

# CHAPTER-I

## INTRODUCTION

### 1.1 Background of the Study

Nepal is land locked country occupying 1, 47,181 sq km area which is 0.03 percent of the total land mass. It is situated in the transition zone between two bio-geographic realm Palearctic of the north and oriental (Indo-Malayan sub-region) to the south has resulted an extra and ordinary assemblage of flora and fauna.

In general, biodiversity tends to the living seeds, herbs, vegetation, animals and micro creatures and species of the Earth. Nepal is well-recognized for biodiversity. Due to unique environment, the creatures are too diverse. If we glance at the background of biodiversity in Nepal, it occupies the 25<sup>th</sup> and 11<sup>th</sup> position of the world and Asia respectively. To protect the biodiversity, different countries adopt different policies. In the same line, to protect the biological diversity, Government of Nepal forwarded the concept of national park in 1972. Chitwan National was established in 1973. By the same to key of conservation, the reservation and national park assists to protect the biodiversity which resulted in to the concept of wetland to preserve the life of people.

The difficulties of biodiversity in Nepal are represented by the Geo-social and economical situation. So that it is taken as sample to study as biodiversity and its management committee is created accordingly. To develop the eco-tourism, protect the Chauriya Hill, forest resources, economical utilization of wetland, and sustainable presentation of biodiversities the five years integrated broad management plan has been assisting. Similarly in the process of conserving the upper and lower parts of Jamunkhadi lake. It is faced the Beteni along with the natural resources like Bamboo, wild mango and so on.

Wetland differs in ecological system with diverse, soil, vegetation, flora and fauna than the general eco-system. In the general sense, wetland tends to swampy land which has the optimum layer of water than general land. Where there is the preserve of rain in exclusive degree. About 70 % of total land is covered by the water in the world. Among that only 2.5 % of water is fresh and 0.0007 % water is accessible to people as fresh drinking water. Due to growing population, water can be turned in to rare source in the future

world. Wetland is counted as one of the good source for the fresh water. Wetland tends to the place which is not touched by tide of be along with the distance of six meters and is free from nature artificial lake, salty water etc.

Etymologically, wetland was used at first in 1950 and came to the function after 1070. The terms wetland is the developed form of two words. Swim means lower land which is in appropriate for cultivation and shar means the water. That is why simshar is the land which is on the upper source of water. Simshar was concrete after the convention in Ramshar the city of Iran in 1971. After this convention, there was the trend of including the unique place of different country in to simshar (Bhusal, 2012).

Jamunkhadi Lake is located in Surunga VDC in Jhapa District , it is situated about the altitude 142 to 1,474 m. The geographically located of this lake is  $28^{\circ} 35' 58.65''$   $28^{\circ} 49' 11.87''$  northern latitude and  $80^{\circ} 53' 23.82''$   $81^{\circ} 0' 33.02''$  eastely longitudes (DFO, 2012-016).

By the biological and cultural values we can say that wetlands and people are closely linked. People activities often affect wetlands and also people are benefited from the use values of wetlands in this way people life is influencing by use values and misuses. But there is no study and exploration about wetlands ecosystem biodiversity, cultural values. So, there is needed to study about wetlands and their cultural values which people have gained.

Despite, having sufficient natural resources, Nepal has remained unable to utilize them in social and economic development. If they are properly utilized employment opportunities can be created in the rural area and it would ultimately increase the income of the people. in the study area local communities specially Tharu, Janajati and Dalit found more dependent on the wetland resource. The wetland resources are useful in several ways these people. They were found using the wetland plant resources in conventional ways for various purposes since long. But, for them wetlands values very little as they utilized it in a traditional way. In fact the wetlands have much more benefits that they know.

Local people are engaged in cattle locally Pater and mattress making in the area. local people of the study area were formed to depend on this resources for their livelihood and this had helped them in managing their economic needs. These people harvest good

leaves of cattle from the drowned area of the reserve as well as from the barrage area. A especially wooden handle and grass are used to set up a loom to were cattle mattress. Mostly women are engaged to were mattress, whereas men collect raw materials. Mattress are taken to the local area on a bicycle and sold for Rs. 200 to 300 per piece. Fishing is an important occupation of the Tharu community. Fish capture and sale are the common occupation of this people.

## **1.2 Statement of the Problem**

Wetlands are a valuable area for biodiversity in both flora and fauna. Due to the availability of distinct natural environment food and shelters, it is considered as the appropriate habitat area for animals and plants. Wetlands are the kidneys of landscape which were important mainly for water filtration, sedimentation and ground water recharge.

Wetlands are the most productive ecosystem and one important natural resource for economic and developmental sustainability for the countries like Nepal. With the concept of wise use of wetland, it can be used to alleviate poverty that is present in the rural areas of our country. Community people can take a lot of advantages from the wetlands, but the wetland must be used in a sustainable way. In the rural areas, the wetlands are in the state of losing their identity.

Empirical evidences collected by IUCN show that the wetlands of Terai are vulnerable to a number of threats and disturbances. Siltation has been a great threat to wetlands. And agricultural run-off is also a major cause.

As human imposed threats, wetlands have been getting problems of over fishing, over grazing deforestation, pollution and so on. A natural threat such as generational succession and compost accumulation is also deteriorating the wetland.

This area is important not only with biodiversity but also from the religious and cultural perspectives. Religious faith and beliefs as well as cultural values and norms are playing an important role in conservation and utilization of this area. It has been said elsewhere that wetlands are rich naturally as well as culturally but despite this reality, their

management has been bias toward natural resource. So our wetland culture also can play an important role in publicizing the importance of culture in the management of wetlands. Jamunbari is the place where various ethnic groups are settled. Many caste ethnic groups are conserving, utilizing and managing jamunbari Wetland. However, due to geographical disadvantages and lack of information no concrete study are research has been carried out yet in the study area.

Therefore this study will basically try to uplift the issues to conservation and utilization the biodiversity of wetlands area which have played a crucial role in the daily life of the local communities also try to relation between community and wetland.

### **1.3 Objectives of the Study**

The major objectives of the study are to find the relationship between wetland diversity and its utilization of local people the following specific objectives of the study area as follows:

- To assess the management and conservation of wetland diversity in Jamunkhadi lake.
- To examine the interrelationship between local community and wetland.
- To analyze the perception and attitude of local people towards conservation of wetlands and biodiversity.

### **1.4 Important of the Study**

Wetland in Nepal is most neglected ecosystem area. They are generally considered as 'wetland' and one given the least attention in conservation programs. They are also given high priority on conversion into other purpose, especially in the Terai areas of Nepal (Bhandari, 1994).

Biodiversity is the canary of Nepal, different type's biodiversity of Nepal. Like physical, climate animals, and plants, birds, cast ethnic, language, socio-cultural and religious traditional norms and values. Wetland resources are widely used by the local communities of the Terai region of Nepal for their substance and economic wellbeing, wetlands of Nepal are important for the sustainable development as they contribute to the local livelihood of the country significantly.

This study might be helpful in tracing out the present condition of wetlands and biodiversity and its conservation from the information gathered in Jamunbari lake area. The suggestions provided through this study one supposed to be helpful for those who are involved in wetlands and biodiversity, conservation and management, both at public and private sectors. The purpose of this study is to provide some finding of how local people and traditional institutions play the role in wetlands biodiversity and utilization by local people conservation.

### **1.5 Limitation of the Study**

This present study will be limited to wetland diversity and its utilization by local people of Jamunkhadi Lake. It is only limited to wetland and its relationship with local people. Both primary and secondary source of data has been used in the study. Selecting information from all members of Jamunkhadi was not possible so this study is based on sampling method.

### **1.6 Organization of the Study**

This study has been organized into five chapters. The first chapter deals with the introduction. It includes the general information of wetland, statement of problem, objective of the study, importance of the study and limitations of the study. The Second chapter presents the review of literature and conceptual framework. The third chapter deals with the research methodology. It includes the research design, source of data, universe and sample, data collection techniques and tools and analysis as well as interpretation. The fourth chapter presents the data presentation and analysis with profile of the study area. The last chapter of the study offers summary/findings, conclusions and suggestions. Appendices and references have been kept at the end of this report.

## CHAPTER-II

### LITERATURE REVIEW

Nepal has many types of wetland scattered in the Mountain and Terai region. Wetlands are among the most productive ecosystems in the world and are important in terms of their ecological, economic, cultural and recreational values. In this chapter has been reviewed of the literatures.

#### 2.1 Conceptual Review

Simply, wetland refers to lands covered with water. River, streams, lakes, marshy land reservoirs and ponds all are wetland. Even paddy fields and river floodplains are wetland. Most wetlands are naturally found in the earth. Some wetlands are artificially created such as paddy fields, reservoirs, canals, fish ponds and village ponds.

A number of definitions of wetlands are used. Wetland is called *Simsar* in Nepali, which is the combination of two words '*Sim*' a derivative of Persian word '*sih*' which means low graded land not suitable for cultivation and '*Sar*' a Sanskrit word meaning water. Thus, *Simsar* can be interpreted as land with water (IUCN, 1996).

Clarke (1994) has explained that more than 1400 wetlands, covering more than 120 million hectares, have been included in the Ramsar list. The earth, two-third of which is covered by water, looks like a blue planet the planet of water from space. The world's lakes and rivers are probably the planet's most important fresh water resources. But the amount of fresh water covers only 2.53 percent of the earth's water. On the earth's surface, fresh water is the habitat of the large number of species. This aquatic organisms and the ecosystem in which they live represent a substantial sector of the earth's biological diversity.

He further added that it is interesting to know that there one nearly  $14 \times 10^8$  cubic km of water on the planet, of which more than 97.5 percent is in the oceans which covers 71 percent of the earth's surface, of those wetlands, nearly 30 is made up of bogs, 26 percent fens, 20 percent swamps and 15 percent flood plains. Of the earth's fresh water, 69.6 percent is locked up in the continental ice. 30.1 percent in underground aquifers and 0.26

percent in rivers and lakes. In particular lakes and found to occupy less than 0.007 percent of world's fresh water.

Nepal is rich in biological diversity due to its varied climate and altitudinal range with in distance. Although, it covers only 0.001% of the world surface. It includes 4.2% of world's mammal's species, 8.5%, of world's bird's species, 4.25% of world's butterflies' species and 204 kinds of world flowering plant species (Shakya 1995). Likewise in comparison, China is 70 times bigger than Nepal but in flowering species it is only 5 times bigger (Shrestha, 2009).

Table 2.1 Distribution of Wetlands in Nepal's Terai

Wetlands Type	Number	Percentage
Lakes & ponds	78	48
Mashes	13	8
Swamps	5	3
Floodplains	53	33
Reservoirs	6	3
Canals	8	5
Total	163	100

Source: IUCN, 1998

Nepal's wetlands support significant species diversity and populations of globally threatened fauna. According to 2003 IUCN red list 123 globally threatened fauna species occur in Nepal, of which 42 species (34%) are found either in fresh water biomass or are significantly dependent on wetlands. Seventeen of 20 endemic vertebrates in Nepal are wetland dependent in term of wetlands flora, it is believed the 25% of the country's estimated 7000 muscular plants species are wholly or partly wetland dependent. The Nepal biodiversity strategy (2002) notes that there are several endemic plants of Nepal – including 246 angiosperm species, 39 lichens, 30 bryophytes, 16 fungi eight species of teridophytes and three species of a algae. Twenty six of the 246 angiosperm species are wetlands dependent occurring in lakes, marshes and river/stream banks. Nepal's wetlands also hold several species of wild cultivars and wild relatives of cultivated crops, including four species of wild rice and two species of wild rice relatives (IUCN, 2004).

Biologically, wetlands have been found rich in resources and therefore they are also known as kidneys of the landscapes, biological supermarket laboratory for education and research, integrated part of people's life styles is sources, sink and transporter of nutrients (Bhandari, 2006). The wet land is among the most productive ecosystem in the world. Wetland is an important base for economic development of the country and plays vital role of subsistence population. The wetland occupy approximately 5% of the total area of Nepal, is in the form of the rivers, streams, lacks, reservoirs, village ponds, paddy fields, marshes sand swamplands. Wetland is one of the most threatened habitats because of their vulnerability and attractiveness for development. Wetland is important in terms of their ecological, economics, cultural, sociological recreational, religious and aesthetic values. Wetlands are transition and interposition between open water and terrestrial system, providing a major ecological benefit to the environment in terms to bio-diversity habitat for aquatic flora and fauna, hydrological regime, sustaining of local communities and strong large quantity of water recharge (Suwal, 1992).

NWMP (2003) The wetlands of the country's low lands alone supports 32 species of mammals, 461 species of birds among which 15 species are rare) 9 species of turtle 20 species of snake and 28 species of fish. Nepal's wetlands are particularly important for threatened species. These range from Terai to the Himalaya including rivers/streams/lakes/ponds, swamps/marshes, reservoirs and paddy field. According to IUCN 2004 red list about 123 globally threatened fauna species occur in Nepal of which 42 species are found in freshwater biomes. Nearly half of the country's globally threatened birds (14 species) and 10 near threatened species regular inhabit wetland (Baral and Inskipp, 2005).

Wetlands are considered as the kidneys of the landscape. Plants and soils in wetlands play a significant role in purifying water. High levels of nutrients such as phosphorus and nitrogen, commonly associated with agricultural runoff are effectively removed by wetlands. This is important in preventing eutrophication further downstream. Eutrophication is a process that leads to rapid plant and algal growth followed by depleted oxygen levels that affect other species ([www.wetlandfriends.org](http://www.wetlandfriends.org)).

Wetlands are habitats that fall somewhere on the environmental spectrums between land and water. Since wetland i.e. at the interface of terrestrial and aquatic habitats, they possess a unique mixture of species, conditions, and interactions. As a result, wetlands are



among our planet's most diverse and varied habitats. Wetlands are defined by the soils, hydrology, and species that occur within them. Wetlands soils also known as hydro soil is shaped by water. These soils are saturated or even submerged all or part of the year. Hydro soils vary depending on the composition of the soil and water in the area and therefore, wetland vary greatly throughout the world ([www.wetland.np](http://www.wetland.np)).

Wetland occurs in all ecological regions throughout the world except Antarctica. There are wetlands in the Arctic (which include fens, swamps, marshes, and bogs) wetland along coastlines (such s mangrove forests, costal swamps, and tidal marshes), and wetlands throughout inland regions (ponds, marshes, swamps, vernal, pools and riparian systems). Wetlands are highly productive communicative and provided habitat and food resources for a wide range of species. Wetlands have a high level of nutrients and coupled with the availability of water they provide ideal habitat for fish, amphibians, shellfish, and insects. Additionally, many birds and mammals rely on wetlands for food, water breeding gerunds and shelter ([www.wetland.np](http://www.wetland.np)).

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Wetlands are areas of land that are covered with fresh water or saltwater and feature species adapted to life in a saturated environment. They are shallow and allow the growth of rooted or avehored plants such as water lilies but also free floating plants like duckweed. Wetland represents the meeting of two habitats (land and water) and therefore some of the most biodiversity areas in the world (some say more than rainforests) with many land and water species and some that are unique only to the wetlands ([www.wetland.np](http://www.wetland.np)).

Wetlands are among the most biologically productive ecosystems in the world. They are of extreme significance to scores of species many of which are endangered. In the United States for example, one third of the nation's threatened and endangered species live only in wetlands, while half use wetlands during a portion of their lives. Without the wetlands these species would go extinct. Estuarine and marine fish and shellfish and some mammals must have wetlands to survive as they are breeding grounds and provide a rich source of food via decomposing plant matter. Some of the species that live in wetlands include wood ducks and muskrats'. Other fish, mammals, reptiles and birds visit wetlands periodically because they provided food water and shelter. Some of these are others black bears and raccoons ([www.wetland.com.np](http://www.wetland.com.np)).

In addition to being unique ecosystems, wetlands also act as a filter for pollution and excess sediment. This is important because rainwater runoff is normally laden with dangerous pesticides and other pollutants. By going through a wetland prior to reaching open water, this is filtered out and often, excess sediment naturally builds up in the wetland instead of in rivers or other water bodies. Wetland also aid in food protection as they act as sponges that absorb rain and floodwater. Furthermore, wetlands are significant act as a buffer between land and the sea an important thing to have in areas prove to storm surges and hurricanes. Inland wetlands also prevent erosion because the roots of the wetlands vegetation hold soil in place ([www.wetlan.np](http://www.wetlan.np)).

Likewise, IUCN,(2004)has noted that wetlands are “sites distinguished by the presence of water which often have unique soils that differ from the definition of wetlands, the strategy clearly identifies “permanently flowing rivers to seasonal stream” as examples of wetlands.

NWMP (2003) defines "Wetland denotes perennial water bodies that originate from underground source of water or rains. It means swampy areas with following or stagnant fresh or salt water that ore natural or man-made or permanent or temporary wetlands also mean marshy lands, riverside areas and agricultural land”.

The National wetlands policy of Nepal simply covers and addresses wide array of issues which are indeed crucial for conservation and sustainable use of wetlands as well as sharing of the benefits arising from the utilization of wetlands resources. But the major challenge between different government agencies and other organization involved for

conservation of wetlands, is how to ensure effective management and co-ordinate them to ensure effective implementation of the policy (Belbase and Thapa, 2009).

Wetlands are amongst the most productive ecosystem in the world, which have for thousands of years supplied human communities with food, drinking water, building materials and countless other benefits. They also play a critical role in maintaining global biodiversity partly through provision of habitat for especially adopted plant and animal species (IUCN, 2004).

Table 2.2 Estimated Areas of Various Wetland Types in Nepal

Wetlands Types	Estimated area (HA)	Percentage
Rivers	395,000	53.1
Lakes	5,000	0.7
Reservoirs	1,380	0.2
Marshy lands	1,200	1.6
Village ponds	5,183	0.7
Paddy fields	325,000	43.7
Total	743, 563	100

Source: DOAD, 1992

Wetlands are so important because they are the main sources of freshwater and biomass production, which are essential for the survival of living being in the earth. Biologically, wetlands are also known as kidneys of landscape; biological supermarket, laboratory for education and research. Integrated parts of people’s lifestyles and sources, sink and transporter of naturists. Culturally their richness can be compared to treasure, trove such as the sources of supernatural power, refuge for spiritual exploration; source of folklore; dance and art; place for pilgrimage etc (Bhandari, 2006).

The stated contributions of biodiversity to human beings have directly interlinked these natural resources to social, cultural and economic dimensions of human society. Hence, biodiversity which we see in our surroundings is actually a product of the integration of both the soil and biophysical systems. Recognizing the relationship (Shenghi 1996) has given the definition of biodiversity as “Biodiversity can be defined as fundamental natural

resource on which humans are dependent for their livelihood and socio-economic development from ancient to present times, and extending to future generations” (Shenghi, 1996).

Biodiversity is the total variety of life on the earth. Scientists can only guess how many millions of species exist on the planet where a major part of tropical forest, land wetlands, ponds etc. are still little explored. Biodiversity is complex beyond understanding and valuable beyond measures (Chaudhary, 1998).

Wise use is defined as “sustainable utilizations for the benefit of mankind in a way compatible with the maintenance of the natural prosperities of the ecosystem”. Sustainable utilization is understood as “human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations” “wise use” there for has conservation of wetlands, as well as their management and restoration at its heart (Bhandari, 1994).

Many locally available wetland resources can provide a significant source of income if sustainable methods of utilization are known. However due to a lack of existing indigenous knowledge of wetlands resource use as a means of securing alternative and sustainable source of income to support livelihood (Thapa&Dhakal, 2009).

There are strong pragmatic and political grounds for paying detailed attention to the impact of biodiversity erosion and conservation upon human welfare, particularly in cases where conservation effects may affect local people directly. The pragmatic grounds are that coerced and enforced conservation tends to fail in the long run. The political grounds are accentuation of inequalities are related to environmental degradation and so conservation efforts must be seen to address these issues too, and not exacerbate them (Blakie and Sally, 1993).

Most of the threats to biodiversity are linked to pressure of human population on biological resource. Because wetland are very productive habitats most of the population of human kind is concentrated around them and most people depend directly and indirectly the biological resources of wetlands. Imagine a world without wetlands, no lakes, no rivers, no marshes no mangroves, no swamp forest and no shallow marine areas. How would the present human population survive? How much larger would the resource

use pressure be on non-wetland biological resources? How would this the world's biological diversity? This the major issue in wetlands biodiversity conservation (Gadgil, 1993).

New and innovative approaches need to be applied to wetlands management. Also there should be increased financial investment in wetlands management. Wetlands provide many benefits environmental, economic and social. Yet there is limited assessment of these multiple values. Consequently, they are often not reflected critical ecosystem services which are undervalued by many public and private intuitions and markets, but which need to be reflected in national accounts and the markets place (Poudel, 2009).

Adaptation strategies for integrated water resource management require reducing water requirements by different sectors by adopting appropriate tools and techniques and economic instruments, recycling of wastewater should be emphasized. Water saving techniques will be required for agriculture, industry the domestic sector to ensure that he needs of wetland are met. At the same time, wetland management should adapt to the conditions of the changing climate so that wetland ecosystem services are loss affected, our understanding of approaches and methods of wetland management is extremely poor, particular in the western Himalayan region. Hence, the importance of education and awareness as well as capacity building at all levels should be recognized, currently, these are at them lowest ebb in the context of wetlands (Sharma et. al, 2010).

Further, the conservation defines that wetlands may incorporate riparian and coastal zones adjacent to the wetlands and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands. These broad definitions cover the majority of all categories of wetlands including most of the world productive lands which are considered among the most productive ecosystems in the words (Hall, 1997).

National Wetland Policy (2003) has mentioned that its main objectives of conservation of wetland ecosystem including its rich biodiversity and ensuring the participation of local communities for wise use and sustainable management of its components. This policy recognizes wetland management as an essential component of ecosystem approach to natural resource management, classified, wetland from management perspective, laid out plans for its wise use proposed wetlands awareness program, under scored the urgency of

controlling invasive plant species for wetland protection and proposed institutional arrangement for wetlands management.

The importance of integrating local people or community participation in biodiversity conservation is not well recognized. However, there is still a need to strengthen effort to ensure that processes for such integrations are developed and implemented. While enactment of legislation is a step towards that direction, formulation of guidelines and methodologies to promote such participation is essential to achieve the desired end. The latter refers to the details on the nature, scope and ways of participation and the impacts upon other actors responsible for biodiversity conservation. There will then set in motion concerned efforts to effectively reach out to more people communities to participate in conservation under the biodiversity conservation regime (Amando and Tolentiono, 1994).

Nepal also stressed the importance of culture in the management and wise use of wetlands as criterion for site designation as discussed in the meeting, the culture working group discussed changing cultural language, noted the loss traditional activities and emphasize incorporating cultural aspects into wetland management, while respecting social specificity of culture (Karki, 2006).

Table 2.3 Ramsar Sites of Nepal

Site	District	Listed date	Size (ha)
Ghodadhodi Tal	Kailali	13/08/2003	2563
Beeshhazar Tal	Chitawan	13/08/2003	3200
Gokyo Tal	Solukhumbu	23/09/2007	7770
Gosaikund	Rasuwa	13/09/2007	1030
Jagadishpur Reservoir	Kapilvastu	13/08/2003	225
Koshi Tappu	Sunsari	17/12/1987	17500
Maipokhari	Ilam	28/10/2008	90
Phoksundo Tal	Dolpa	23/09/2007	494
Rara Tal	Mugu	23/09/2007	1583

Source: [www.ramsar.org](http://www.ramsar.org)

## **2.2 Important of Wetland**

Lakes, rivers, streams, marshes, swamps, paddies, canals and reservoirs are important feature of land escape. Their common element is water, the life line of any ecosystem. They are the main sources of water and biomass production, which are essential for the survivable of living beings on the earth. The collectivity of these features is called wetland due to their variations in types, geographical setting, biological diversities and culture, wetland is generally used in the plural form i.e. wetlands (Bhandari, 2006).

Wetlands are among the most productive ecosystem is the world, which have for thousands of yearssupplied human communities with food, drinking water, building materials and countless others benefits. They also play a critical role in maintaining global biodiversity; partly through their rich productivity, which helps to support food chains, and partly through provision of habited for specially adopt plants and animal's species (IUCN, 2004).

Wetland is very important properties for human beings and other living things. It is necessary for the life. Wetland performed many roles in nature conservation. The values of functions have been point below;

### **Source of food**

Wetland is so important for the food production including staples like an rice, fish, vegetables etc. They are considered as fertile land for agriculture. Many ethnic and cast group of Nepal are traditionally dependent on wetlands. For example, the Tharu of Ghodaghodi Lake area has traditionally been dependent on fishing.

### **Resource of Water**

Wetlands are the source of water. Wetlands store water which can be used for irrigation. They hold heavy rain falls, preventing possible flooding downstream .many wetlands help recharge on underground water. They recycling the water and give we fresh drinking water.

### **Wetland as Biological Supermarket**

Wetlands are the store house of biodiversity .wetlands provide habitat for several animal and plants .So it is supermarket of biology.

### **Wetland as Carbon Storehouse**

Wetlands have been identified as significant storehouse of carbon .peat lands and forested wetlands are in particularly important carbon sinks.

### **Destination of Tourism**

Wetlands in Nepal are important tourist destination .The natural beauty as well as the diversity of animal and plant life in many wetlands makes them ideal location for tourists .Bird watching is the prime recreational activity in wetlands.

### **Wetland as Religious Place**

Wetlands have a special religious, historical and cultural importance in Nepal as well .Lakes and rivers are important for many festivals such as Chhat, Naagpanchanmi etc.In Ghodaghodi lake indigenous Tharu people celebrate a traditional festival, Aganpanchanmi, in December and take a holy bath in the lakes.

### **Wetland as the Kidneys of the Landscape**

Wetlands are considered as the kidney of the landscape .Plants and soils in wetlands play a significant role in purifying water .High levels of nutrients such as phosphorus and nitrogen, commonly associated with agricultural run –off, are effectively removed by wetlands ([www.wetlandfriends.org](http://www.wetlandfriends.org)).



## 2.3 Review of Previous Studies

The Ramsar convention on wetlands has defined wetlands as “area of Marsh, fen land or wastes whether natural or artificial, permanent or temporary with water that is static or flowing, fresh, brackish or salt. Including areas of marine water the depth of which at low tide does not exceed six meters” definition also incorporates riparian and coastal zones adjacent to the wet land (Bhandari, et.al. 2003).

Simply wetland refers to land covered with rivers, streams, oceans. Lakes, marshy, land reservoirs and ponds, all are wetland. Even paddy fields and river flood plains are wetlands. Most wetlands are naturally found in the earth some wetlands are artificially created such as paddy fields, reservoirs, canals fish ponds and village ponds. Water is present in the wetlands either seasonally or perennial. For example, water occurs seasonally in flood plains whereas it occurs perennially in oceans. Water may be static or flowing in wetlands. Wetlands occur in river country but how much of the earth’s surface is presently composed of wetlands is not known exactly, the Nepal term for wetlands is “Simsar” which means lands with perennial source of water (Pradhan, 2000).

Biological diversity is the variety of plant, animal and microorganism species on our planet. The number of species is estimated to be between 5 and 50 million of which only 1.4 million have been identified of the 1.4 million which have been identified 248000 are higher plants 9000 are birds, species and 400 are mammals (Rijal, 2011).

Lakes, rivers streams marshes swamps, paddies, canals and reservoirs are important features of landscape. Their common elements are water the lifeline of any ecosystem they are the main of water and biomass production which are essential for the survival of living beings on the earth the collectivity of these features is called wetland due to their variations in types Geographical setting biological diversities and culture, wetland is generally used in the plural form i.e. wetlands (Bhandari, 2006).

The environment of the commune is ensured only when conservation and management of biological resources are integrated with the development of the local community. The development activities inside the reserve should always be sympathetic and sensitive to local culture as well as social norms and values. In order to reduce heavy pressure of humans and livestock on the natural resources inside reserve, the concepts of a buffer

zone and resource area should be brought into practice in consultation with the local community (Bhandari, 1994).

Although Nepal is land locked country. It has many types of wetlands scattered through the mountain and Terai regions. Because of its mountainous physiographic bigger wetlands are rather very few. There are 33 wetlands within the protected area system (Manandhar, 2005).

Nepal is a country, full of various kind of biodiversity manifests human relationship with wetlands in many ways. The variable human relationship are being minimized day by day. Yet in countryside, we can still observe how for generations people from different geographical, ethnic and cultural background have been maintaining strong and close relationship with wetlands. Several communities have developed their own socio-economic and cultural traditions based on their close relationship with wetlands on their neighborhood (Rajaure, 2006).

Nepal's wetlands are facing tremendous anthropogenic pressure. Human induced activities such as deforestation, destructive means of wetlands resources collection (e.g. fishing, gravel and driftwood collection) and water drainage for irrigation are the activities with the longest impact for the deterioration of wetland habitats (IUCN, 2004). In addition to this wetlands are widely covered by invasive weeds. For some years, Nepalese wetlands have heavily suffered from invasive alien plant species primarily water. It was first reported in Nepal in 1966 and is now widely distributed in most of the Terai protected areas (ranging from 75m to 1500m) of Nepal. It has been considered as one of the major problems everywhere in south Asia and caused more damage to Nepal's habitats than any other invasive, allied species (Gopal and Krishnamurthy, 1993).

The literatures on wetlands show that definitions of wetlands fall in two camps. Ecology and conservationist camps. The ecologist looks at wetlands as an ecosystem giving some kind of ecological and social characteristic. To them it is an eco-tone between terrestrial and aquatic communities. The conservationist views it as a composite of a wide range of habitats and attributes including its multiple uses and functions. The former is narrow and latter is broad and inclusive in scope (Bhandari, 2009).

The religious beliefs and cultural performances are the main factors that had to Hindus and Buddhists to visit the lacks of confluence or rivers and observe some rites and rituals according to their traditions. Besides, the culture performances such as songs and dances the worshipping of their respective deities are also embedded in their cultural beliefs. In this regards people from the priest to the shaman from lower to the higher caste groups etc. Visit the wetlands sites for earning merits not only in the world but also for the next world too (Sharma, 2007).

Wetlands are the source of cultural and religious inspiration for indigenous people and attraction of international tourists. This generates business and employment to the communities that increases the values of wetlands ecosystem and generates funds for conservation through tourism revenue and tax (Sherpa, 2008).

## **2.4 Conclusion of Review**

All the above mention literature shows that local people have their own traditions and customs in management and conservation practices. Traditional institutions and indigenous knowledge possessed by the local people have there is the basis of traditional system of natural resources management and conservation. But such activities of local people have been determined with modernization. Younger generation is no longer interested with traditional institutions and indigenous knowledge by which their ancestors maintained their fragile environment. So marriage between traditional and modern technique is essential for the proper management of such kinds of natural resources.

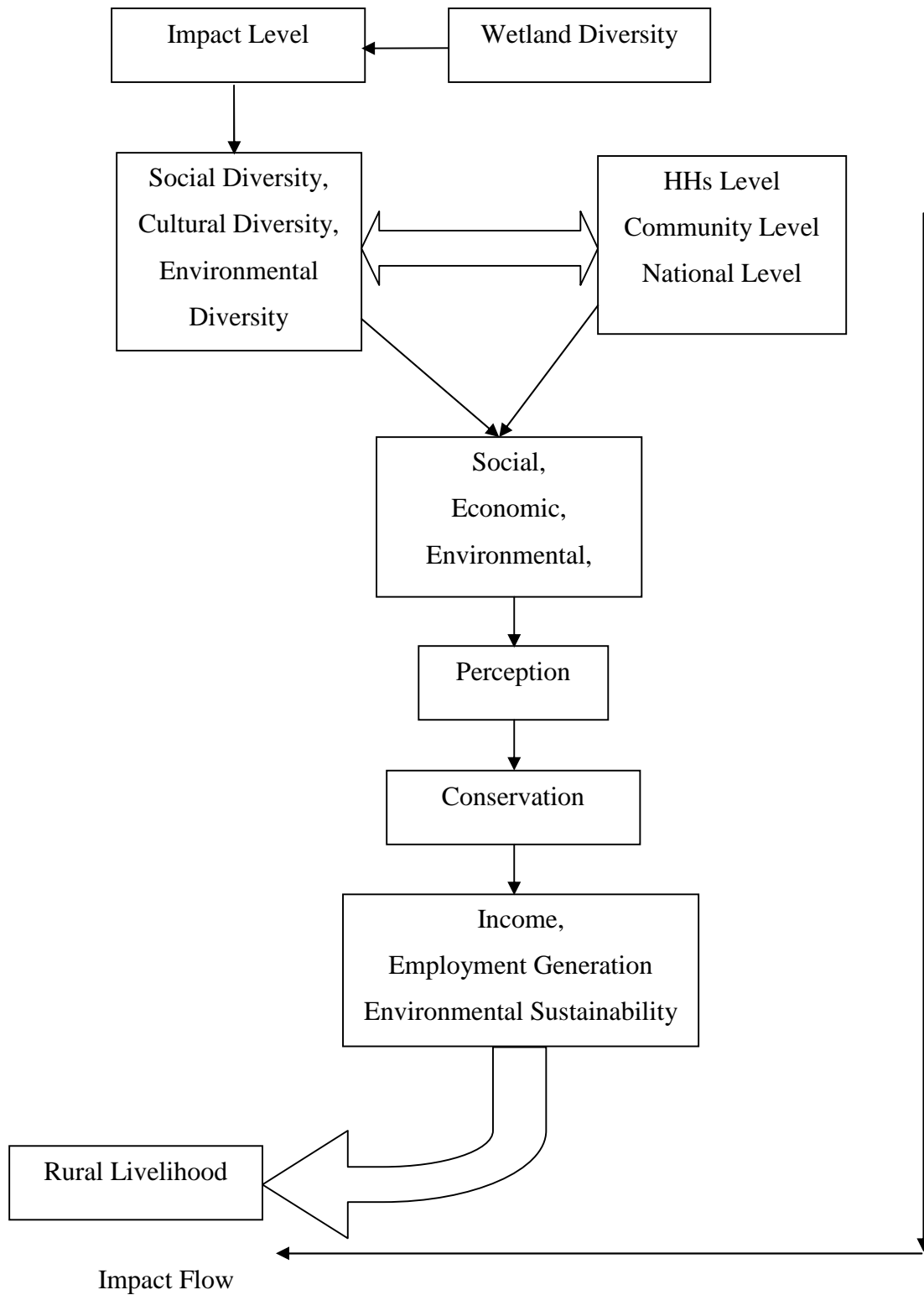
Local community, civil society organizations, government agencies particularly District Forest office and District Development Committee, has been implementing various activities in the area. However, these activities were unable to bring significant improvements in the livelihoods of local communities. They were also not very successful in conserving wetland and forest resource of GLA. Despite reasonable funding for conservation & development activities in Ghodaghodi area, poor coordination among concerned stakeholders & ineffective monitoring and evaluation practice were factors that prevented achieving positive result. So in this study, I had attempted to analyze the inter relationship between the wetland resource and local people's participation as well as the role of community in conservation of wetlands and its biodiversity.

## **2.5 Conceptual Framework**

The independent variable affects dependent variables and they formulate and abstract process, which constructs a figure in a society rural livelihood well, be better only when the wetland conservation programme moved on better way for rural people. Hence, wetland diversity and rural livelihood development are interrelated to each other. On the other hand, wetland diversity conservation program is affected by various human and socio economic factor of their local people.

Hence, for the specification of the variable study the wetland diversity is independent variable and socio-cultural, environmental, households, community have been selected, as dependent variables.

**Figure 2.1 Dependent and Independent Variables**



## **CHAPTER-III**

### **RESEARCH METHODOLOGY**

Methodology is one of the most important parts of any research study. A systematic research study needs to follow a proper methodology achieve the predetermined objectives. Research methodology is a sequential procedure and methods to be adopted in a systematic study.

#### **3.1 Rational of the Study Area**

Jamunkhadi Lake is situated into Eastern Development Region. It is passing through the district of Jhapa. The Jamunkhadi Lake is surrounded at Surung VDC and others two Village Development Committee (VDCs) also. I have selected this area because of my own interest that the place where I want to get new experience in my study and ethnographic knowledge. The study will find out the biodiversity in the Jamunkhadi livelihood condition improvement due to use of diversity resources.

Jamunkhadi is that place with full of religious and cultural significance. The study area supports broad range of wildlife vegetation and resource diversity. People from different cast ethnicity involved in the management and utilization of the wetland. Many of them are depend more on wetland resources for their livelihood. Similarly, it is one of the wetland where conservation and wise use of wetland project is running in addition to this researcher is more familiar with the study area which helped to built report while collecting information.

#### **3.2 Research Design**

This study will be carried out on the basis of description and analytical in nature. It will give focus on the wetland diversity and livelihood status of local people who are directly or indirectly dependent on the wetland diversity. This research will try to find out the interrelationship between local communities who are directly or indirectly dependent on the wetland diversity. This research will try to find out the attitude of local people

towards the conservation. It will give the information on the seasonal availability of wetland diversity on the basis of the interview schedule to the older people, teachers, local leaders, who have the ethno botanical knowledge.

### 3.3 Nature and Source of Data

The quantitative data has been obtained from questionnaire and analyzed using statistical tools. The collected qualitative information will be presented in a descriptive way. The information obtained will be presented in appropriate tables and figures. They are categorized and tabulated according to the objective of the research

Both primary and secondary sources of information had been used for study. The primary data has been collected through observation, interview, questionnaire and key information interview. The secondary data will be gathered from 3 VDCs, District Development Committee (DDC), Jamunkhadi Lake Area Catchment Level Management Plan (2012-016) Jamunkhadi Religious Forest Group (GRFG) conservation and wise use of wetland, CBS and library as well as published and unpublished articles and books.

### 3.4 Universe and Sample

The study area is not homogenous. Stratified random sample has been used to collect data and information. Therefore the study had been based on purposive sampling process.

Status	Total HHs	Sample	Percentage
Tharu	109	29	26.60
Chhetri	127	33	25.98
Brahmin	98	26	26.53
Dalit	24	6	25
Dasnami	3	1	33
Janajati	27	5	18.51
Total	388	100	25.8

There are all together 388 households in the study area. Among them 100 household was taken from the total households of the study area. 29(26.60%) Tharu Households, Chhetri33 (25.98%), 26 (26.53) Brahmin, 6 (25%) Dalit, 1 (33%) Dasnami and 5 (18.51%) Janajati, were selected as sampled population. The selection was educated by

applying stratified sampling method. Total population based on age, sex, status, cast and education of particular ward no 2 of Jamunxhadi VDC. The house hold survey is done in the entire universe.

### **3.5 Data Collection Techniques and Tools**

The study depends both on primary and secondary data. The primary data had been collected from the fieldwork conducted during household survey, key informant interview and observation using following techniques;

#### **3.5.1 Household Survey**

A set of questionnaire has been used as a tool to collect primary data in order to achieve the research objectives. Sex, ethnicity, education, family size, marital status, income, expenditure, attitude and practices and influences in conservation were collected through household's survey. Head of households were interviewed in order to get relevant information of their respective households.

#### **3.5.2 Key Information Interview**

Key informant interview had applied to obtain information from the knowledgeable persons of the community (teachers, government officers, older persons, political leaders) who known the aspect of the Jamunxhadi Lake historical, political, cultural and provides the information in details about their knowledgeable and experience in conservation of wetland and its biodiversity.

#### **3.5.3 Observation**

Observation has been carried out number of times, during field visit. Observation has been made about present condition of wetlands biodiversity and its interrelationship with community. The cultural, social and linguistics values also has been under spotlight of research of further the level used of the local people also included inside the circle of research. Important information observed during fieldwork was noted for study.



### **3.6 Data Analysis and Interpretation**

This study had mainly based on descriptive statistics. After the field surveys the data and other information has been arranged in tabular form according to the needs of research design. In this study descriptive analytical method will be used to analyze the data and information. The relative information will also be used in analysis chapter which are gather by observation, interview and group discussion. Most of the data will be analyzed in two ways. The first was based on percentage of respondents. Some maps and diagrams were also prepared for the better visualization of the output.

## CHAPTER-IV

### DATA ANALYSIS AND INTERPRETATION

This chapter has analyzed the collected data with respect to the objectives of the study. In this chapter data available from survey is tabulated. It has been included the study area profile also.

#### 4.1 Profile of the Study Area

Jhapa district is the district having many wetlands due to availability of dense forest over the district. Thus, the fate of the wetlands and the dwellers is closely linked with the fate of the dense forest. Jamunxhadi Lake situated in the middle of the district is a significant wetland of this area. It is central attraction for national and international organizations due to its complete biodiversity that has been extended approximately in 8.25 sq. km. Therefore timely management of this lake-group can assist in the sector of economy and community development in this region.

Jhapa district is located in mechi zone in eastern Development Region situated in the Northern latitude of  $28^{\circ} 24'$ - $29^{\circ} 18'$  and in the longitude of  $80^{\circ} 30' - 81^{\circ} 15'$  due to basin of the Ganges in the south there is alluvial and fertile land whereas in the south the Bhabar area is situated consisting sandy and concrete area of Churia range. Surkhet and Bardiya district lie in the east of kailali Dadeldhura and Kanchanpur lies in the west. Likewise, The total area of jhapa is 3,235 sq. km. with the total population of 7, 75,709 and 61.8 percent territory is occupied with dense forest (CBS, 2011). Approximately, 13.2 percent territory is covered with 35 wetland areas which contain the area of five hectares each (Bhandari, 1996).

Jamunxhadi Lake is the biggest lake of this lake group which is situated in the Northern latitudes of 28° 41' 03" and the eastern longitude of 80° 56' 45" at the elevation of 205m from the sea-level in Terai region. There are nearly 20 hillocks around the lake. The lake is stretched in 19 corners in the plam-fingers shape. Among them the biggest corner in the north is called Badaka Shira. The lake occupies the total area of 138 hectors, (Bhandari, 1996). More than 450 races of plants 35 kinds of fishes, 148 kinds of birds, 132 types of butterflies, 4 types of snails, 7 types of reptiles are available in this area. Especially this place is the important home place of birds. This lake is located in 205 meters height. The central part of Jamunxhadi Lake lies in here are several myths about the origin of lake. Once of the area of lake was a beautiful village. The heavy downpour throughout the nigh terminated the village in to a lake. It was informed to king and he sent his obedient horse to known about the disaster. But the horse died before reaching the spot. In order to acquire the message of the spot the bereaved king sent a mare again.

### **Climate**

The study area enjoys the tropical monsoon type of climate with dry winter and rainy summer. GLA experiences tropical to subtropical climate. Subtropical in the Terai and temperate in the Churia hills. High temperature during March to may prevail resulting in fire hazards in forest area. In the Terai, the maximum temperature is 40°C in the summer and minimum 6° to 4°C in winter. Rainfall pattern varies by months. Most of the rainfall occurs during the three months of rainy season.

### 4.1.2 Flora and Fauna

Both the fresh water lakes are surrounded by mixed deciduous forest. A 28 species of aquatic vegetation (submerged, floating and emergent) were recorded in the GLA (Annex 1).

The wetland and surrounding forest area renew for their rich mammalians fauna. GLA is rich in aquatic fauna particularly the herpetic fauna 43 species of aquatic fauna were recorded in the GLA (Annex 2)

### 4.1.3 Forest Composition

A total of 113 plants species (tree and shrub) were identified during forest inventory (2010) in GLA. These occur in various development stages. The forest is dominant along the lakes. Sindure (*Melatus Philippines's*) is the second dominant tree species found in GLA. Other major three species include jamun (*Syzygicim cumini*), Asane, Kusum, Dudhi and Sadan (Annex-3).

Table 4.2 Development Stages of Tree and Shrub Species

Development stage	No. of Species
Regeneration	71
Sapling	34
Tree	34
Pole	47
Total	186

Source: DFO, 2012

Forest is dense with a secondary layer of vegetation. The main three species in the secondary layer are Bhalayo (*Semecarpas anacardium*) Bhogate

(Muesa maero phyla), Bayer (Ziziphus mauritiana) piyar (Buchanani latifolia) and Sindure (Mallotus philippensis). Trees of Eugenia Kurzzi and Kyamun (Syzigium cumini) are found especially along the lakes during forest inventory. It was observed that riverside species such as Khair (Acacia catcha) and Sissoo (Dalbergia sissoo) were relatively less abundant.

#### 4.1.4 Forest Status

Almost 72 percent of the total area of GLA is covered by forest. Table 4.3 shows changes in forest cover based on the analysis of satellite image (Land sat TM, 1990, 2000 and 2009). The analysis reveals that 583ha of forest land was converted to other land uses between 1990 and 2009. The main reason for land conversions was found to be for agriculture.

Table 4.3 Changes in forest cover between 1990 and 2009

Year	Terai			Chauria			Total		
	Forest	Non-forest	Change Percent	Forest	Non-forest	Change Percent	Forest	Non-forest	Change Percent
1990	5638	2017	64.23	1899	96	94.94	7537	2113	78.12
2000	5582	2073	62.86	1855	140	92.45	7437	2213	76.27
2009	5094	2561	49.73	1860	135	92.74	6954	2696	72.06

Source: DFO, 2010.

The table 4.3 presents that 78.12 percent covered the forest in 1990. The forest has decreased 76.27 percent in 2000. Likewise, the forest has decreased 72.06 percent in 2009. It scenario represents that the forest had been decreased in yearly.

## 4.2 Population Composition and Ethnicity

### 4.2.1 Composition of the Ethnicity

Population is the one of the important aspect of any research. Cast & ethnicity plays an important role in our traditional society. We can find peoples occupation is highly influenced by cast & ethnic group which they belong. This study tried find the wetland dependent communities which are making its livelihood directly & indirectly from the wetland resources of the reserve. So the questionnaire was used to collect the information the communities. People, who are dependent on the wetland resources. The cast ethnic composition of the study area is prepared in table 4.4

Table 4.4 Ethnic Composition

Cast/Ethnicity	No. of Respondent	Male	Femal e	Percentage
Tharu	29	82	93	29
Brahmin	26	52	65	26
Chhetri	33	94	105	32
Dalit	6	15	21	7
Dashami	1	2	3	1
Janajati	5	21	31	5
Total	100	266	318	100

Source: Field Survey, 2016

The table 4.4 Show that 29% of total respondent were from the chaudhary communities followed by Brahmin with 26%. It shows that the highest population of Chhetri can be found on the study area. The respondent from the Dalit & Dasnami community as well as Janajati communities were 90 & 1% & 5% respectively 45% of the respondent are female. More number of male respondents is older people who were not engaged in any occupation.

#### 4.2.2 Age Structure of the Respondents

It deals with the distribution of respondents in following age groups of study area. The age composition of respondents is presented as follows:

Table 4.5 Age Structure of the Respondents

Age group	Number	Percentage
20-30	25	25
31-40	30	30
41-50	21	21
51-60	19	19
61 above	5	5
Total	100	100

Source: Field Survey, 2016

The table 4.5 shows the age group of respondents of study area. Among the total population 31-40 age groups occupies 31% likewise 20-30 age group occupies 25%, 41-50 % 51-60 age groups occupies 21% & 19% respectively & 61 above age group occupies 5% . The age group 20-30 in community is most productive because they are involving in the different types job like Agricultural, fishing, Animal Husbandry, Business & services.

### 4.2.3 Family Type

Family is the major part and cell of the society which has important role in human life. Being a rural sector area is has also found the rural features. In this part of society is has been included size and types as follows:

Table 4.6 Family Types of the Respondents

Type	Number	Percentage
Nuclear Family	52	52
Joint Family	32	32
Extending Family	16	16
Total	100	100

Source: Field Survey, 2016

The table 4.6 shows that 52% of families lived in nuclear family. 32% & 16% live in joint and extended family respectively. It is found that traditional joint family system was breaking up. People preferred the nuclear family for the economic opportunities. In query of researcher why the nuclear family is emerging? The respondents answer was the self dependent economy. Because of this mania of self dependent notion the traditional society tie was replaced by modern values of nuclear family.



#### 4.2.4 Marital Status

The marital status of respondents was identified & percentage in the following tables:

Table 4.7 Distributions of Respondents by Marital Status

Respondent Type	Number	Percentage
Widow	7	7
Married	78	78
Unmarried	15	15
Total	100	100

Source: Field Survey, 2016

The table 4.7 shows that data 77% of the respondents are married. Windows are 7% & 15% respondent are unmarried, Researcher could not find the any cases of the divorce & separateness in the study area. The old people are windows.

#### 4.2.5 Educational Status of Respondent

The field survey carry out the overall educational status of respondents. The given table shows the educational status of the respondents:

Table 4.8 Educational Status of Respondents

Level of Education	No. of Respondents	Percentage
Master	4	4
Diploma	7	7
+2	11	11
S.L.C	15	15
Only Literate	30	30
Illiterate	33	33
Total	100	100

Source: Field Survey, 2016

The table 4.8 shows that 33% of the respondents are found illiterate in the study area. out of them 30% of the respondents are only literate followed by 15% of SLC pass respondents. Similarly, 4%, 7% & 11% respondents had completed masters, diploma & +2 levels. Two Chhetri peoples & 2 Brahmins people have completed master's level education. 2 peoples from Tharu community two from Cheetri 3 people from Brahmin community have completed Diploma level education. All the Damai peoples are illiterate. The most of only literate respondent are female who housewives were. And the older people are illiterate in the study area. All the school-age groups children are admitted is school and they went school regularly.

#### 4.2.6 Major Occupation of the Respondent

The primary occupation of most of the respondent is found agriculture but also some of them have alternative occupation. The occupation structure of the respondents is presented in the table:

Table 4.9 Major occupation of the Respondents

Primary Occupation	No. of Respondent	Percentage
Agriculture	55	55
Business	30	30
Service	8	8
Carpenter	5	5
Animal Husbandry	2	2
Total	100	100

Source: Field Survey, 2016

The table 4.9 shows that 55 percent households' primary occupation is agriculture followed by 30% of business. It shows agriculture is the primary occupation of the study area. So, most of the people living in this area are depending on agriculture for their livelihood. Cash crops & fishing are major agriculture source of income of the local people. Brahmins & Cheetri some Tharu people are engaged in business. Dalit people are engaged in teler mostly landless.

Some educated people are involved in services in government & private services. They are engaged in local level trade and industry but the percentage is very low. Few people went outside the village for services. Police, driver, military, civil servants & some went foreign employments.

#### 4.2.7 Family Income of the Respondents

The total income in the family is analyzed on the basis of monthly income. The income of family is categorized four different series & presented in following table in monthly schedule. The family income is presented in table 4.10:

Table 4.10 Family Income of Respondents

Income (Monthly)	No. of Family	Percentage
20,000 Below	77	77
20,000-40,000	12	12
60,000-80,000	3	3
Total	100	100

Source: Field Survey, 2016

The table 4.10 shows that their family income per months 20 Twenty Thousand 77 household it carry 77% another family income per months 20-40 thousand 12 households & its carry 12% then family income per months 40 to 60 thousand for 8 household and it carry 8% & 60 to 80 thousand for 3 household & it carry 3%. The study shows that collection from more family members has been below 20 thousand monthly incomes.

Food is essential for all to get energy to survive. Man does various works in order to get better food & income for family. Female are involved in households works & business. All the economically active people were employed in different sector like agriculture works, business, fishing, carpenter, teller, service etc.

### 4.3 Management and Conservation of Wetland Diversity in

**Jamunxhadi Lake** :This Asian sensitive wetland area is considered with the concept of forest environment and biological diversity conservation by mobilizing local people of this area. The financial and technical support is taken from District Forest Office (DFO) Jhapa , IUCN Terai soil cycle program and area forest office (Range Post) for the discouragement of open grazing of domestic animals, fishing, killing tortoises and the open area is conserved by facing the area, planting and making trench. Being under the DFO (jhapa ) the community forest registration and formation are done in this area. The financial support is given by Terai soil cycle program. Different networks and forums for Jamunxhadi Lake Conservation and consciousness rising are formed to rise consciousness about environment conservation, biological diversity in the involvement of poor, Dalit, Janajati and females for the improvement of their lifestyle and income capita. Alternative power or income making program are conducted to reduced poverty. Mobilizing the local people cooperating with NGOs and INGOs the forest environment and biological diversity related information is disseminated. This institution is keeping on effort to make people self employed for people's economic, social and educational development. Zoo and park are built. Due to the increased of density employment programs, alternative energy programs are to be conducted conserve biological diversity. Jamunxhadi Lake Cooperative Organization public awareness forum was established aiming the improvement of economic, social, cultural, educational or ecological aspects of the users of community forest.

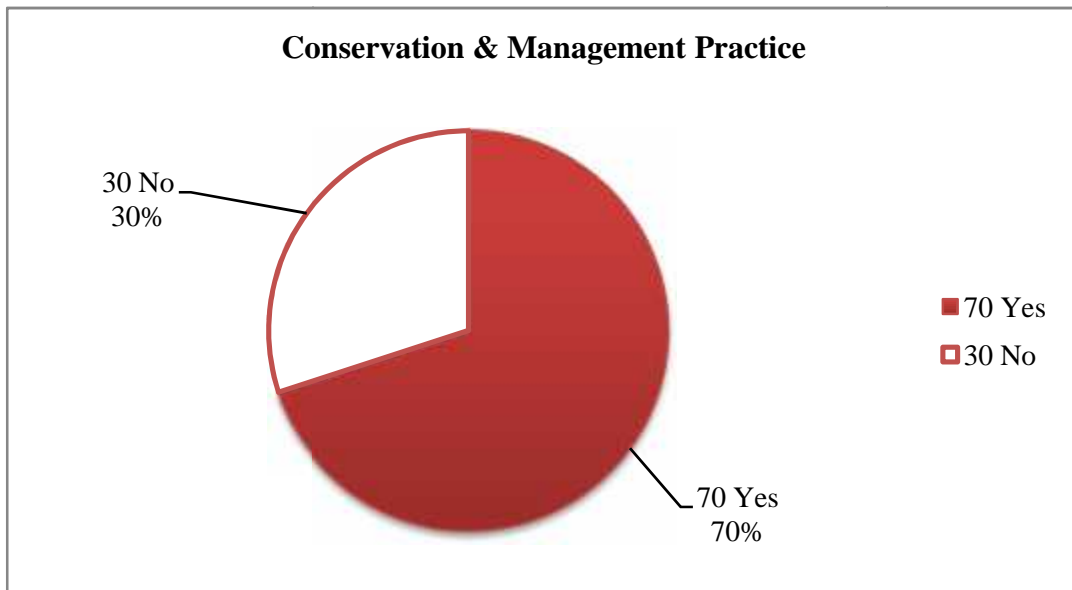
Jamunxhadi Lake area conservation forum has conducted different activities to conserve forest, environment and biological diversity. Crocodile's habitation management is done by this institution. This forum conducted trainings about hunting for local people. Bio-gas reformed ovens are used in three

VDCs. Management of domestic animal tree grass management and unseasonal vegetable producing is also conducted. To make area the eco-Jamunkhadi Lake clubs are formed within 36 schools, community forest and teacher-clubs are also formed. Awareness programs are conducted about forest, environment and ecology by social mobilizing at the local level. For plantation the nursery is established. Agricultural tools are provided to the farmer in the cheaper first by this institution. For Jamunkhadi Lake area conservation 34 communities forest are included. Socio-cycle related trainings are conducted relating with the important of forest conservation to the community. This institution cooperated with district office for forest conservation but not have sufficient budget.

The people's ownership and their commitment towards conservation, management and utilization of resources are found. Illegal hunting is stopped. For the awareness programs eco-clubs, teacher-clubs, community forest users committee, cooperation organization are organized. The involvement of 34 community forest has also played an important role. Wetland policy and forest policy helped the local people to be capable for decision making. So the direct participation of stakeholders for decision making can be seen from different races, castes/ethnic. The local people have got different trainings about forest and animal management and conservation. So, they have the capacity to resolve conflict. Thus, the people are aware of wetland management for forest, environment and ecological conservation.

Maximum number of respondents (70%) were felt to conserve this wetlands because it is the part of the ecosystem as well as to maintain natural beauty and it is the most important place for religious value. It provides many direct and indirect benefits for them but another side some respondents (30%) were disagreed to conserved this wetland, which explains figure 4.1

Figure 4.1 Conservation & Management Practice



Source: Field Survey, 2016

#### 4.4 Interrelationship between Local Community and Wetland

The local people hold the perception to conserve the wetlands within the reserve area. But there are certain confrontations between the wetland and the local people especially on the issues of the wild animal's encroachment on their agriculture land.

Active conservation of habitats had increased wildlife population with in protected areas which start causing damage outside the Ghodaghodi area. The relation between Ghodaghodi Lake & people is imbalanced when the Ghodaghodi area animals damage outside and disturb the adjacent settlement. Damage of agriculture crop, human harassment, injuries and death & livestock depreciation are the common causes of this imbalanced relationship (Sharma, 1997).

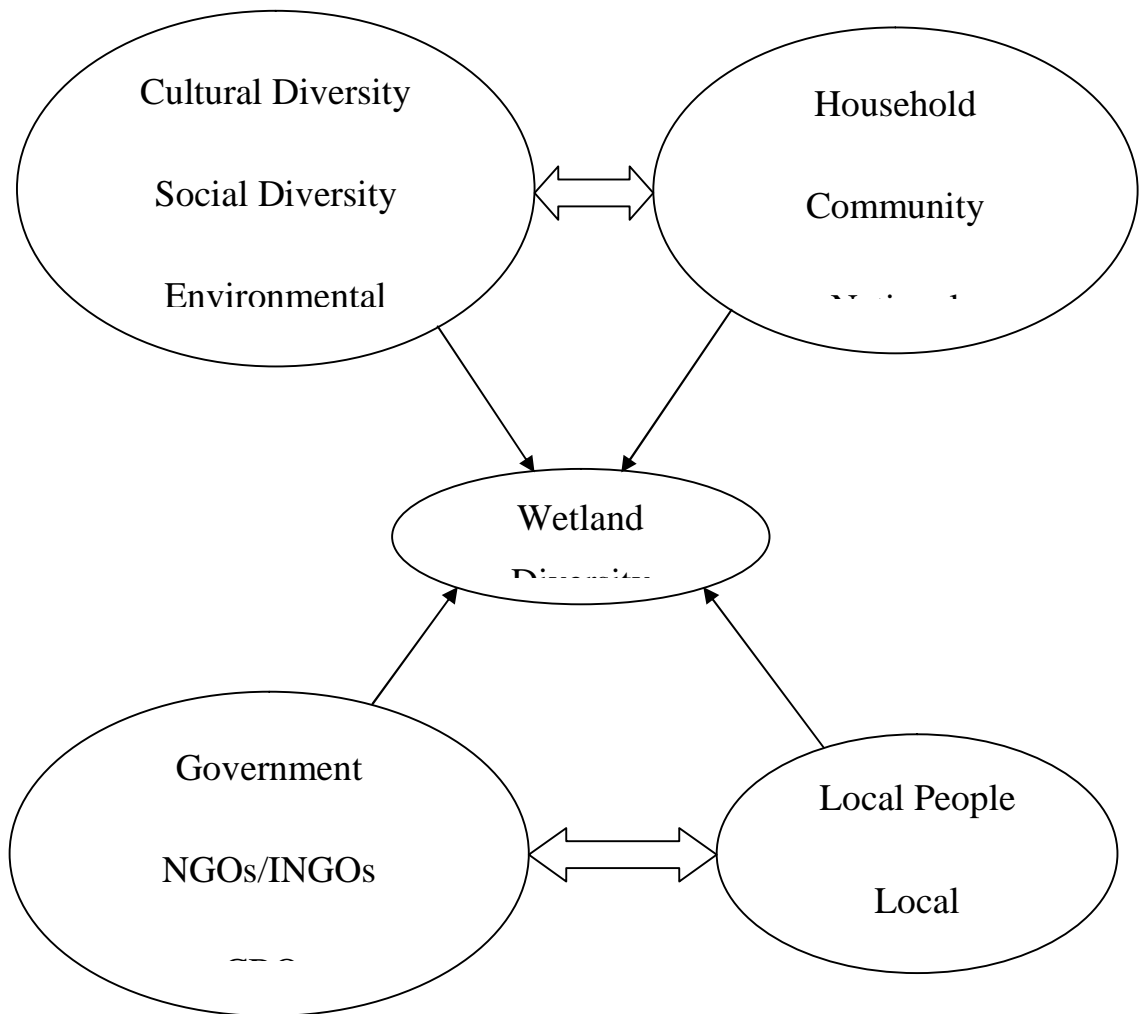
It is a fact that wetlands deliver a wide range of critical and important services vital from human well-being is well-known. Wetland systems directly support millions of people and provide goods and services to the world outside the wetland. People use wetland as sources of fresh water and water transportation for agriculture, they catch wetland fish to eat.

All the local communities near by the wetlands area have strong attachment with the wetlands for their daily livelihood. These communities depend on the wetland services in their day to day life. Wetland can act as the major source of water supply, Irrigation, flow regulation & water transportation for community. In case of wetlands area Jamunxhadi Lake people are benefited from several aspects. Jamunxhadi Lake has strong excess of water storage which may occur during the heavy rainfall. Most of the people of this study area are benefited from this wetland. Among households of this area more than 50 households are fully dependent on the water Irrigation for their daily livelihood because they have no alternative source of water. People are using water for irrigation through the water canals from the outlet of the Jamunxhadi Lake where water is collected from the different other. Wetland is littering around the Jamunxhadi Lake . And women from the poorer families gather wild plants for food and medicines.

The wetland has been supporting and protecting a rich diversity of endemic plant and animals. Species and their genetic diversity help to maintain wetland processes such as water storage, sediment trapping and nutrients. Cycling which are the opportunities for formal & informal education and training to researchers and students from this community & outsiders. According to the Shahi, (2013) wetlands are especially for many migratory birds & plants. The logical & cultural values of Jamunxhadi Lake area attracted national tourists. From different places where they are spending money & times for entertainment & research that benefited the local communities.



Figure 4.2 Relationships between Wetland & Community



#### **4.5 Perception of Local people in Conservation of Wetland and Biodiversity**

The local people of the study area were unaware of the term wetland and biodiversity when they were explained about direct and indirect uses of wetland and the variability of the plants & animals species in this area they conceptualized the term wetland & Biodiversity to their meaning. Nevertheless, they expressed their views & discussed about local efforts to maintain high number of plants, animal's species in this area. They further clarified that they required various wetland product from the wetlands area. This made them increase or maintain the diversity of plants and animals as well as cast & culture in the wetland area.

When the conservational work was done in Jamunkhadi Lake area by GJM the need and aspiration of local people were not taken into consideration just they have realized that the diversity of plants and animals were not able to survive if wetlands area had disappeared. They ranked their activities according to the importance of the species. In this work technical support by the District Forest Office of Jhapa . They made a code of conduct for the conservational activities with the involvement of local people, schools, INGOs/NGOs government representatives & local stakeholders.

The chairman of the GJM expressed his opinion that perception of local people is positive. For the conservational activities and it will be converted into a safe & well protected area within 15 years. However, on the basis of the varieties of plants and animals the community should have to more. Local people created the plan for the animal and plants conserving which would help them for their living alternatives sources. The local people in the present study have mentioned that they would increase or maintain the species diversity in the wetlands area they have been able to the knowledge

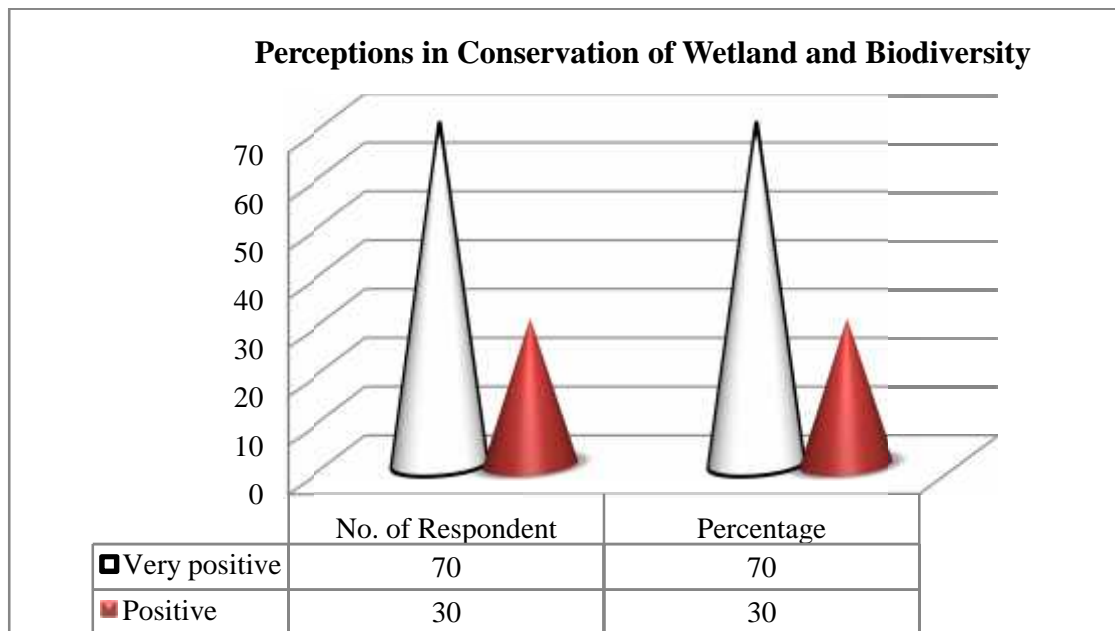
that they could interview in the wetland area to increase the diversity of plants & species of wetlands through management operations. One respondent further emphasized that their activities are not only guided by use values but also by cultural & religious beliefs. He informed that religious belief of local people also played a critical role in conservational activities.

The local people perception towards conservation of wetlands & biodiversity is positive. Most of the local people are conscious about values & benefit of wetland and increased biodiversity.

#### 4.5.1 Wetland Management Related Programme

There are many programmes which are working for conservation and management of wetland. But some respondents are still unknown about it. The following figure 4.2 explains about it.

Figure 4.3 Perceptions in Conservation of Wetland and Biodiversity



Source: Field Survey, 2016

The figure 4.3 shows that 70 percent of the respondents said that there are many programme related to conservation of the wetland area available. And 30 percent of the respondents who have not aware the conservation and management of the lake, were should that there are no any programme which are working the field of wetland conservation.

Next table shows that if there is wetland conservation related programmes are available, in which field they are working.

Table 4.11 Field Working Programme

Field Working Programmes	No. of Respondents	Percentage
ssEducation & Awareness	61	61
Financial Assistance	17	17
Other	22	22
Total	100	100

Source: Field Survey, 2016

Note: other includes sustainable use of wetland resources, biodiversity conservation etc.

The table 4.11 shows that many organizations are working different field of wetland conservation. They have many programmes in different fields. Most of the respondents 61 percentage said that wetland conservation programmes are working in the field of education and awareness. Out of which 17 percent of the respondents said in the field of financial assistance and 22 percent respondents said that the programmed are working others fields.

#### **4.6 Social, Economic and Religious Values of Wetland**

Wetlands are the valuable resources for all living things. People, who are living at periphery area of wetland, have many social benefits through wetland. Out of the total sampled household 70 respondent had believed the great place for religious purpose. They believed that religious value is the most important social aspect. Many people who visited this side and worship to god and goddess Jamunkhadi Lake, It gave name and fame to local people .It is a sustainable place to meet villagers and do conservation about the development activities. It helps to increase in mutual cooperation and coordination between developments related agencies and villager's. There are many wetlands conservations programs are running, it helps to increase social awareness, integration between all caste and class group. They agreed social importance of wetland through economic strength .tourism; irrigation and animal husbandry are the main economic potentiality of wetland. Through economic well being, people's social indicators can be strong.

Majority of the respondents has replied that wetland is the very important resource. It helps to people in their social aspects and overall wellbeing. And 30 respondents were unknown about social important.

Wetlands are important part of environment and biodiversity. It helps to maintain ecological balance and protect flora and fauna diversity. It has many importance economic values for people. Wetlands are valuable resources to human beings. This wetland is very important from point view of religious values. All of the respondents were favored the religious important (100%) were agreed with the religious importance of the wetland .

## **CHAPTER-V**

### **SUMMARY OF FINDINGS, CONCLUSIONS AND SUGGESTIONS**

This chapter contains the summary major findings of the study, conclusions and suggestions that might be helpful for all these who are concerned with Wetland and Biodiversity to improve some of the existing problems faced wetland and biodiversity for the further study.

#### **5.1 Summary of the Major Findings**

Nepal small land locked country which lies between India and China, is very rich in biological diversity and freshwater resources. So many wetlands like Floodplains of the river, ox-bow lakes, swamps, marshes etc. are found here. Nepal houses a diverse group of ethnic communities with their own unique cultures, traditions and language. The best thing about this diversity is that this ethnic community has been living in perfect. This was the reason why late king Prithivi Narayan Shah, the Great mentioned Nepal as a grade of four castes and 36 sub-castes some 250 years ago. Even today Nepal has remained a common garden of all those communities and linguistic groups. But it is sad, that some of these ethnic groups lay in terms of socio-economic conditions. These people are yet to be fully absorbed in the national mainstream for various reasons such as lack of access to basic facilities for education, health and other such facilities. In Kailali there are many lakes such as Ghodaghoohi as well as 19 sub wetland lakes of in this area. Which have high values of wetland?

This study aims to understand wetland diversity and relation with people and practices and influences of community who are the main actor of wetland and biodiversity conservation. The study focused on assesses the interrelationship between community and wetlands explore the perception and attitude towards conservation of wetland and biodiversity. This study competed information from Jamunkhadi Lake wetland area from Jhapa district. Both primary and secondary data were collected by using

observation techniques, questioner methods and revising available records of literature.

Result of the study reveal that the majority of the people depended on the agriculture and some have adopted the profession of Carpenter, fishing, business, services, animal husbandry, those people who fully dependent on the fishing profession lived in poor condition. Their livelihood situation was so measureable. The survey shows that most of the respondents monthly income Rs. 20, 000 below. Poverty is rampant in the area where single households cannot have Rs. 20, 000. The people of here cannot have a sufficient income for their livelihood from the wetland resource. So, these local ethnic people were found to involve in different occupations rather than their traditional occupation.

All the local community near by the wetlands area has strong attachment with the wetland for daily livelihood. These communities depend on the wetland service in their daily life. In the past few conservation organizations supported and worked closely with local NGOs/INGOs and CBOs for the protection and development of Ghodaghodi Lake. Wetland acts as the main source of water supply, irrigation and water transportation for community.

This study was focused only in Jamunkhadi Lake area . Overall literacy rate of this area is about 30 percent but also agriculture is the main occupation of these people about 55 percent are depending on agriculture for their livelihood. An animal husbandry and cereal crop is the traditional occupation of the people. The interrelationship between community and wetland were analyzed according to data gathered from the field by using the different methods and techniques. Wetland and community had a strong relationship in their daily life. The community was benefited from the wetland and its

biodiversity indifferent ways and their activities had also attempted to conserve wetland and biodiversity.

## 5.2 Conclusions

From the summary and findings of this study following conclusion has been run;

- ✎ Women, Dalit and Janajati respondents in depended on wetland resources. Thought the NGOs/INGOs should make wetland dependent people targeted programs but it is not strictly follow.
- ✎ The Jamunkhadi Lake has not enough information of wetland resources as well as conservational knowledge.
- ✎ Some respondents have no idea for wetland resources utilization and conservation.
- ✎ The people of the area are more interested in development and conservation of wetland and pristine beauty.
- ✎ Growing awareness of people indicates the positive factors for wetland and resources management.
- ✎ Most of the wetland depended respondents expected economics supports from wet land resources. Besides also some respondents expected skill development training which from able to increase employment as well as conservation of wetland resources.
- ✎ Likewise, during the field survey most of the respondents alive the wetland resources and change economic condition.
- ✎ All the wetland dependent communities expect the Janajati, Dalit community have a measurable life condition. The earning from the wetland resources cannot support the livelihood of their family.
- ✎ High local community dependence on wetland resources but low involvement in their management low recognition of wetland values.
- ✎ During the study time 28 flora species were recorded and 43 fauna species wetland plants were identify with the assistance of the local stakeholders as well as researcher.
- ✎ Finally, the wetland conservation program of government of Nepal does not encamp pass the objective of biodiversity conservation. After complete this thesis research, this research made up his mind suggest following way forward to policy



makers implements and the users of wetland and biodiversity conservation programs.

### **5.3 Suggestions**

- ☞ Wetland conservation policy and forest conservation policy would be formulated with addressing common agenda because most of the wetlands areas are located with attachment to forest.
- ☞ Jamunxhadi Lake conservation programs must included as much as local people in the conservation activities making them aware on the loss of the wetlands .
- ☞ Effective education and awareness programs on sustainable use of wetland resources be given priority to local stakeholder which is found to be lack in the study are.
- ☞ Alternative technologies should be promoted in the area. Programmers related to the use of clean energy technologies must be given priority in order to minimize the use of fuel wood.
- ☞ Existing local and traditional institutions cultural and religious practices which are functional in wetland and forest management system must be incorporated in wetland and biodiversity conservation program instead if replacing them.
- ☞ Local participations of user groups and community based organizations (CBOs) should be encouraged for the collaborative management of the resources.
- ☞ A detail ethno-botanical survey of the study area in needed because wetlands are rich in biodiversity. People can sustain their livelihood by farming the medicinal plants found in this area.

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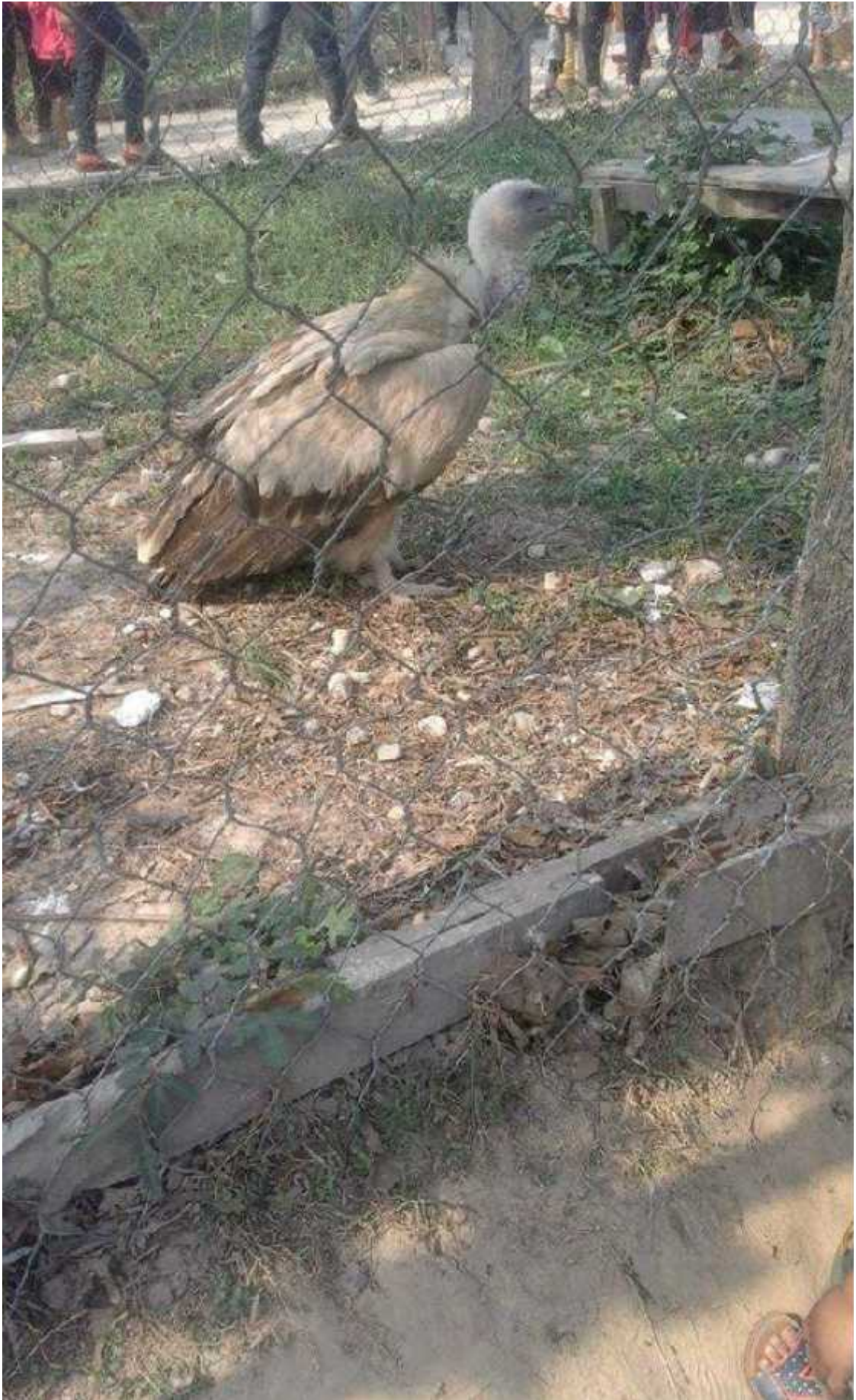
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## Anex



















## Questionnaire for Household Survey

Respondents Name:

Cast:

VDC:

Ward No:

Sex: Male

Female

1. Household information of respondents:

S. N.	Relation with HH Head	Age	Sex	Marital Status	Education	Occupation
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

2. How long have you been living here?
  - a) 1-5 years
  - b) 6-10 years
  - c) 11-20 years
  - d) More than 20 years
  
3. How is your family's monthly income (head of the family ) ?
  - a) Below Rs. 20,000
  - b) Rs. 20,000-40,000
  - c) Rs. 40,000-60,000
  - d) Rs. 60,000-80,000
  - e) Above Rs. 80,000
  
4. How many members of you family are directly engaged in wetland Resources (ues of wetland conservation )?
 

.....
  
5. Who else from your family visit the wetland side for Resources?
  - a) Children
  - b) Wife/husband
  - c) Parents
  - d) Others
  
6. Is it necessary to conserve the wetland and its biodiversity?
  - a) Yes
  - b) No

If yes, why is it necessary? .....
  
7. What is your purpose of visiting the wetland site ?
  - a) For collection of fodder and fuel wood.
  - b) Grazing cattle
  - c) Bathing and swimming
  - d) Collection of edible plant resources.
  - e) Fishing
  - f) Other purposes,(specify).....

8. What are the major factors for wetlands and its biodiversity losses?
- a) Cultural                      b) Environment                      c) Economic
- d) Political                      e) Poaching
- f) Other (specify),.....
9. Have you notices and changes in the biodiversity (loss of local species) in recent time?
- a) Yes    b) No
- If yes, (which local species is loot).....
10. If there any species in your locality which is affected by the loss of wetland?
- a) Yes    b) No
- If yes (specify),.....
11. Which is the effective management practice for wetland and its biodiversity conservation?
- a) Traditional    b) Community use group
- c) Government management                      d) Management by Int'l community
12. How do you use collected resources as a non economic benefit material?
- a) For fertilizer    b) for soil improvement
- c) As livestock feed    d) for bedding
- e) Other please specify
13. Can you tell me why do you flame a traditional/community management practice is better than other?
- .....



14. Do you have conservation knowledge?
- a) Yes
  - b) No,
- If yes, from / when/ whom did you learn?
15. What are the institutions involved in the conservation process of Jamunkhadi wetland area ?
- .....
16. What types of income generating programmes have been lunched for the local people ?
- a) Direct income
  - b) Employment opportunities
  - c) Sealing food
  - d) others
17. What are the Negative impacts of wetland management?
- .....
18. What are the problems faced by local resident due to wetland?
- .....
19. Can you mention the positive aspects of wetland caused by wetland conservation?
- .....
- 20 . whose domestic animal graze in the wetland area ?
- a) Local people
  - b) another village
  - c)
- 21 . what is the source of fuel energy for the cooking ?
- a) Fuel
  - b) fire wood
  - c) Gas
  - d) Dung

22. Do they satisfy with the present management committee?

- a) yes                      b) No

23. how frequently does the local people visit the wetland ?

- a) Daily                      b) bi-weekly/weekly                      c) monthly.

24. what are the feeding sources for livestock ?

- a) CF                      b) wetland, c) Govt forest, d) Grass land e) private forest

25. what types of conflict rises in the wetland utilization ?

- a) resources use b) management committee

## **Key Informants Checklists**

1. What do the wetlands mean to community?
2. What is the perception and attitude towards wetland and biodiversity conservation?
3. Is there any change on wetland and biodiversity conversation pattern?
4. What does the community understand about wetland and biodiversity conservation?
5. What can be the way to be taken up to preserve wetland and biodiversity of this area?





