental sanitation training and 22.5% of the total respondents realized the training that they have received on importance of toilet. 20% of the total respondents remember hygiene and 17% for the transmittable diseases.

;

4.24 Sanitation Situation

Respondents were asked to solicit their view on the existing sanitation situation of the village following the project which has carried out number of activities on this matter.

Table 4.24: Sanitation Situation

Category	No. of HH	Percentage
Yes	33	82.5
No	7	17.5
Total	40	100

Source: Field Survey, 2008

Not surprisingly, about 82% of the total respondents feel that the sanitation situation of the village has been sufficiently improved following the project activities while 7% still think that there has not been much improvement.

4.25 Frequency of bathing

When clean water facility is easily accessible and people are aware of the health and hygiene issues, it is expected that their bathing habit also go changes.

Table 4.25: Frequency of Shower

Category	Daily	3 times a week	weekly	more than a week	Total
Before DW			4 (10%)	36 (90%)	40 (100%)
After DW		38 (95%)	2 (5%)		40(100%)

Source: Field Survey, 2008

Prior to the project, 90% of the total respondents used to shower once in more than a week, while following the project, 95% of the total respondents get shower three times a week. This is a great impact of the easy access and sanitation awareness activities carried out in the village.

4.26 Responsibility of Maintenance

The sustainable development issues not only discuss about the environmental aspects of development but also the longevity part of the development initiatives. Until the project and NGO were there in the village, they also take part on any damages of the system. But once they are gone out of village, the system has to continue by the locals.

Table 4.26: Responsibility of Maintenance

Category	Number	Percentage
Drinking water committee	10	25
Village Mobilizer	22	55
All users	8	20
Total	40	100

Source: Field Survey, 2008

55% of the respondents thinks that the maintenance responsibility lies with the village mobilizer. Village mobilizer is the recruited staff of the project, may or may not be continued by the local people once the project period is over.

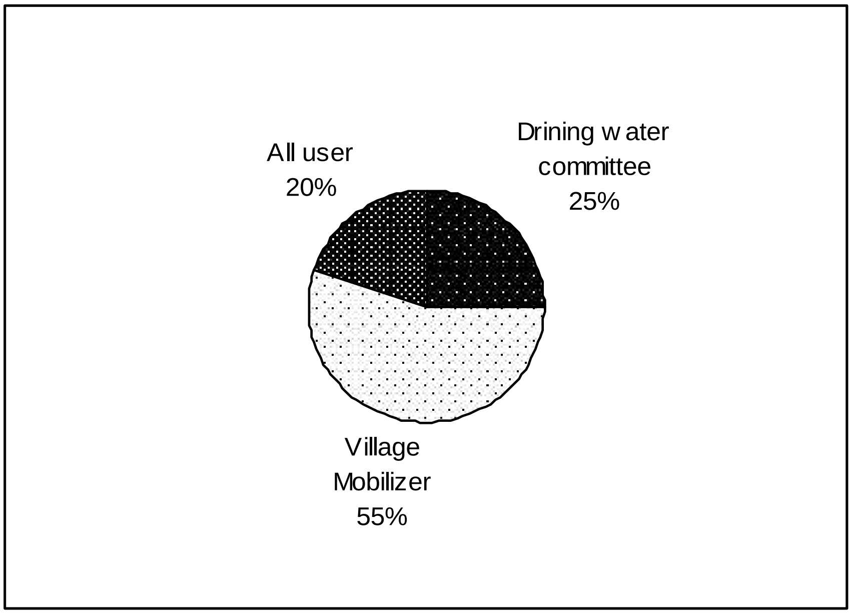

Figure 4.7: Responsibility of Maintenance

25% of the respondents thinks that it is the drinking water committee which is responsible for maintenance. Still, 20% of the households thinks that all users are responsible for maintenance of the drinking water system if any damages occur.

CAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The present study is related with the community drinking water supply scheme of the Sindhuli district. The study has focused on the Rural Water and Sanitation Fund Development Board (RWSFDB) supported program of drinking water in ward no 1, 2 and 7of Harsahi VDC of Sindhuli District. The summary of the major findings of the study are as follows.

- Before the construction of this DWS, drinking water supply was an acute problem in this study area. But after the implementation of this Patha Khola Drinking Water and Sanitation Project, people had easy access to safe, clean and piped drinking water.

- Surprisingly, only about 17% of the total population in the village is illiterate. This seems to be far better than the rest of the rural areas of Nepal in educational status of the village.

- Majority of the population belongs to Danuwar Caste. Danuwars are the indigenous caste of Nepal and their origin is said to be the Sindhuli district.

- The majority of the respondents had agriculture as their prime occupation, directly owning land or by working as a labor in others' land. There were also some people who were engaged in business activities by selling ginger, turmeric, maize and alcohol.

- Majority of the households do not need now to use other sources of drinking water. The present drinking water source has been sufficiently meeting the local demand of water.

- Cattle rearing has been tremendously increased following the water facility in the village. Buffalo rearing has been increased by 1500%. Average livestock rearing has been increased by 4 times compared with the prior to project situation.

- Average quantity of use of drinking water has been doubled following the drinking water availability in the village. Difficulties of fetching water prior to the project had limited the people's water consumption pattern. The average time to fetch water also has been drastically lowered by four times.

- Drinking water tap near by their households has sufficiently decreased the time of fetching water. The saved time has been mostly used in productive areas such as earning, studying, livestock care, kitchen garden etc.

- Primarily, the women are responsible in fetching water from any source. This has led a great relief for women to same their time. Only 15% of the total households responded that all members of the family are responsible for managing water.

- The water available in the village is sustainable and sufficient to meet the local demand. There has been no irregularities cases experienced until now for smooth functioning on the drinking water scheme in the village.

- The existing DWS had provided safe and clean drinking water in this project area. So, it had good impact on health and sanitation.

- The quality of the water is experienced to be hygienic. No such cases of illness due to the present drinking water have been experienced by the villages. Several diseases caused by unsafe drinking water of prior to project have been adequately minimized with the safe drinking water and sanitation programs.

- Even with the great deal of effort to motivate local people for the construction of their private toilet at the houses of the villages, less than half of the households have built the toilet. And the toilets which are built in the village are due to the efforts of the project. The households which have toilet are clean enough with the availability of water.

- Local people are fully aware of advantages of having toilet in the households; even those who have not made the toilet in their households.

- Majority of the households have used the waste water for the irrigation purpose. The water has motivated the local people to start kitchen garden in their house surrounding. The villagers have realized the other use value such as showering, washing cloth, and water for livestock, of drinking water being very helpful to them. Their showering frequency has also been increased.

- The sufficient water availability has eased the villagers during the social/religious events in the village.

- The project organized sanitation related training is very important for keeping the village and households clean. Villagers have realized that the sanitation situation has been adequately improved.

- Operation and maintenance responsibility is still given to Village Maintenance Worker. This would not be a sustainable solution for the drinking water operation in the village. Local people themselves have to take the responsibility.

Thus the existing drinking water scheme has improved the lives of local people in comparison to the time before the implementation of the scheme. The project also provided the sanitation related training is crucial.

5.2 Conclusion

Water is, with the exception of air, the most important single substance to man's survival. Man, like all other forms of biological life, is extremely dependent upon water and can survive much longer without food than he can without water. But in Nepal, a rich country in water resources, still there is large number of population who do not have proper access to safe drinking water and sanitation facility. Water related diseases has been very common which are giving life taking threats for the people living in those areas. Various efforts are still being made by the government of the country, public and private institutions as well as various donor agencies to provide adequate quantities of water of reasonable, though not entirely satisfactory, quality. If sufficient water could be supplied to the people living in rural areas then they could spend their surplus time for income generating activities through which socio-economic progress can take place.

The study in ward no 1. 2 and 7 of Harsahi VDC of Sindhuli district with reference to socio-economic analysis has revealed several aspects of this program. This scheme was constructed 5 years ago with financial assistance from RWSFDB. The short conclusion of this study can be made as:

- Drinking water is the prime need of human being and should be provided to all the people.

- Participation of local people in decision making and implementation of any development program is the most important factor for the successful of the project.

- Adequacy of drinking water is the symptom of human and social development.

- Small scale funding projects regarding drinking water should be implemented in all those rural areas where there is acute drinking water problem.

5.3 Recommendations

Some necessary issues which were ignored in the past are important to improve the quality of the community drinking water scheme. These recommendations are being made in order to make the project more effective in future.

- Local people's participation in all levels of project cycle should be recognized and practiced sincerely. Operation and maintenance responsibilities should be clearly allocated also to the local community and they should feel and ownership of the project.

- The community fund of the project should be also used for construction of toilet by individual families on loan basis, if the loan is the problem of construing the toilet. The toilet construction is seen to be very low compared to the efforts made by the project.

- If possible, awareness program about the utilization of saved time in income generating activities should be conducted to lighten the hard lives of people.

- The drinking water users' committee and the whole people of the community will be responsible for the successful continuity of the scheme after the scheme is handed over to the community. Hence every people of community should be very serious regarding any problem related to drinking water scheme.

- The community should also give proper attention to the sanitary condition of the village so that everybody will remain clean and healthy.

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Annex 1: Questionnaire

An Assessment of Drinking Water and Sanitation Project
Harsahi/Tandi, Sindhuli
Questionnaire

1). Name of the Household Head:

a) Ward number: b) Age:

c) Sex:

d) Family Size : Female Male Total

2) Educational Status of Family (write down in numbers)

a) Illiterate b) Literate c) 1-10 class

d)SLC e) I.A. f)B.A.

3) Primary Occupation of family member (write down in numbers)

a) Service b) Farming c) Business

d) Labor e) Unemployed f) Student

4) Livestock

	Cow/Ox	Buffalo	Goat	Pig	Have nothing
Before Project					
After Project					

5) Do you use other sources of drinking water too beside newly constructed tap water?

No Yes If yes, what sources ______________________

6) How much do you pay for drinking water monthly? ____________

How much would not be expensive for you as monthly expenses for drinking water? ________________________

7) How long does it take to fetch water from current drinking water source? __________

8) How long did it use to take to fetch water prior to the project_________________?

9) How much water does your family consume in a day?

Gagri___________ = Liter _______________

10) How much water does your family used to consume prior to project?

Gagri___________ = Liter _______________

11) how would you rank the preent drinking water system?

a) sustainable/Reliable b) Irregular c) Insufficient

d) Sufficient e) Others____

12) How do you rank the quality of drinking water that you have been using?

a) Hygienic b) moderate c) others

13) What were the water borne diseases that your family was suffering with prior to using this safe drinking water? ____

____

(14) Have you suffered with any water borne diseases due to the use of current drinking water?

No Yes

If yes, What are they ____

15) How has the drinking water project been helpful to you?

a) Time Saving b) Children go to school

c) Improvement in health and hygiene

How ____________________________

d) waste water is used for irrigation purpose?

Others____

If time has been sufficiently saved for fetching drinking water everyday,

How have you been utilizing the saved time so far?

____

16) Do you have toilet?

Yes No

If yes, When did you make it? Years before

Is there sufficient water managed in the toilet? Yes No

17) What are the differences between having and not having toilet in the households?

____

____

18) what are the diseases caused by unsafe drinking water?

____

____

19) Who manages the drinking water in the family? Who is mainly responsible for fetching water?

____

20) What are the learning from the different training organized in the village by the drinking water and sanitation project?

____

____

____

21) Is there improvement in the sanitation situation of community following the drinking water facility?

Yes No

If yes, How____

____

____

22) what do you do to keep the food safe and hygienic?

Before the project____

After the project____

23) How frequently do you get shower?

Category	Daily	3 times a week	weekly	More than a week
Before project				
After project				

24) Who is responsible for operation and maintenance of new drinking water system?

____

____

25) How was your participation in decision making of drinking water project?

____

26) what are the other uses of the drinking water besides drinking?

____

____

27) How has the drinking water facility been helpful during the various religious/social events in the village?

____

28) What are the advantages of the project that you are experiencing?

____

____

29) is there any loss due to the project to you?

____

If yes, what are they____

____