Chapter – One

INTRODUCTION

1.1 Background

Wetlands are basically the wet areas where the soil is saturated with water for sometime during the year. During rainy seasons many areas receive enough rain so that the soil especially in rural areas remains water saturated for several days. This does not turn all lands into wetlands. Wetlands are characterized, besides their soils by specific plants and animals which are particularly adapted to water logging or submergence of the soils during their growth period. Thus, the term "Wetlands" includes a variety of habitats with permanent or temporary water such as floodplains which are periodically flooded by the river overflowing its banks, shallow water bodies, ponds, puddles, pools and roadside ditches which retain water for several weeks and often support plants and animals characteristics of wetlands. As any patch of land with a few trees cannot be called a forest, all wetlands do not qualify to be a wetland.

The term "wetland" has been used in the broad sense as defined in the text of the convention on wetlands of international importance especially as waterfowl Habitat (The Ramsar Convention, 1987). Thus wetlands are "areas of marsh, fen, peatlands or water, 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 low tide does not exceed six meters".

Wetlands are among the world's most productive environments. They are cradles of biological diversity, providing the water and primary productivity upon which countless species of plants and animals depend for survival. They support high concentrations of birds, mammals, reptiles, amphibians, fish and invertebrate species. Wetlands are also important storehouses of plant genetic material. Rice, for example, which is a common wetland plant, is the staple diet of more than half of humanity.

The multiple roles of wetland ecosystems and their value to humanity have been increasingly understood which has led to large expenditures to restore lost or degraded hydrological and biological functions of wetlands. But it's not enough - the race is on to improve practices on a significant global scale as the world's leaders try to cope with the accelerating water crisis and the effects of climate change. The ability of wetlands to adapt to changing conditions, and to accelerating rates of change, will be crucial to human communities and wildlife everywhere as the full impact of climate change on our ecosystem lifelines is felt.

Though a mountainous country, Nepal is endowed with many types of wetlands. These range from high altitude glacial lakes to hot springs, ponds to river floodplains, marshes to swamps and so forth. These wetlands are critical habitats for one horned rhinoceros, Bengal tiger, Asiatic elephants, fishing cat, gharial and mugger crocodiles, turtles, gangetic dolphins and 193 species of wetlands-dependant bird. Out of the total wetland dependant birds 11 species are described as globally threatened. There are 10 species of amphibians, 1 species of reptile, 8 species of fish and 7 species of flowering plants endemic to Nepal's wetlands.

Wetlands are spread over approximately 5 percent of Nepal's total landmass. There are 163 wetland sites in Terai. Of these, Koshi Tappu is the most outstanding wetland that has been recognised as wetland of international significance especially for waterfowl habitat (Ramsar Site) in 1987. Other wetlands of Nepal that have attained global recognition in 2003 through the inclusion in the Ramsar Site are Ghodaghodi Tal (Kailali District), Beeshazari Tal (Chitwan District) and Jagdishpur Reservoir (Kapilbastu District).

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an inter-governmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 138 Contracting Parties to the Convention with 1328 wetland sites designated for inclusion in the Ramsar List of Wetlands of International Importance. Adequate knowledge on the

biodiversity status of wetlands distributed throughout the middle and high mountain regions of Nepal is yet to be generated.

Unfortunately, most of the wetlands of Nepal, especially those in the Terai region, and their rich biological resources are facing several threats due to growing population's demand for land and wide variety of products and services. Some of the major threats are: siltation, eutrophication, over exploitation of wetland resources, over fishing, hunting and poaching, over-grazing, illegal harvesting of wetland resource, encroachment, water pollution, developmental activities in adjoining areas, drainage, introduction of invasive species, and floods.

Nepal has made enormous progress since its accession to the Ramsar Convention in 1987. It has designated 4 Ramsar sites and the National Wetlands Policy is now in place, and a comprehensive wetlands inventory of the Terai has been completed.

The root causes for wetland degradation constitute major challenges for wetland conservation in Nepal. However, there are several emerging opportunities to promote wetland conservation in Nepal.

Wetland conservation has been clearly identified as a priority for biodiversity conservation in national policy and planning frameworks in Nepal. They form a key conservation sector under the Nepal Biodiversity Strategy 2002 and the National Wetlands Policy 2003 is the first such policy for wetland conservation in Nepal.

The National Wetland Policy's emphasis on promoting collaborative wetland conservation and provides a key opportunity to build on Nepal's other successful efforts at natural resources management such as the community forestry programme and the buffer zone management programme. This Policy outlines the need for a co-ordinated approach to wetland management and stresses the need to conserve, manage and promote the wise-use of national wetlands, particularly through the collaboration of communities in the

management and decision-making process; recognizes the importance of the knowledge, innovations, and practices of indigenous people and local communities in relation to wetlands; raises public awareness, especially of women, about the wise-use of wetlands; and ensures a sound scientific and technological basis for conservation, management, and wise use.

Early civilization were also based around coastal sites and wetlands, and depended on them for food, water and building materials. Coastal and inland waterways were important for transport and communication. In more recent times, these same areas have often been regarded as wasteland-areas where land and water could be put to better use. As a consequence, many natural wetlands have been destroyed. Only now is the rate of loss of these vital habitats been realized. Similarly, appreciation of the rapid degradation of the remaining wetlands is growing. These productive ecosystems are important natural resources for economic and developmental sustainability in Nepal.

In Nepal there are many ethnic groups who rely on wetland resources for their livelihood. Wetlands are therefore, valuable for the overall socio-economic development of the country. Unfortunately however, in the light of the conflicting claims over these resources and in absence of an effective mechanism to ensure the efficient local level management of these valuable resources, they are gradually disappearing from the scene and with their disappearance the valuable aquatic biodiversity is also getting extinct. This is high time that all concerned stakeholders of wetland resources join hands for wise and sustainable use of wetlands in Nepal.

1.2 Statement of Problem

Wetlands are the most productive ecosystem and are important natural resources for economic and developmental sustainability for the countries like Nepal. With the concept of wise use of wetlands, 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.

Wetland destruction and degradation often have adverse effects and unforeseen long-term costs. These costs can exceed the value of benefits derived from the original project. Drainage of excess runoff during the rainy season can result in water shortages during the dry season and exacerbate drought situations. Irrigation to overcome water shortage for agriculture can be costly and is often maintained by high levels of public subsidy. Even then, soil and groundwater salinization, agro-chemical pollution and disruption of established social patterns can result. Construction of dams and reservoirs have profound effects of people, displacing many from their homes and altering patterns of water use and land use.

Empirical evidences collected by IUCN shows 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 vegetational succession and compost accumulation is also deteriorating the wetlands.

Due to the cause of these problems many wetlands have gone under the subsidence and the rate of subsidence will increase if those problems remain unchanged.

This study will basically study on the wetland resources which have played a crucial role in the daily life of the local communities and also try to focus on the impact on the wetlands of the surrounding areas**.**

1.3 Rationale for the Study

Wetlands in Nepal are the most neglected natural ecosystem areas. They are generally considered as “wasteland” and are given the least attention in

conservation programs .They are also given high priority on conversion into other purposes, especially in the Terai areas of Nepal.(Bhandari,1995:5)Now the conservation efforts should be made in order to conserve the wetlands which are in the state to lose its identity.

Wetlands of Nepal are important for the sustainable development as they contribute significantly to local livelihood of the country. More than 21 ethic communities are traditionally dependent either directly or indirectly on wetland resources (IUCN, 1998a:18).The Wetland Inventory for Nepal (IUCN-Nepal, 1998:14) indicates that in the Terai, fishing occurs in 94 percent of wetland sites and plant harvesting in 59 percent of the wetlands. Wetland resources play important role in sustaining the local communities' economic activities (Gurung and Pradhan, 1992:24).

Wetland resources are widely used by the local communities of the Terai region of Nepal for their sustenance and economic wellbeing. These resources due to rapidly diminishing wetland sites have become rare and precious to the local communities. Sustainable utilization and management of existing wetland is the only way for their conservation.

In addition to different benefits derived from the wetlands, wetlands are also very rich in biodiversity 25 percent of 7000 species of plants recoded in Nepal are aquatic of the 7000 species of medicinal plants and 250 species of endemic plants, 27 are rare, 7 are threatened and 9 are endangered species of endemic plants(Bhandari,1992:11).

Considering the above facts, this research would focus on the livelihood situation of the wetland dependent communities .The findings of the research would also help in elaborating the knowledge on wetland resources and it will also be helpful to the concerning organization working in the field of wetland management.

1.4 Objectives of the Study

The major objectives of the study are to find the relation ship between the wetland resources and the livelihood of the local communities. It has the following specific objectives:

1. To find the mode of utilization of wetland resources for livelihood.
2. To learn about the seasonal availability of the wetland resources.
3. To access the livelihood situation of the wetland dependent communities in the study area.
4. To study the involvement of local clubs, NGOs and other professionals agencies in the management of the wetlands.
5. To know the local people's attitude towards the conservation of the wetlands.

1.5 Limitation of the study

Since the study was limited to selective local/ ethnic communities which are dependent on the wetland resources. The findings don not necessarily represent the overall situation in other area of the country as there are more than 21 ethnic communities who are directly or indirectly dependent on the wetland resources, although the findings would give information about the study area.

The findings are the reflection of the sampled households. In general, local informants and local community do not have records; so that the figures arrived here were form sampled households and such data were mostly subjective. The study had covered different communities and the obtained results and the generated recommendations would not be generalized to other places where local people's livelihood is substantially fulfilled by the wetland resources. It would give the detail representation of the study area. With the limitation of time frame, this work was conducted for the short term analysis.

Chapter – One

LITERATURE REVIEW

2.1 What Are Wetlands?

Simply, wetlands refer to lands covered with water. Rivers, streams, oceans, lakes, marshy land, reservoirs and ponds, all are wetlands. Even paddy fields and reverie floodplains 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 occurs in every country but how much of the earth's surface is presently composed of wetlands is not known exactly. The Nepali term for wetlands is "Simsar" which means lands with perennial source of water.

National Wetlands Policy of Nepal (2003:3) defines wetlands as follows:
"Wetlands denote perennial water bodies that originate from underground sources of water or rains. It means swampy areas with flowing or stagnant fresh or salt water that are natural or man-made, or permanent or temporary. Wetlands also mean marshy lands, riverine floodplains, lakes, ponds, water storage areas and agricultural lands".

Nepal Biodiversity Strategy (2002:3) notes that wetlands are"sites distinguished by the presence of water, which often have unique soils that differ from definition of wetlands, the strategy clearly identifies "permanently flowing rivers to seasonal streams" as examples of wetlands".

2.2 Why Are Wetlands So Important?

Lakes, rivers, streams, marshes, swamps, paddies, canals and reservoirs are important feature of land escape. Their common element is water, the lifeline

of any ecosystem. They are the main source 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 settings, biological diversities and culture, wetland is generally used in the plural form i.e. wetlands (Bhandari, 2006:12).

Wetlands are amongst the most productive ecosystems 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 their rich productivity, which helps to support food chains, and partly through provision of habitats for specially adapted plant and animal species (IUCN, 2004a:5).

2.3 Importance of Wetlands

Wetlands are among the world's most productive environments. They have significant human use values. They perform many important roles in nature conservation. The values and functions of the wetlands have been discussed below:

Wetlands as biological supermarkets

They are reservoirs of biodiversity or biological supermarkets. They provide habitat for several species of plants and animals. They support high concentrations of birds, mammals, reptiles, amphibians, fish and invertebrate species. We often see the birds swimming in a lake. We see lotus plant flowering in a pond.

Wetlands as source of food

Wetlands are crucial for food production including staples such as rice, fish and vegetables. They are considered as fertile lands for agriculture. Rice is a common wetland plant which is the staple diet of more than half of humanity. Many ethnic and caste groups of Nepal are traditionally wetland dependent. For example, the Majhis have largely settled on the banks of the Koshi River and have traditionally been dependent on fishing and river transport. Many

Sadars of Koshi Tappu still depend on crafts produced from wetland plants as a primary source of income. The Tharus of Ghodaghodi Lake Area have traditionally been dependent on fishing. These wetland dependent communities are some of the poorest and most marginalized peoples in Nepal.

Wetlands 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 *chat festival* in the eastern Terai, Godavari Mela in Lalitpur district and Agan Panchami in Ghodaghodi Lake. People take a holy bath in the lakes, rivers and ponds. For example, indigenous Tharu people celebrate a traditional festival, Agan Panchami, at Ghodaghodi Lake in December and take a holy bath in the lake.

Wetlands as tourist destinations

The natural beauty as well as the diversity of animal and plant life in many wetlands makes them ideal locations for tourists. Wetlands in Nepal are important tourist destination. Many foreign and local visitors visit the lakes of Pokhara and the Koshi Tappu wetland every year. Bird watching is the prime recreational activity in wetlands. Ghodaghodi lake is a famous destination for local visitors but it has not been fully explored yet to foreign visitors.

Wetlands as scientific laboratory

Researchers often do scientific study on wetlands. Such study may cover broad range of subjects such as flora, fauna, ecosystem health, human dependency etc.

Wetlands as source of water

Wetlands store water which can be used for irrigation. They hold heavy rainfalls, preventing possible flooding downstream. Many wetlands help recharge underground aquifers. An aquifer is a underground layer of rock containing water. The aquifer provide drinking and irrigation water.

Wetlands as storm protector

Coastal wetlands play a critical role in storm protection. They act as the frontline defence against incoming storms. They help minimize the impact of storms by reducing wind action, wave action and currents.

Wetlands as nutrient bank

Wetlands slow the passage of water and encourage the deposition of nutrients and sediments carried in water. This capacity for nutrient retention makes many wetlands among the most productive ecosystems.

Wetlands as carbon storehouse

Wetlands have been identified as significant storehouses (sinks) of carbon. Peatlands and forested wetlands are particularly important carbon sinks.

Wetlands as the kidneys of the landscape

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 run-off, 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 (Source: www.wetlandsfriends.org)

Table 2.1: **Use and Functions of Wetlands**

Direct use value	Indirect use value (Functions)	Non-use value
Fishing, food, medicine Agriculture and wetland products	Nutrients and sediment Retention	Biodiversity, habitat Unique ecosystem
Teaching and learning	Flood control	Religious-cultural value
Recreation and tourism	Strom and erosion protection	Research and educationl value
Transport, wildlife harvesting	Recharge and discharge of ground water Water purification	Landscape and aesthetic values Spiritual values
Water supply and timber	Regulation of micro-climate	Bequest value
Energy (peat, hydropower,fuelwood)	Shoreline stabilization and biomass export	Genetic values

Source: Let us keep our wetlands healthy IGES, 2004, Cited in Bhandari, 2006:4

2.4 Concept of Wise Use of Wetlands

Wise use is defined as "sustainable utilization for the benefit of mankind in a way compatible with the maintenance of the natural properties 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" therefore has conservation of wetlands, as well as their management and restoration, at its heart. (Bhandari 1994:50)

2.5 Threats to Wetlands

A review of the status of wetland habitat in the Asian region (Scott and Pool 1998, cited in Mundkur & Matsui 1997) indicates that 85 percent of important wetlands are under some from of threat. The reasons for the threat are disturbances from human activities like settlement, agriculture, encroachment, grazing and drainage. Industrial waste, water pollution, pesticide usage, over-exploitation of fishery resources and logging, have caused the degradation of the watershed, resulting in soil erosion, siltation and a decrease in the water quality(Boere & Lenten 1997).Another problem to wetland is water hyacinth,

which covers the surface of fresh water, and is a big problem everywhere in South Asia(Gopal & Krishnamurthy 1993).

Empirical evidences collected by IUCN states that the wetlands of Terai are vulnerable to a number of threats and disturbances. Siltation has been a great threat to wetlands. 66 percent of all the wetlands are exposed to siltation problems, whereas 62 percent show the problem of agricultural run off.

According to Lemly et.al. (2000):

- The drainage of wetlands has forced water birds to rely on certain remaining wetlands during migration in the US, causing the death of birds and the disappearance of many species of native fish.
- Management of water for irrigation purposes mainly with large dams has seriously affected river flow and wetlands e.g. in Australia, leading to a changed water regime which has killed aquatic vegetation adapted to wet and dry cycles.
- Over use of wetlands invites many problems like disease and salinity, which, directly affects humans in central Asia.
- Human impact during the recent decade, rapid increases inhuman population and demand for fuel, wood and fodder, diverse human activities in adjacent land, and introduced species of plants and animals have resulted in rapid deterioration and decline of all kinds of wetland throughout Southeast Asia and Africa.

Some causes of wetland degradation are listed below:

Table 2.2**: Cause and Impact of Wetland Degradation**

Cause of wetland degradation	Impact of wetland degradation
Population pressure Conversion into paddy fields Flood control Irrigation projects Drainage Faulty planning Felling of wetland trees Over grazing, Over fishing Residential and industrial development	Reduction of aquatic flora and fauna Loss of indigenous plants Loss of soil nutrients Recurrence of flash floods Loss of water source Quality of life decreases Loss of water reservoirs Reduction of wetland flora and fauna Loss of ecosystem

Source: Bhandari, 1994:15

2.6 Global Scenario of Wetlands

More than 1,400 wetlands, covering more than 120 million hectares, have been included in the Ramsar List. The earth, two-thirds of which is covered by water, looks like a blue planet-the planet of water-from space (Clarke, 1994:31). The world's lakes and rivers are probably the planet's most important freshwater 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 a large number of species. These aquatic organisms and the ecosystem in which they live represent a substantial sector of the earth's biological diversity.

It is interesting to know that there are nearly 14×10^8 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. Wetlands are estimated to occupy nearly 6.4 percent of the earth's surface. Of those wetlands, nearly 30 percent 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 are found to occupy less than 0.007 percent of world's fresh water (Clarke, 1994:36).

2.7 Wetlands in Nepal

Though a mountainous country, Nepal is endowed with many types of wetlands. This ranges from high-altitude glacial lakes to hot springs, ponds to river floodplains, marshes to swamps and so forth. Wetlands of Nepal provide a number of services and goods for consumptive and non- consumptive uses for the people who directly or indirectly depend on its resources. They are some of the most diverse and productive ecosystems in Nepal. Over 240 important wetlands exist in Nepal, including 163 inventoried in the Terai districts by IUCN (1998). It is estimated that wetlands cover almost 750,000ha or 5 percent of the country's total surface area. Of the 27 recognized global freshwater wetland types, 20 are found in Nepal , including floodplains of snow-melt fed" cold" Himalayan Rivers ,and "warm" rivers originating in the lower mountains; high altitude glacial lakes; hot springs; ponds; ox-bow lakes; and swamps. Since all the major rivers of Nepal flow through the Terai region to the Ganges River in India, this region is particularly rich in many types of wetlands, and contains at least 80 natural lakes, 55 important floodplain areas, flood plain areas, 12 marshes, as well as reservoirs and canals, constituting 17 percent of the total area of the Terai districts (IUCN 1998).

Table: 2.3 **Estimated Area of Various Wetland Types in Nepal**

Wetland Type	Estimated area (ha.)	Percentage
Rivers	395000	53.1
Lakes	50000	0.7
Reservoirs	1380	0.2
Marshy lands	12000	1.6
Village ponds	5183	0.7
Paddy fields	325000	43.7
Total	743563	100.0

Source: IUCN, 2004:4

2.8 Ramsar Sites of Nepal

Nepal is a party to the Ramsar Convention for the conservation of Wetlands (1971). Nepal became signatory of the Convention in 1985. The Convention on Wetlands came into force for Nepal on 17 April 1988. Nepal presently has four sites designated as Wetland of International Importance, with a surface area of 23,488hectares. The Ramsar sites of Nepal are given in table 2.4:

Table 2.4: **Ramsar Sites of Nepal**

Name	Topography	Location	Elevation (m.)	Designation Date	Area (ha.)
Beesh Hazar and associated lakes	27° 37'N, 84° 26'E	Chitwan	286	Aug 13, 2003	3200
Ghodaghodi lake area	28° 41'N, 80° 57'E	Kailali	205	Aug 13, 2003	2563
Jagdishpur Reservoir	27° 35'N, 83° 05'E	Kapilbastu	197	Aug 13, 2003	225
Koshi tappu wildlife reserve	26° 39'N, 86° 59'E	Flood plain of Koshi river	75-81	Dec.17,1987	17500
Total					23488

Source: www.wetlandfriends.org.np

2.9 Wetland area Legislation in Nepal

The *Jalachar Samrachhan Ain*-2017 (Aquatic Animals protection Act, 1961) is one of the Nepal's oldest pieces of legislation indicating the early recognition of wetlands and aquatic life values. It prohibits the use of poison and explosive substances in water bodies, but this Act remains ineffective as nobody has been prosecuted for violating the Act. It does not specify an agency to administer or enforce the Act. Much of the legislation concerning protected areas is irrelevant to wetland habitats. The *National Park and Wildlife Conservation Act 2029* (1973) provides the legal basis for Nepal's conservation programme. This Act provides the broad legistation for the

establishment of national parks and reserve to protect areas and species. The national park and wildlife programmes were initiated in 1974 to control hunting and restrict wild animal trade in accordance with the Convention of International Trade in Endangered Species (CITES) of wild flora and fauna, of which Nepal is a signatory. Other relevant regulations include the *Royal Chitwan National Park Regulation (1975), Himalayan Mountain National Park (1979), and Khaptad National Park Regulation*(1982) and the Convention on Wetlands of International Importance (the Ramsar Convention) in 1978. Nepal has not yet joined the convention of the conservation of Migratory Species (CMS) of Wild Animals (the Bonn Convention) (Sah, 1997:3). The GoN had implemented the the National wetland policy 2003 in order to conserve the existing wetlands of Nepal.

The Wetland Policy (2003) (HMGN/MFSC, 2003) has its main objective 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. The policy has further identified participatory wetlands management, classified wetlands from management perspective, laid out plans for its wise use, proposed wetlands awareness program, underscored the urgency of controlling invasive plant species for wetland protection and proposed institutional arrangement for wetlands management.

2.10 Nepal's Terai Wetlands & Problems

The terai region, which comprises about 23 percentof Nepal;s land area, ranges in altitude from 61m. in the South to 300 m. in the North. It consists of large number of wetlands, such as rice paddies and river flood plains. Wetland in Terai are eutrophic in nature (Bhandari et al, 1994:8) and are considered the important source of livelihood for rural communities. In addition to the socio-economic values and benefits they provide to the communities, these wetlands are the last remaining habitats for many endangered and threatened flora and fauna.

Terai wetlands are precious ecological resources creating numerous opportunities for commercial fisheries, bird watching, wildlife husbandry and aquaculture. They purify polluted water and check the destructive power of flood and stream (Shrestha, 1994:42). They are also used as holy shrines, and numerous temples stand along side many rivers and lakes,, and were considered to be places of pilgrimage from ancient times (Rajbanshi & Gurung,1994).

Nepal's wetlands are rich in flora and fauna, and support 172 species of fishes, 190 species of birds, 2 species of endangered crocodile and great numbers of reptiles and mammals in associated floodplain forests. They also support 25 percent of the 7000 plants found in Nepal believed to be aquatic (Bhandari, 1994).Among birds 90 species are migratory, 66 species are residential and 34 species are uncommon and rare residents (Manandhar and Shrestha, 1997).

Table2.5: **Distribution of Wetlands in Nepal's Terai**

Wetland type	Number	Percentage
Lakes and ponds	78	48
Marshes	13	8
Swamps	5	3
Flood plains	53	33
Reservoirs	6	3
Canals	8	5
Total	163	100

Source: IUCN, 1998:28

The Nepal Biodiversity Strategy 2002 has identified 10 wetland sites in the Terai as meriting legal protection because of their significant biodiversity value.

Table2.6: **Wetland Sites in the Terai that Merit Legal Protection**

Site	District (VDC)	Size (ha.)	Reason for Listing
Beesh Hazar Tal *	Chitwan (Gitanagar)	150	Large complex of oxbow lakes set in a very scenic environment. Of major importance as a particularly good representative of an oxbow ecosystem, supporting an appreciable assemblage of rare, vulnerable and endangered wildlife species.
Gaindahawa Tal	Rupandehi (Bisnupura)	11	Oxbow lake supporting small resident and wintering populations of several species of waterfowl.
Jagadishpur Reservoir	Kapilbastu (Niglihawa)	156	Large irrigation reservoir supporting >4% of Asian population of Ferruginous duck (*Aythya nyroca*). (1% criterion=100) with 405 recorded. The same site almost reached the 1% criterion fore the Lesser Whistling duck (*Dendrocygna javanica*).
Badahiya	Bardia (Dhailahi)	100	Large marshy natural depression supporting a large number of resident and wintering populations of several species of waterfowl.
Ghodaghodi Tal *	Kailai (Darkh Nidi)	150	Large complex of oxbow lakes set in a very scenic environment, surrounded by dense Sal forest. Of major importance as a particularly good example of an oxbow ecosystem supporting an appreciable assemblage of rare, vulnerable and endangered wildlife species. Important site for transient migratory species moving between Dudwa National Park (India),Suklaphanta Wildlife Reserve and Royal Bardia National Park, the resident population of *Nettapus coromandelianus* makes up nearly 1% of the total Asian population.
Narcrodi Tal	Kailali (Sandepani)	100	Large complex of oxbow lakes set in a very scenic environment, surrounded by dense Sal forest. Of major importance as a good example of an oxbow ecosystem supporting an appreciable assemblage of rare, vulnerable and endangered wildlife species.
Rampur Tal	Kailali (Urma)	20	Medium- sized complex of oxbow lakes set in a very scenic environment, surrounded by dense Sal forest. Of major importance as particularly good representative of an oxbow ecosystem supporting an appreciable assemblage of rare, vulnerable and endangered wildlife species.
Deukhuria	Kailali (Dhangadi Municipality)	22	Large lake set in a very scenic environment. Of major importance as a particularly good example of an oxbow ecosystem supporting an appreciable assemblage of rare (*Sarkidiornis melanotos*), vulnerable and endangered wildlife species.
Patriyani	Kanchanpur (Krishnapur)	35	Large oxbow lake of major importance as a particularly good representative of an oxbow ecosystem supporting an appreciable assemblage of rare, vulnerable and endangered wildlife species.
Betkot	Kanchanpur (Daiji)	4	Very scenic lake of species value for maintaining genetic and ecological diversity.

Source: BPP (1995:48)

Note: * Included in Ramsar Site's List

2.11 Wetlands and Sustainable Livelihood in Nepal

The wetlands of Nepal have significance human values, which are crucial for food production including for staples such as rice, fish and other food products such as vegetables. We have seen there are lots fisheries running in the wetlands of Nepal which have directly helped in sustaining the livelihood of the marginalized indigenous people like Majhi, Mallah, and Jhangard.

Nepal has several wetland ecosystems of global significance. These wetlands are important for Nepal's sustainable development as they contribute significantly to local livelihoods. While all communities benefit from wetlands, about 17 percent of the Nepali populations from 21 ethnic communities have traditionally based their livelihood on wetlands (fishing, river transport etc.). They are some of the most marginalized and poorest people in Nepal (IUCN 1998.68).

2.12 Wetland dependent People in Nepal

The major ethnic groups dependent on wetlands in the country are small fractions of the total population and are scattered over the region. They have their own language, culture, physical features and way of life. The major ethnic groups of people dependent on wetland resources for their livelihood in Nepal are the followings:

The "*Sunaha or Sunduwas"* reside in the Karnali basin of far western part of Nepal. Those people engaged in gold planning and collecting motes, called *Khanwas* live around the Babai River. *Mallahs* are found in the area near the Gandak Barrage in the Southern part of Nawalparasi district of the Western of development region. The "*Bhotes*" are found in Nawalparasi and chitwan, they are of two types Pani Bhote and Pakhe Bhote; the "*Mushahar*" around the Narayani river and eastern terai district ; "*the Bantar* " also called *sardar* found in Sunsari and Saptari ,these people depend on cattails, from which they weave and make a variety of mattresses. "*Gongi"*, people are found around Koshi Tappu wildlife Reserve. They are also called "*Mallahs*", mostly landless

and engaged in fishing in the Reserve. "*Mukhia*, also called *Bihin* in Rautahat district of the central terai, engaged in fishing by small nets. Due to diminishing of wetlands in the Terai region, they are gradually withdrawing form this occupation. "*Dushad*" are found in Parsa district, involved in fisheries, fish catching and fish trading. "*Sahani*" found in Rautahat, Parsa, and Bara, catch and sale and are trained to raise fish in private and community ponds. "*Kewat*" found in Rampurwa, Tribeni Susta, Baidauli, Haripur and Bhajhawa VDC of Nawalparasi. "*Danuwars*" larges group of Chitwan live in the inner Terai area as well as in Siraha and Sindhuli districts in the eastern part of the country. They are of three distinct type: Kacchare (living along the upper river valleys), Rajhan in the Terai and Bahadauriya/ Bista found in other parts. "Majhis", indigenous people reside inner Terai and river basins of Nepal. Their primary occupation is ferry service and fishing. "Darai" found in river basin of Chitwan and Nawalparasi and at the foothills of the Mahabharat range of Terai. "Kumal" are found in Chitwan, small valleys and gorges of the Mahabharat range doing pottery and fishing. "Barhamus" are found in the district of Gorkha and close to the Darai along the river valleys. "Dhangar" are found in the river banks of Morang, Sunsari and sarlahi districts of eastern Nepal and nau saya Bigha near Janakpur. "Tharus" found in Terai belt of Nepal, engaged in farming, livestock raising and fishing. "Pode" are found in Phewa tal and in Panauti of kavre district. They do fishing for livelihood. "Kushars" from a number of terai districts who depend primarily on fishing and aquatic resources for their livelihood (IUCN 1998:75-77).

2.13 Community Participation in Conservation

Nepalese people have a long tradition of using wisely their natural resources. Economic necessity and centuries old deep-rooted cultural and spiritual values have resulted in a myriad example of both individual and collective efforts to conserve natural resources. Such effort has protected, and often enhanced, a landscape that is sometimes benevolent, sometimes unforgiving.(HMG/NPC/IUCN 1998:5)

Traditionally, resources were managed by local people themselves through their indigenous system. The locals used their own informal but socially

binding rules to regulate the use of these resources mainly to meet basic needs and maintain various forms of cultural expression.

2.14 Wetland Resources of Nepal

Wetland fauna

Of the country's total number of species, only some animal taxa are known, less is known about the number of species dependent on wetlands. Nepal's wetlands support significant species diversity and populations of globally threatened fauna. According to the 2003 IUCN Red List, 123 globally threatened faunal species occur in Nepal, of which 42 species (34 %) are found either in freshwater biomes or are also significantly dependent on wetlands. 17 of 20 endemic vertebrates in Nepal are wetland dependent & the most globally threatened wetland species found in Nepal are dependent on Terai wetlands. This suggests the significance of the Terai wetlands for biodiversity conservation in Nepal.

Of the 861 bird species found in Nepal, 193 (22.5%) are known to be dependent on wetlands. The IUCN Red List 2003 lists 12 globally threatened species that are wetland dependent; including the **Critically Endangered** Pink-headed duck (*Rhodonessa caryophyllacea*), many believe this species is extinct. **Endangered** Greater adjutant (*Leptoptilos dubius*) and Lesser Folican (*Sypheotides indica*); and **Vulnerable** Baikal teal (*Anas formosa*), Swamp francolin (*Francolinus gularis*), Baer's pochard (*Aythya baeri*), Grey pelican (*Pelecanus philippensis*), Sarus crane(*Grus antigone*),Indian skimmer (*Rynchops albicollis*), Black-necked crane (*Grus nigricollis*), Lesser adjutant (*Leptoptilos javanicus*), and Band-tailed fish eagle (*Haliaeetus leucoryphus*).

Globally threatened mammals in Nepal that are wetland dependent include the **Critically Endangered** Pygmy hog (*Sus salvanius*) ; **Endangered** Gangetic river dolphin (*Platanista gangetica*), Wild water buffalo (*Bubalus bubalis*), Greater one-horned rhinoceros (*Rhinoceros unicornis*), Elephant (*Elephas maximus*) and Tiger (Panthera tigris); **Vulnerable** Indian smooth-

coated otter (*Lutrogale perspicillata*),and Common otter (*Lutra lutra*), Fishing cat (*Prionailurus viverrinus*) and Barasingha (*Cervus duvaucelii*).

Thapa (1997) inventoried 5052 species of insects in Nepal. The **Vulnerable** Relict Himalayan dragonfly *(Epiophlebia laidlawi*) is the only globally threatened wetland dependent species known to occur in Nepal. The NBS 2002 mentions that a total of 182 fish species have been recorded in Nepal, including eight species that are endemic. **Endangered** Sahar (*Tor putitora*), jalkapoor (*Clupisoma garuwa,Ompak bimaculatus*); **Vulnerable** Katle (*Neolissocheilus hexagonolepis*), Patharchatti (*Chagunius chagunio*), Zebra (*Danio rerio*), Asala (*Shizothoraicthy*s progastus), Rajabam (*Anguilla bengalensis*);and 17 species listed as **Rare**.

Of the 20 endemic vertebrate animals found in Nepal, 17- including 8 fish and 9 herpetofauna species are wetland dependent.

Wetland flora

Naturalists have given more information on Nepal's flora than there is on its fauna. 25 percent of the country's estimated 7,000 vascular plant 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 pteridophytes, and three species of algae. Twenty six of the 246 angiosperm species are wetland dependent (Shrestha and Joshi, 1996), occurring in lakes, marshes and river/stream banks.

Of the 91 nationally threatened plants found in Nepal, ten are dependent on wetlands (CAMP2001) including the **Endangered** *Aconitum balangrense, Crateva unilocularis*, *Operculina turpethum*; and **Vulnerable** *Alstonia scholaris, Butea monosperma, Neopicrorhiza scrophulariifolia, Valerina jatamansii, Piper longum, Panax pseudo-ginseng, Dalbergia latifolia*. Four wetland macrophytes- *Spiranthes sinensis, Cyathea spinulosa,Sphagnum nepalensis,Pandanus nepalensis*- are also considered nationally endangerd(Joshi and Joshi,1991).

Shrestha(1999) notes that species such as *Crateva unilocularis* and *Operculina turpethum* are threatened primarily due to habitat disturbance and human encroachment, where as *Piper longum* has been overexploited for its medicinal value. *Dalbergia latifolia* is now gravely threatened due to habitat loss. Nepal's wetlands hold several species of wild cultivars and wild relatives of cultivated crops, including four species of wild rice- *Oryza nivara, Oryza granulata*, *Oryza officinalis* and *Oryza rufipogon*.

Wetland flora is highly dependent on the altitude of wetlands. Glacial lakes only support phytoplankton and many lakes are devoid of macro aquatic vegetation, for example the lakes of Khumbu glacier (Loffler, 1996). The Sub-Alpine lakes support House reeds (*Phragmites*), rushes (*Juncus*) and sedges (*Carex, Fimbristylis*) along their margins and *Myrophyllum* species in shallow waters. The mid-hill lakes are richer in floral diversity in comparison to the above two. The common aquatic macrophytes found in mid-hills lakes(e.g.Pokhara and Kathmandu) are *Nelumbo nucifera,Nymphoides indica,Trapa quadrispinosa, Lemna spp.,Potamogeton spp., Vallisneria spp., Hydrilla verticillata, Utricularia aurea and Hygrorhiza aristata.* Marshy meadows harbour *Polygonum imilletii, Owygraphis polypetala* and *Ranunculus spp*.

Wetlands of Terai region possess considerable amount of floral diversity, where 318 wetland dependent species have been recorded. Twelve of them are floating species, 16 species are submerge, and 290 species are found exclusively in aquatic habitats, eleven species in riverine and ravine forest habitats, 21 species in savannah grasslands, and 42 species on anthropogenic lands (Source: IUCN 2004:15-23).

Chapter – Three

RESEARCH METHODOLOGY

Research methodology is the most important aspect of the research work. This provides the tentative picture of method that was followed to undertake this study. This research had adopted exploratory and descriptive research design.

3.1 Selection of Study Area

Koshi Tappu is situated in the Eastern Development Region along the Koshi River passing through the districts of Udaipur, Sunsari and Saptari. Twelve Village Development Committees (VDCs) from these districts surround it. The Reserve lies on the alluvial floodplain of the Sapta Koshi (or simply Koshi) river and is fed by seven major tributaries: Indrawati, Bhote Koshi (Sun Koshi), Tama Koshi, Dudh Koshi, Likhu, Arun and Tamor. Koshi Tappu Wildlife Reserve has many wetland habitats such as river, streams, waterfalls, oxbow lakes, freshwater lakes and ponds, riverine marsh, seasonally flooded grassland, reservoir, riverine floodplain, freshwater swamp, river flats, swamps dominated by cattail, and so on.

The study covered KUSAHA VDC, where lies the headquarter (HQ) of the Koshi Tappu Wildlife Reserve (KTWR).This study area lies in the buffer zone area of the reserve where the different wetland dependent ethnic communities are living.

3.2 Research Design

This study is a descriptive and analytical in nature. It has given focus on the socioeconomic aspects of the local people who are directly or indirectly dependent on the wetland resources. This research tries to find out the attitude of the local people towards the conservation. It has given the information on the seasonal availability of wetland resources on the basis of the interview schedule to the older people who have the ethno botanical knowledge.

3.3 Study Population

This research had tried to cover the wetland dependent communities whose livelihood is supported by using the resources that are available from the reserve area. The localities were selected on the basis of proximity to the reserve area and the residing people's dependency on the wetland resources. It had tried to cover the 20 percent households of each community to have the in depth knowledge of the wetland dependent people.

3.4 Sampling Technique

For this study the simple random sampling has been used in the study population because all the communities were found to have a compound settlement.

3.5 Nature and Source of Data

In this study, both primary and secondary data have been used to meet the objective of the study. Both the primary and secondary data were collected from the study area. During the field work 'primary data' was collected from the sampled respondents (HHs, stakeholders, key informants, elder people). Some information was also collected from the users groups of the buffer zone. Secondary data were collected from library study, research report, and annual report of the CBS, DDC and newspapers.

3.5.1 Primary Source of Data

For the collection of primary data the following tools were used in order to meet the objectives of the study.

3.5.1.1 Questionnaire Method

Household questionnaire survey was designed to meet the objectives of the study and was asked to every sampled population. This is the only method which would help to ask the questions within the core of the study.

3.5.1.2 Unstructured Interview

Unstructured interview was also asked to fulfill the remaining objectives and to have the specific knowledge of the ethnic communities' cultural and social structures.

3.5.1.3 Observation

Observation is a very important tool in finding the situation or condition of the study area and the wetland area. The active participant observation was done to have broad information about the study area and to have livelihood situation of the local people.

3.5.1.4 Key Information Survey

Key informants such as elder persons, local leaders and experts were contacted in order to have a more information about the utilization of wetland resources in their daily life.

3.5.1.5 A Case Study

The research work had tried to include the 3 case study of the local people whose profession is related on the wetland products.

3.5.2 Secondary source of Data

Secondary data was collected from library, study research, newspaper, annual reports of DDC and CBS.

3.6 Data Analysis and Presentation

Primary and secondary data were collected, analyzed and scrutinized to get desired results. The numerical data were analyzed through statistical technique. The obtained data was tabulated and demonstrated with the help of computer or presented according to the objective of the study .So it would be easily comprehensible.

Chapter – Four

THE STUDY AREA

4.1 Overview of KTWR

Koshi Tappu Wildlife Reserve was gazetted in 1976 to preserve habitat for the only remaining population of Wild Buffalo, Arna (Bubalus arnee). It is the Nepal's smallest wildlife reserve .Koshi Tappu Wildlife Reserve is the only Ramsar site of Nepal, managed and protected by the DNPWC. Koshi tappu wildlife reserve is located in the flood plain of Sapta Koshi River juxtaposed in Sunsari, Saptari and Udaypur districts of eastern Nepal. It is a freshwater, natural and permanent river system and is a major river system in Nepal that originates in the Central Himalayas. Koshi tappu is a rectangular shaped reserve and was formed by the Koshi barrage near Nepal-India border on the east-west Mahendra National Highway.

KTWR has many type wetland habitats such as river, streams, waterfalls, oxbow lakes, freshwater lakes and ponds, riverine marsh, seasonally flooded grasslands, reservoir, riverine flood plain, fresh water swamp, river flats, swamps dominated by cattail.

Koshi Tappu Wildlife Reserve

Ramsar Designation Date	: 17-12-1987
Coordinates	: 26^{O}39'00"N 86^{O}59'00"E
Area	: 17,500ha
Length	: 24km
Elevation	: 75m-81m
Land use	: Agriculture (50 percent), Open forest (10 percent), Dense forest (20 percent), Settlement (20 percent)
Special features	: Many cultural heritage sites and bird-viewing points.
Hydrology	: It has permanent inflow, outflow and dam.
Climate	: Tropical

4.2 Hydrological Value

The floodplain is periodically flooded flat area between the river channel and the terrace or plateau delimiting the plain. The Koshi floodplain gradually dries up during the post-flooding period, although it remains saturated with water in certain places, while in other places it dries out to a loose sandy, semi-arid condition. The flood plain is characterized by grassy marshes, oxbow lakes, back swamp lakes and many other depressions which retain water throughout the year.

4.3 Status of Flora and Fauna in Koshi Tappu Wetland

Flora:

The existing vegetation consists of diverse physiognomic types as submerged and floating aquatic plants, tall reed stands, seasonally flooded grassland/savannah and structurally complex forest communities in various conditions of spatial arrangements. Among 514 species of plants, *Dalbergia sissoo, Bombayx ceiba, Saccharum sp.,Phragmites sp., Typha sp., Imperata sp., Valisneria sp., Eichornia sp., Hydrilla sp., Azolla sp., Lotus sp.*, are common species found in the wetlands. Six species off plants found in this area, *Rauwolfia serpentine, Alstonia scholoris, Oroxylum indicum, Acacia catechu, Butea monosperma and Dalbergia latifolia*, are listed in the different threat categories and appendices of IUCNand CITES respectively. Except *Acacia catechu*, other 5 species are sparse in the area. Lacustrine habitat like oxbow lake such as Kamal Daha harbors 28 species of plants.

Fauna:

KTWR is internationally an important wetland for waterfowl population, particularly as a staging and wintering area for a variety fo trans-Himalayan migrants. The notable ducks include *Anas acuta, A. clypeata, A.falcata, Anas Penelope, A. playtyrhynchos, A. querquedula, A.strepera, Aythya baeri, A. ferina, A. fuligula, A. nyroca, Netta rufina,Tadorna ferruginea*. Ducks build up in population from late October and reach a peak between mid-February and mid-March.

Among 485 species of birds, notable birds recorded in the site include *Gallicrex cienrea, Caprimulgus asiaticus, Bubo coromandus, Coracina melanoptera, Saxicola leucura and Megalurus palustris*. At least 144 species are water birds, 176 species breed in the reserve and 180 species are passage migrant or winter visitors. It is the only area in Nepal where water cock, (*Gallicrex cinerea*) and Abbott's babbler are found. Out of these 485 species of birds, 12 species are globally threatened and 101 species are nationally threatened. Of the 31 species of mammals recorded, Nepal's last remaining population of wild water buffalo (*Bubalus arnee*) inhabit the area and the Gangetic dolphin (*Platanista gangetica*) has been recorded in the Koshi river. Large mammals like gaur (*Bos gaurus*) and blue bull (*Boselaphus tragocamelus*) are almost disappearing from the area. Other mammals found are Wild Elephant (*Elephus maximus*), wildboar(*Sus scrofa*), hog deer (*Axis porcinus*), sotted deer(*Axis axis*), smooth coated otter(*Lutra perspicillata*) and jackal (*Canis aureus*). Of the 200 species of fishes, 91 species are resident, 21 species are local migratory and 5 species are migratory. Of these, 9 species are listed in the different threatened categories, 8 species as vulnerable and 1 species as endangered. 11 Amphibian (2 toad and 9 forgs) and 24 reptiles (2 crocodiles, 11 turtles, 6 lizards and 5 snakes) are recorded in the DNPWC booklets .17 species of herpetofauna are nationally threatened. 77 species of butterfly are recorded in the area.

4.4 Buffer Zone Concept for Sustainable Management and KTWR

Buffer zone has been defined as the area adjacent to a protected area on which land use is partially restricted to give an added layer of protection to the protected area while providing valued benefits to neighboring rural communities (Mackinnon et al. 1986). Thus, it is an area of controlled and sustainable land use, which separates the protected area from direct human pressure (Ordsol 1987; Nepal and Weber, 1993).

World National Parks Conference at Bali in 1982 focused on the relationship between protected areas and human needs and stressed the relevance of integrating protected areas with other major development issues (Mishra,

1991). The message is that the protected areas should respond to the needs of local people (Sayer, 1991). The involvement of local people in the management of the protected areas for mutual benefits is widely accepted today (Oldfield, 1988). This ultimately leads to harmony and sustainability between the natural heritage and the well being of the people living on the periphery of the park (Anon, 1993). These days, buffer zone concept has been widely accepted in protected area management in order to reduce conflicts between protected area authorities and the local people (Berkmuller et. al., 1990).

As the park and people conflict emerged and the government realized that conservation of wildlife inside the protected areas is not productive in lack of local people's participation and also the issues that were repeatedly raised who should benefit from conservation efforts the local people or the wildlife. Through the 4th amendment in the NPWC Act of 1973 in 1992, HMG has allowed to create buffer zone surrounding national park and reserves in order to provide the use of forest products to local people. The Act defines buffer zone as *"The peripheral area of the National park or reserve under section 3A for providing facilities to local inhabitants to utilize forest products regularly*".

The concept of buffer zones is recently developed in Nepal. The DNPWC proposed a buffer zone concept for the protected areas of Nepal in 1984. However, for the declaration of a buffer zone, the factors such as; geographical situation of the reserve, area affected from the reserve, status of settlements and appropriateness from the point of management, have to be considered.

To involve local community for Sustainable management of National Parks and Wildlife Reserve, Conservation area, Buffer Zone Management plan is being implemented. There are various parks and people issues need to address. If we look the global context of sustainable management of protected area, main issues is always park people conflicts. Nepal has been implementing park people project with the help of UNDP since 1998.

The wetlands of the KTWR and its BZ consists of rivers, streams, floodplains, oxbow lakes, river marshes, swamp forest, rice fields and seasonally flooded grasslands. KTWR and its BZ's most wetlands are created due to the Large Dam Constructed in the Koshi River. It has upstream and down stream two way impacts to the both countries India and Nepal (Bhandari M. 2000:13). Buffer zone of 173 sq.km has been declared in 2004 incorporating 16 VDC of 3 districts around the reserve. Buffer zone management committee has already been formed with user committees and user grou0s from 10,693 households of the buffer zone. The study area also falls in the proposed BZ of the Reserve.

4.5 Kusaha VDC

Kusaha VDC lies in the Buffer zone of KTWR in Sunsari district covering an area of 15.99 sq. km. There are 9 wards in the VDC where lies the Headquater of the reserve.this VDC is 2.6 km. away of the East- West Highway in north- west direction(Bhandari.1992:5) The VDC lies in the Buffer Zone declared by DNPWC in 2004. It is touched by the Mahendra Highway, so the VDC has access to other parts of eastern Nepal.

4.5.1 Social Characteristics

Migrated people from hills and different parts of India live in the adjoining settlement of KTWR. People towards the Northern side of the reserve ar the migrants for the hilly regions of Nepal especially from Terathum, Dhankuta, Bhojpur etc.

Kusaha VDC includes only those people who have migrated form India or local terrain people. The people residing in the VDC has closest link with the Bihari people in terms of social reforms (i.e. marriage). Yadav, Urau, Miya, Jhagar, Mandal etc. are the major ethnic groups inhabiting the study area. These people are directly or indirectly dependent on the reserve for the sustenance of their life.

4.5.2 Settlement

The settlement pattern in the VDC is in the cluster form where we can see the people of different ethnic groups making a cluster of each one. But the distance of one ethnic group's settlement is nearly 50-100meters from others. All the houses in the VDC are traditionally made up of bamboo with thatch roof of cattail & Khair and they are of one storey building. Livestock raising is done adjacent to the main house. Though the lack of pasture land in the VDC, most of the villagers have raised the livestock.

4.5.3 Economic Characteristics

People residing in this VDC are very poor and backward. The people are very innocent form the heart. In the VDC many of the people are illiterate, conservative and do not agree with the modern process of farming. Most of the lands have been used for agriculture and we cannot see the land abandoned without any purpose. Agriculture is the main occupation of most of the villagers. But the people from the Majhi, Godi Mukya communities adapted fishing as their main occupation.

4.5.4 People

This area possess the multi-ethnic groups of people especially the marginalized people have dominated the area. The local inhabitants like Musahar, Mallah, Sardar , Mia, Jhangard, Braham, Chhetri etc. do reside in this VDC.

4.6 Climate

In general the climate is tropical monsoon type.in this region the average daily maximum temperature ranges from 23.5^0C to 33.4^0C and the minimum temperature ranges from 7.8^0C to 25.3^0C and the mean monthly temperature ranges from 15.7^0C to 29.2 degree Celsius(Sah,1997). The region experiences three distinct types of seasons.

Summer:

Summer season commence on from February and continues up to May. Summer is intensely hot with minimal precipitation and the temperature reaches up to 40^0C in the months of May and June. In this season days are dull and dry. During March-April, air becomes dustier in comparison to other seasons. In March relative humidity is very low. April and May are characterized by violent high velocity thunderstorm.

Monsoon:

The monsoon commence on late May or in early June with frequent and violent thunderstorm. Monsoon last until September bringing heavy rainfall. Rainfall is greatest during July but high humidity and temperature is experienced during this season. The average annual rainfall at KTWR ranges between 1300mm recorded at Fatepur, 1.5 km to the Northwest of the reserve and 2052mm at Chatara, 4 km to the Northeast of the reserve. 80 to 85 percent of the rainfall occurs in this season from mid June to mid September (Sah, 1997). The Koshi River is flooded at this season and people dependent on fishing are heavily engaged in catching fish in the reserve i.e. flooded area.

Winter:

Winter season is characterized by clear skies with moderated temperature. This season is cool and pleasing. People feel neither hot nor cold during the season. Winter starts from October and lasts till the end of January. Humidity is high but rainfall spares. Mornings are cold and days are warm in the season. For the past few years the winter season has been cold without much sunshine for almost a month. There are frequent fogs and gusty cold winds also blow occasionally during the winter.

Chapter – Five

SOCIOECONOMIC SITUATION OF THE STUDY AREA

5.1 Wetland Dependent Communities in the Study Area

The wetland dependent communities found in the area were the Musahar, Mallaha, Bantaar, Jhangad and the Yadav and these people were found living with in the distance of the 1 km. from the reserve area. These people have found to have a link with the reserve for sustaining their livelihood.

5.1.1 Caste and Ethnic Composition of Sample HHs

Caste and ethnicity plays an important role in our traditional society. We can find peoples' occupation is highly influenced by cast and ethnic groups which they belongs. This study tried find the wetland dependent communities which are making its livelihood directly or indirectly from the wetland resources of the reserve. So the questionnaire was used to collect the information on the communities' people who are dependent on the wetland resources. The communities which are taken under study are listed below in the Table 5.1

Table 5.1: **Ethnic Composition of the Study Area**

Caste/ethnic group	Location	Total No. of HHs	No. of HHs sampled	Percentage
Musahar	Pashim kusaha-3	25	10	14.08
Mukhia	Jamuwa -9	21	16	22.54
Uranw	Jamuwa -9	30	15	21.13
Sardar	Sardartol-4	25	20	28.17
Yadav	Jhalitol-4	18	10	14.08
Total		119	71	100.00

Source: Field Survey, 2006

5.1.1 Musahar Community

Musahar people residing in the Pashim Kusaha ward no. 3 were found to be settled in a clustered form. There were 25 HHs of the Musahar communities. While communicating with these people most of the young generations were

found to be working in India and other parts of Nepal. These employed people go to India for about 6 to 12 months and come out with earnings. When the earning goes down they again go for the same jobs.

Musahar people were called as the untouchable caste in the village. The people of upper especially Brahim and chhetri do not take any food given by these people. For the livelihood the most of the musahar people work on the agricultural field as the wage labour. Some were found working in the profession of mat weaving.

The Mushahars, who claimed to be the descendants of ancient Hindu saints, are still illiterate, poverty-stricken and couldn't say even the date of their children's birth.

They were still following the traditional profession of fishing, ploughing, cattle herding, shepherding, who live in small huts crowded together at one place. They do not use fishing nets while fishing and usually their fishing is characterized by blocking the river rivulets. They use their hands for catching the fish in the blocked area.

They hesitate to stretch hands for something and never wanted to live on begging even if they have to die of hunger, which shows their family specific orientation towards work.

These people showed no any concern for the legal and formal things like the registration of birth, death, schooling their children. But these people were found eager to get the citizenship certificate from the District office. There were 3 people who don't have the citizenship certificate.
Medium in height, thin of body and with attractive nature, the Musahars were found to be really poor. They have no land. They build their huts on others' land.

5.1.1.1 Gender

In order to find out the male female ratio, respondents were asked about their gender. Of the total number of 10 respondents taken 7 were female and 3 people were male that is the male and female percentage was 30 & 70 respectively.

5.1.1.2 Land Composition

To find the land composition of Musahar people, they were asked about the land holding status. Of the total respondents, 70 percent had hold only 1-5 kattha land and the remaining 30 percent did not possess any land i.e. they had land only to make house.

Table 5.2.1: **Land Status of the Musahar Community**

Land holding size	Respondents	
	Number	Percentage
No land	3	30.00
1-5	7	70.00
6-10	-	-
11-15	-	-
16-20	-	-
Above 20	-	-
Total	10	100.00

Source: Field Survey, 2006

Note: 20Kattha= 1 Bigha

5.1.1.3 Household Size

The majority of the respondents were with household size of 6-10 members each that is, it covered 60 percent of the total respondents. Household size of 1-5 family members & 11-20 family members had covered 20 percent each.

Table 5.2.2: **Household Size of Musahar Community**

Members in a HH	Respondents	
	Number	Percentage
1-5	2	20.00
6-10	6	60.00
11-20	2	20.00
Above 20	-	-
Total	10	100.00

Source: Field Survey, 2006

5.1.1.4 Occupation

The majority of respondents from this community said that they have adapted the main occupation agricultural wage labour. And the other remain had said that they have taken the mat weaving and fishing as their main occupation which was continued from generations. In this community especially the women were found to involve in the mat weaving activities. The materials needed for the mat weaving was the Pater, locally called which was bought from the private land with Rs. 25 per bhari. They sale the mat in the near by market i.e. coming to Lauki, a neighbouring VDC especially in Hat Bazaar with the cost of Rs.30 to 50 per piece. When the women are worked as agricultural laborer, they are paid only Rs.35 per day on the other hand males are paid 100 per day. So here we can conclude that there is gender discrimination in terms of working rate paid.

Table 5.2.3**: Occupational Status of Musahar Community**

Main occupation	Respondents		Secondary occupation	Respondents	
	Number	Percent		Number	Percent
Agriculture	-	-	Agriculture	-	-
Ag. wage labour	5	50.00	Ag. wage labour	10	100.00
Service	-	-	Service	-	-
Mat weaving	1	10.00	Mat weaving	-	-
Livestock rearing	-	-	Livestock rearing	-	-
Others	4	40.00	Others	-	-
Total	10	100.00	Total	10	100.00

Source: Field Survey, 2006

Note: Others include fishing, riskwa pulling

5.1.1.5 Agricultural Sufficiency

Agricultural sufficiency also affects in the economic condition of the people if the people can grow the surplus food they can have the better life. It means that they can fulfill their basic needs. But the status of the agricultural sufficiency of this community is far less than the expected. The agricultural production would not support more than 3 to 5 months for the responding houses.

Table 5.2.4: **Agricultural Sufficiency of Musahar Community**

Agricultural sufficiency (months)	Respondents	
	Number	Percentage
Up to 5	10	100.00
6-9	-	-
9-12	-	-
More than 12	-	-
Total	10	100.00

Source: Field Survey, 2006

5.1.1.6 Educational Status

It is inevitable to produce efficient, robust, productive, disciplined and healthy citizens in the country by developing the entire social service i.e. education, health etc. to bring the overall development of the country. That is the education plays the crucial role in the development of the nation. The educated people can divert the nation in their way.

Table 5.2.5: **Educational Status of Musahar Family**

Educational level	Respondents	
	Number	percentage
Under SLC	21	77.78
SLC	4	14.82
Intermediate	2	7.40
Under graduate	-	-
Post graduate	-	-
Total	27	100.00

Source: Field Survey, 2006

People of this community were backward in educational attainments. Of the total sample surveyed form this community, 77.78 percent of children were studing under SLC and 14.82 percent were SLC graduates. The remaining 7.40 percent were studying in intermediate level.

5.1.1.7 Status of Livestock Rearing

In this community livestock rearing is also a secondary occupation. Every house has on average 1-3 cow and 3-10 ducks. They used to domesticate ducks and chickens even though these animals are eaten by the squirrel.

Table 5.2.6: **Status of Livestock Rearing in Musahar community**

Livestock Type	Livestock	
	Number	Percentage
Cow	6	33.34
Buffalo	-	-
Goat	-	-
Others	12	66.66
Total	18	100.00

Source: Field Survey, 2006

Note: others imply ducks, hens and oxen

5.1.1.8 Purpose of Visiting the Wetland Site

The people of this community usually visit the site for the purpose of collecting the fodder and fuel wood. For the necessary materials needed for the mat weaving they used to visit the site area.

Table 5.2.7: **Purpose of Visiting the Wetland Site in Musahar Community**

Purpose of visiting	Respondents	
	Number	percentage
For collection of fodder and fuelwood	6	60.00
Bathing and swimming	-	-
Collection of edible plant resources	1	10.00
Grazing cattle	-	-
fishing	1	10.00
For other purpose	2	20.00
Total	10	100.00

Source: Field Survey, 2006

5.1.2 Mallah Community

Mallah community was found in the Jamwa ward no.9 of Kusaha, from where reserve is at the half an hour walking distance. In Jamwa there are altogether 21 houses of mallah community.

Mallah are also called as “Mukhia, Godi” in the study area. These people are the true fisherman. They are born for fishing in the wetland area and in the Koshi River with the assistance of the boat and the fishing nets.

Fishing in the Koshi River has been an age-old source of livelihood for these community people. In such a community, fishing people often mutually assist each other, not only in fishing, but also in social functions such as marriage ceremonies and village festivals.

From the socio-cultural point of view they were maintaining the same social activities as their ancestors, but every activity was firmly connected with the river and catch. Illiteracy, high population growth, low risk bearing capacity and unskilled youth in the community bind them to go on with their traditional occupation even if it was no longer beneficial.

5.1.2.1 Gender

In order to find out the male female ratio, respondents were asked about their gender. Of the total respondents there were

5.1.2.2 Land Holding Status

People of this community were found to be very poor were found to be living in a miserable condition. Most of the respondents were found to be landless and its represents 37.50 percent of the total surveyed from this community.

Table 5.3.1: **Land holding Status of the Mallah Community**

Land holding size (kattha)	Respondents	
	Number	percentage
No land	6	37.50
1-5	9	56.25
6-10	1	6.25
11-15	-	-
16-20	-	-
Above 20	-	-
Total	16	100.00

Source: Field Survey, 2006

Note: 20Kattha= 1 Bigha

5.1.2.3 Household Status

Of the sample surveyed from this community 68.85 percent represents to have a household size of 6-10 members. The cause of having this number of family is due to the join family system in this community.

Table 5.3.2: **Household Size of the Mallah Community**

Members in a HH	No. of Respondents	Percentage
1-5	4	25.00
6-10	11	68.75
11-20	1	6.25
Above 20	-	-
Total	16	100.00

Source: Field Survey, 2006

5.1.2.4 Occupation

Of the total respondents the majority had continued the fishing profession from the generation .Adapting this profession was their cultural trend. 68.75 percent of the respondents were of the profession of fishing as the main occupation. While the 25 percent and 6.25 percent of the respondents had adopted the main occupation as the agricultural wage labour and mat weaving respectively.

On the contrary, the people possessing the secondary occupation reveal the following data. 31.25 percent of the mallah people worked as the agricultural

wage labour. 43.75 percent go outside the area in search the job as the worker in the industries and the 25 percent had adapted dthe mat weaving as the secondary occupation. People of this community especially adapted the secondary occupation in term to fulfill the financial need.

Table 5.3.3: **Occupational Status of Mallah Community**

Main occupation	Respondents		Secondary occupation	Respondents	
	Number	Percentage		Number	Percentage
Agriculture	-	-	Agriculture	-	-
Ag. wage labour	4	25	Ag.wage labour	5	31.25
Service	-	-	Service	-	-
Mat weaving	1	6.25	Mat weaving	4	25
Livestock rearing	-	-	Livestock rearing	-	-
Others	11	68.75	Others	7	43.75
Total	16	100.00	Total	16	100.00

Source: Field Survey, 2006

Note: Others Imply fishing, working abroad, industries in Nepal, riskwa driver, shepherding

5.1.2.5 Agricultural Sufficiency

Having no adequate land for agricultural production and a possession of large number of family members had let the respondents to live in the scarcity of food. Of the total sample surveyed from this community 100 percent said that their agricultural production only support up to 5 months only. They used to fulfill their food by selling fish in the market.

Table 5.3.4: **Agricultural Sufficiency of Mallah Community**

Agricultural sufficiency (months)	Respondents	
	Number	Percentage
Up to 5	16	100.00
6-9	-	-
9-12	-	-
More than 12	-	-
Total	16	100.00

Source: Field Survey, 2006

5.1.2.5 Educational Status of the Family

Education is one of the most important factors in development at the village level or in a community status. In this community majority of the people were found to be illiterate and those who said they are educated had a education below SLC.

Table 5.3.5: **Educational Status of the Mallah Family**

S.N.	Educational Level	Respondents	
		Number	Percentage
1	Under SLC	12	100.00
2	SLC	-	-
3	Intermediate	-	-
4	Under graduate	-	-
5	Post graduate	-	-
Total		12	100.00

Source: Field Survey, 2006

5.1.2.6 Status of Livestock Rearing

The people of this community have a hard life for gaining a food for them as well as for their family. In this conditions how they can domesticate the animals. But during the study, 77 percent of the respondents have domesticated cow for the purpose of selling milk.

Table 5.3.6: **Status of Livestock Rearing Mallah Community**

S.N.	Livestock type	Number	Percentage
1	Cow	20	77.00
2	Buffalo	6	23.00
3	Goat	-	-
4	others	-	-
Total		26	100.00

Source: Field Survey, 2006

5.1.2.7 Purpose of visiting the wetland site

Being the fisherman community, most of the respondents said they used to visit the wetland site for the purpose of fishing. They used to visit the site daily.87.5 percent represents the people visiting the site for fishing.

Table 5.3.7: **Purpose of visiting the wetland site in Mallah community**

Purpose of visiting	Respondents	
	Number	Percentage
For collection of fodder and fuelwood	2	12.5
Bathing and swimming	-	-
Collection of edible plant resources	-	-
Grazing cattle	-	-
fishing	14	87.5
For other purpose	-	-
Total	16	100.00

Source: Field Survey, 2006

5.1.3 Jhangad/ Uranw Community

The Jhangad community was found in the ward no. 9 of the kusaha. There were altogether 30 HHs of this community. Of the total households 15HHs were taken under study.

The Jhangad are one of the many ethnic groups of Nepal and are also recognized as Uranw locally. They are mostly found in Jhapa, Biratnagar, Mohottari and Sarlahi. They have their own language called “Jhangad language”.according to the observation made during the field trip; they seldom tell a lie or resort to deceit and dissimulation. Most of them are dark in complexion. They are tall in stature, stout and strong and have thick black hair. At the same time they are very laborious. They live by cultivating land. They also keep cattle and fowl.

They live in thatched houses and have an extensive common courtyard where they all assemble to sing and dance. The majority of the Jhangad families live with their extended family. In general one family has 3 generations i.e. grandfather, father and son. Very few nuclear families were found in the

Jhangad community of Kusaha VDC. Extended families share some of the bitter experiences of poverty. They maintain kinship and respect and obey elders.

Jhangad people are good agricultural workers. Their agricultural products are paddy, wheat, barley but their production is not sufficient to be able to store. So these people mostly work as the agricultural wage lobourers.

5.1.3.1 Gender

In order to find out the male female ratio, respondents were asked about their gender. Of the total 15 respondents 11 respondents were male and remaining 4 were female. That is male percent is 73.33 percent and female is 26.66 percent.

5.1.3.2 Land Holding Status

In Jhangard community majority of local people possesses 3 kattha land and most remain with out land.60 percent of the respondents possess the 1-5 kattha of land which is not sufficient to fulfill the needs of the family because of the large number of family size. People of this community were also found to be without land and represents 20 percent of the total surveyed from this community. Some of the people said that they only have a land occupied by their hut

Table 5.4.1: **Land holding Status of the Jhangad Community**

Land holding size (kattha)	Respondents	
	Number	Percentage
No land	3	20
1-5	9	60
6-10	3	20
11-15	-	-
16-20	-	-
Above 20	-	-
Total	15	100.00

Source: Field Survey, 2006

Note: 20 kattha=1 Bigha

5.1.3.3 Household Status

The people of this community are backward; most of them are illiterate and unaware of family planning. 53 percent of the sampled HHs represents to have a household size of 1-5 and 40 percent represents the household size of 6-10.

Table 5.4.2: **Household Size of Jhangad Community**

Members in a family	Respondents	
	Number	Percentage
1-5	8	53.33
6-10	6	40.00
11-20	1	6.67
Above 20	-	-
Total	15	100.00

Source: Field Survey, 2006

5.1.3.4 Occupation

The occupational status encompasses access to employment, working conditions, better pay and career development prospects. The occupational status describes what sort of occupation people have access to, how far they are rewarded, whether they are skilled or unskilled and their working environment. It is an indicator of the social and economic development.

The total number of respondents from the Jhangad community said that their ancestors have adapted the mat weaving as their main occupation for their livelihood. The data reveals that 66.67 percent of respondent have an occupation as an agriculture wage labour and 26.66 percent of respondents have continued their ancestor's profession. The Jhangad are the minority community so they do not have access to the service. Only the 6.67 percent of the respondents were service holders. And in the so her we can conclude that there is gender discrimination in terms of working rate.

Table 5.4.3: **Occupational Status of Jhangad Community**

Main occupation	Respondents		Secondary occupation	Respondents	
	Number	percent		Number	Percent
Agriculture	2	13.33	Agriculture	-	-
Ag. Wage labour	11	73.33	Ag. Wage labour	8	53.33
Service	-	-	Service	-	-
Mat weaving	1	6.67	Mat weaving	2	13.33
Livestock rearing	-	-	Livestock rearing	-	-
Others	1	6.67	Others	5	33.34
Total	15	100.00	Total	15	100.00

Source: Field Survey, 2006

Note: Others Include fishing, working abroad, industries in Nepal, riskwa driver, shepherding

5.1.3.5 Agricultural Sufficiency

Of the total sample surveyed, 73.33 percent said their agricultural production support only to 5 months and 20 percent represents agricultural support up to 9 months and the 6.67 percent represents that their agricultural production support up to 12 months.

Table5.4.4: **Agricultural Sufficiency of Jhangad Community**

Agricultural sufficiency (months)	Respondents	
	Number	Percentage
Up to 5	11	73.33
6-9	3	20.00
9-12	1	6.67
More than 12	-	-
Total	15	100.00

Source: Field Survey, 2006

5.1.3.6 Educational Status

The people of this community are also illiterate. Of the sample surveyed form this community 76.92 percent people are studying under SLC and 15.38 percent are SLC level and 7.70 percent are studying at intermediate level.

Table 5.4.5: **Educational Status of the Jhangad Family**

Educational Level	Respondents	
	Number	Percentage
Under SLC	10	76.92
SLC	2	15.38
Intermediate	1	7.70
Under graduate	-	-
Post graduate	-	-
Total	13	100.00

Source: Field Survey, 2006

5.1.3.7 Status of Livestock Rearing

The people of this community used to have a more ducks and hens as comparison to other community people. While analyzing the livestock percent, 69.23 percent represents ducks and hens.

Table 5.4.6: **Status of Livestock Rearing in Jhangad Community**

Livestock Type	Livestock	
	Number	Percentage
Cow	9	13.85
Buffalo	-	-
Goat	11	16.92
Others	45	69.23
Total	65	100.00

Source: Field Survey, 2006

Note: Others Include ducks, hens

5.1.3.8 Purpose of Visiting the Wetland site

Of the total sample surveyed from this community 86.66 percent of the respondents used to visit the wetland site for the purpose of collection of fodder and fuel wood.

Table 5.4.7: **Purpose of Visiting the Wetland site in Jhangad Community**

Purpose of visiting	Respondents	
	Number	Percentage
For collection of fodder and fuelwood	13	86.66
Bathing and swimming	-	-
Collection of edible plant resources	1	6.67
Grazing cattle	-	-
fishing	1	6.67
For other purpose	-	-
Total	15	100

Source: Field Survey, 2006

5.1.4 Bantar/ Sardar Community

The Bantar community was found in the Sardartol in ward no. 4 of the Kusaha. These people were found to depend on the wetland resources i.e. cattail for their livelihood. There were altogether 40HHs of the Bantar community.

The Bantar people were also called as Sardar. Especially the compound settlemnents of small huts were their residential area. In this community man and women both worked together in making the mats from the locally called plant species “Pater”. It was common to see the mat weaving in every house.

5.1.4.1 Gender

In order to find out the male female ratio, respondents were asked about their gender. Of the total sampled population of this community only 45 percent were female and the other 55 were of male composition.

5.1.4.2 Land Holding Status

Of the total respondents taken from this community, the 50 percent of the respondents were holding the land of about 1-5 kattha, 30 percent were of no land. The remaining 15 percent posses the land of 6-10 kattha and the other 5 percent of the sampled respondents of this community possess above 20 kattha of land.

Table 5.5.1: **Land Holding Status of Sardar Community**

Land holding size (kattha)	Respondents	
	Number	Percentage
No land	6	30
1-5	10	50
6-10	3	15
11-15	-	-
16-20	-	-
Above 20	1	5
Total	20	100.00

Source: Field Survey, 2006

Note: 20kattha= 1 Bigha

5.1.4.3 Household Status

The family structure, its composition and member participating in the various occupations can highly influence the socio-economic status of any family. If there are a higher number of family members it directly affects in the economic condition of the family. In this community of the total respondents taken under study 60 percent of the HHs have household size of 6-10 and 25 percent HHs have a household size of 11-20. The remaining 15 holds the family members of 1-5 in numbers.

Table 5.5.2: **Household Status of the Sardar Community**

Members in a HH	Respondents	
	Number	Percentage
1-5	3	15
6-10	12	60
11-20	5	25
Above 20	-	-
Total	20	100.00

Source: Field Survey, 2006

5.1.4.4 Occupation

The total no of respondents from the Sardar community said that they have adapted mat weaving as the main occupation. The data analysis reveals that 65 percent respondents have chosen mat weaving as their main occupation which was running from generation as a traditional occupation. And the data shows that 10 percent of respondents worked as a wage labour in order to fulfill the basic need of their family. In doing the wage labour, male people get Rs100 per day on the other hand female gets Rs. 40 per day. So there we can conclude that there is gender discrimination in terms of working rate. And the 15 percent were found to involve in the main occupation of rikshwa driver, milk selling in the market.

The percentage of the respondents having the secondary occupation as agricultural wage labour is 40 and the percentage of respondents who were working in different fields like rikshwa driver, industries and shepherding covers 40 percent. Twenty percent were found adopting the mat weaving as the secondary occupation.

Table 5.5.3: **Occupational Status of Sardar Community**

Main occupation	Respondents		Secondary Occupation	Respondents	
	Number	Percent		Number	Percent
Agriculture	2	10	Agriculture	-	-
Ag. wage labour	2	10	Ag. wage labour	8	40
Service	-	-	Service	-	-
Mat weaving	13	65	Mat weaving	4	20
Livestock rearing	-	-	Livestock rearing	-	-
Others	3	15	Others	8	40
Total	20	100.00	Total	20	100.00

Source: Field Survey, 2006

Note: Others Include fishing, working abroad, industries in Nepal, rikshwa driver, shepherding and milk selling

5.1.4.5 Agricultural Sufficiency

Agricultural sufficiency also indicates the livelihood situation of the people. It helps to show whether the people have the sufficient agricultural product to sustain their life. Of the total respondents of this community 80 percent of them have the sufficient agricultural product for 5 months. Other 10 percent of respondents can sustain with agricultural production upto 9 months, while the other 5 percent each can sustain upto 12 months and the other more than 12 months.

Table 5.5.4: **Agricultural Sufficiency of Sardar Community**

Agricultural sufficiency (months)	Respondents	
	Number	Percentage
Up to 5	16	80
6-9	2	10
9-12	1	5
More than 12	1	5
Total	20	100.00

Source: Field Survey, 2006

5.1.4.6 Educational Status

In terms of educational status in the study area, sardar community people were quite literate in comparison to other community people. Their settlement areas were also found to be neat & clean.

Table 5.5.5: **Educational Status of Sardar Family**

Educational Level	Respondents	
	Number	Percentage
Under SLC	47	75.81
SLC	12	19.36
Intermediate	2	3.22
Under graduate	1	1.61
Post graduate	-	-
Total	62	100.00

Source: Field Survey, 2006

5.1.4.7 Status of Livestock Rearing

The people of this community used to domesticate cow, goats and ducks. After analyzing the respondents' data, 22.95 represents the cow percent and 69.95 represents the percentage of ducks and hens.

Table 5.5.6: **Status of Livestock Rearing in Sardar Community**

Livestock type	Number	Percentage
Cow	42	22.95
Buffalo	-	-
Goat	13	7.10
Others	128	69.95
Total	183	100.00

Source: Field Survey, 2006

Note: Others Include ducks, hens etc.

5.1.4.8 Purpose of visiting the Wetland Site

The people of this community were found to visit the reserve area regularly for the collection of cattail (*Typha anguistifolia*) which is used to make the mats, curtains of window. 60 percent of the respondents of this community were found to visit the area for the collection of cattail. Ten percent of them used to visit the reserve for the collection of fodder and fuel wood. The fuel wood collection was prohibited to the people but they were allowed to collect form their community forestry under certain terms and conditions.

Of the total respondents 5 percent used to bath and swim in the reserve while other 10 percent used to collect the edible plant resources. The remaining 15 percent uses the reserve for the purpose of fishing.

Table 5.5.7: **Purpose of visiting the Wetland site in Sardar Community**

Purpose of visiting	Respondents	
	Number	Percentage
For collection of fodder and fuelwood	2	10
Bathing and swimming	1	5
Collection of edible plant resources	2	10
Grazing cattle	-	-
fishing	3	15
For other purpose	12	60
Total	20	100.00

Source: Field Survey, 2006

Note: Other purpose include pater collection

5.1.5 Yadav Community

Yadav of this VDC used to live in the ward no.4 in jhalitol. The Yadavs were socially and economically strong. They are rich ethnic community of this area. They are found to be settled in a compound from. There are altogether 18 HHs of this community.

5.1.5.1 Gender

In order to find out the male female ratio, respondents were asked about their gender. The total respondents taken from the Yadav community was 10, of which 6 female and 4 male that is male percent is 40 and the female percent is 60.

5.1.5.2 Land Holding Status of Yadav Community

In yadav community 50 percent of the respondents have the land above 20 katth and the other respondents having 6-10 kattha and 11-15 kattha represents 10 percent each. The 30 percent of the respondents possess the land between 16-20 kattha. The people of this community not have land is rare.

Table 5.6.1: **Land Holding Status of Yadav Community**

Land holding status (kattha)	Respondents	
	Number	Percentage
No land	-	-
1-5	-	-
6-10	1	10
11-15	1	10
16-20	3	30
Above 20	5	50
Total	10	100.00

Source: Field Survey, 2006

Note: 20 Kattha= 1 Bigha

5.1.5.3 Household Status

In this community the 80 percent of the respondents have the household size of 6-10 which means there is high population density in each family and the remaining 20 percent covers the household size 11-20. The large no. of family members was found living under one roof. The cause for the large no. of family members are due to the extended family system, lack of education and awareness about family planning practices and desire to have male child to conduct last rituals after deaths i.e. Social factor.

Table 5.6.2: **Household Status of Yadav Community**

Members in a HH	Respondents	
	Number	Percentage
1-5	-	-
6-10	8	80
11-20	2	20
Above 20	-	-
Total	10	100.00

Source: Field Survey, 2006

5.1.5.4 Occupation

The surveyed HHs of this community shows the majority of the respondents have the main occupation as the agriculture. They were called as jamindar in this community. Whole HHs family was actively engaged in the agricultural activities. They are also regarded as the rich community in financial position. 80 of the surveyed respondents have respondent to have the main occupation as the agricultural farming. While the other 20 percent response to have the main profession as the livestock rearing. When the respondents were asked about their secondary occupation cent percent selected to choose the secondary occupation as the livestock rearing. Livestock has provided a bug of alternative source of income to these people. Some used to sell the milk in the market for earnings.

Table 5.6.3: **Occupational Status of Yadav Community**

Main Occupation	Respondents		Secondary Occupation	Respondents	
	Number	Percent		Number	Percent
Agriculture	8	80	Agriculture	-	-
Ag. Wage labour	-	-	Ag. Wage labour	-	-
Service	-	-	Service	-	-
Mat weaving	-	-	Mat weaving	-	-
Livestock rearing	2	20	Livestock rearing	10	100.00
Total	10	100.00	Total	10	100.00

Source: Field Survey, 2006

5.1.5.5 Agricultural Sufficiency

The respondents surveyed from this community concluded that they have sufficient agricultural production for yearly need. Some of the HHs used to sale the surplus production to the market. Of the sampled population of this community 60 percent possess agricultural surplus i.e. more than 12 months. 30 percent HHs sustain 9-12 months from the agricultural production and the other 10 percent can sustain only to 9 months from the agricultural production.

Table 5.6.4: **Agricultural Sufficiency of Yadav Community**

Agricultural sufficiency (months)	Respondents	
	Number	Percentage
Up to 5	-	-
6-9	1	10
9-12	3	30
More than 12	6	60
Total	10	100.00

Source: Field Survey, 2006

5.1.5.6 Educational Status of the Family

In comparative of the other communities' responses the family members of the respondents were found to be little bit educated in comparison to other communities which are undertaken for the purpose of the study.

Table 5.6.5: **Educational Status of the Yadav Family**

Educational Level	Respondents	
	Number	Percentage
Under SLC	13	40.63
SLC	10	31.25
Intermediate	6	18.75
Under graduate	2	6.25
Post graduate	1	3.12
Total	32	100.00

Source: Field Survey, 2006

5.1.5.7 Status of Livestock Rearing

In this community livestock rearing is also a secondary occupation. Every house has on average 1-3 cow and 1-3 buffalo. Population density of livestock is also found high in this community. The percentage of the cow and buffalo was found to be 26.97 and 38.20 respectively. 34.83 represent the percentage of the goat population.

Table 5.6.6: **Status of Livestock Rearing of Yadav Community**

Livestock type	Livestock	
	Number	Percentage
Cow	24	26.97
Buffalo	34	38.20
Goat	31	34.83
others	-	-
Total	89	100.00

Source: Field Survey, 2006

5.1.5.8 Purpose of Visiting the Wetland Site

Majority of the respondents i.e. 40 said that they used to visit the site for the purpose of fodder and fuel wood. They used to collect grass for animal feeding. Yadav people have adopted the profession of livestock raising, so they used to visit the wetland site for the collection of fodder for their animals. Some people leave their buffaloes into the reserve.

Table 5.6.7: **Purpose of visiting the Wetland Site in Yadav Community**

Purpose of visiting	Respondents	
	Number	Percentage
For collection of fodder and fuelwood	4	40
Bathing and swimming	1	10
Collection of edible plant resources	2	20
Grazing cattle	-	-
fishing	1	10
For other purpose	2	20
Total	10	100.00

Source: Field Survey, 2006

Note: Other purpose Include pater collection

Chapter – Six

LOCAL COMMUNITY AND WETLAND RESOURCE USE STATUS

6.1 Annual Income of the Local Communities

Of the entire total sample surveyed, majority of respondents' do not have the annual income below the Rs. 5000 per annum. Only the respondents from the Yadav's have the annual income more than Rs.5000. the respondents from the Musahar community said that they have the average daily income of Rs. 70 per day to 150 rupees. The Mallah community respondents have said that can make money of Rs.50 to 250 in a single day by selling the fishes. But it is not sure that they can make certain money in a single day by visiting the reserve area. If they have luck in catching the fish they can make handsome money otherwise not. Some time they have to be back with no fish on a basket. The Bantar community people can make on average Rs.100 -150 per day. This people were seemed to be found satisfied with their profession.

6.2 Members of Family Engage in Earnings

Of the total sampled surveyed of the VDC the 70 percent of the respondents have said they only one member of the family is engaged in earnings and the 30 percent of the respondents said two members of the family are involved in earnings for fulfillment of the needs of the family. What ever the number of the members engaged in earnings even a single house could not have the sufficient income source to fulfill the basic needs of the family except the members of the Yadav community. All the respondents of the wetland dependent families were found to exist under environment of scarcity and in miserable condition in terms of socially and economic analysis.

6.4 Economic Aspects of the Wetland Resources

Earnings from the wetland resources are often important as a complement to other resources. Income made form the wetland resources is often used to

purchase farm inputs and other inputs for the activities that contribute to livelihoods. Especially the Bantar and Mallah were found to use the wetland resources for the livelihood. People having the occupation of mat weaving used to buy the cattail from the private land. They usually pay Rs. 20-25 per bhari (weight of 30-45 kg.) From one bhari of cattail they can make 7-10 mats whose market price ranges form Rs. 30-50.

The mallah people have the profession of fishing in the Koshi river and in their wetland area which in managed by their users groups (UGs). According to the local fishermen, the best fishing season in Koshi

River is from March to July for fishing good-sized fishes. In average a fisherman can collect fishes weighing ½ to 2 kg per day according to the fishing season. They sell about 90 percent of the total catch composition of fishes at local markets at the rate of Rs. 50/- to 150/- per kg depending upon the species of fishes. The rest catch will be consumed by the family.

The condition of fish market is very poor in the Kusaha VDC. During the investigation period, a few temporary fish market had been noticed at Laukhi, a neighboring VDC. According to the local fishermen, the government has no plan to set up the fish market in the area.

6.5 Energy Consumption Pattern

In Nepal's energy consumption, the traditional bio-fuels such as firewood, agricultural wastes and animal dung are the major sources of energy which occupies more than 90 percent of the total energy requirements. The so called commercial fuels like fossil fuels and electricity have only a small quantity. In the study area most of the local communities of this area depend on the traditional source of energy. They are not aware of using the energy saving devices and clean energy devices.

Of the total traditional energy consumption in FY2004/05, share of fuel wood was 89.0 percent, agriculture residue 4.43 percent and cattle residue 6.57

percent, while in FY 2005/06 it was forecasted the share of agriculture and cattle residues would expect to remain same (Economic survey2005/06:149). The people of this village had given the first priority to use the animal dung as the main source of energy and second priority to use the plant residue and the fuel wood as the last source of energy.

Table 6.1: **Energy consumption pattern**

Energy used	Respondents	
	Number	Percentage
Animal dung	56	78.89
Plant residue	13	18.30
Fuel wood	2	2.81
Total	71	100.00

Source: Field Survey, 2006

From the above table, it shows that of the total 71 respondents 78.89 percent of the respondents used the animal dung as the energy source and the used percent of the plant residue was 18.30 percent and the remaining 2.81 percent revels that they use the fuel wood as the energy source.

6.6 Condition of Sanitation

Even in a single house, there wasn't a single toilet in the respondents' houses. It seemed like the whole VDC do not have a single toilet .They were found unaware on case of the need of the toilet for them. The existence of toilets is an indicator of basic hygiene, but also of resources. Most of the local communities do not have toilets due to the cultural practices and lack of awareness. This has negative impact on the human health.

6.7 Local Peoples' Attitude Towards the Conservation of Wetlands

The local people hold the perception of conserve the wetlands within the reserve areas. But there are certain confrontations between the parks and the local people especially on the issues of the wild animals' encroachment on their agricultural land.

Active conservation of habitats had increased wildlife population within protected areas, which start causing damage outside the park. The relation between park-people is imbalanced when the park animals damage outside and disturb the adjacent settlement. Damage of agricultural crop, human harassment, injuries and death, and livestock depredation are the common causes of this imbalanced relationship (Sharma, 1996:56).

Conservation alone cannot be successful without people's participation. Local people are not yet fully convinced for the protection of this reserve. As in their opinion they do not get any benefit but lose their crops & cattle.

Table 6.2: **Peoples' Attitude Towards the Conservation of Wetlands**

Attitude	Respondents	
	Number	Percentage
Conserve it	58	81.69
Don't conserve it	5	7.04
Don't know	8	11.27
Total	71	100.00

Source: Field Survey, 2006

While asking the respondents about their views on whether the wetlands should be preserved, the 82 percent of the respondents were holding the vision of conserve wetlands on the contrary 7 percent respondents said don't conserve it. Their response was of this kind due to the wild animals eat their crops and they usually want to encroach the wetland areas. 11 percent of the respondents were in dilemma whether the wetlands should be conserved or not. It was due to the lack of awareness and education.

A real story of three people residing in the Kusaha VDC, who were sustaining their livelihood with resources that are available in the reserve area:

Case Study 1: *Baccha Yadav is 32 years old and has lived in Jhalitol ward 4 since he was born. He told me that he has only an area of small land, which is not enough to support his eight children. He is despairing for his future because he never gets benefits from the KTWR, only problems. He said, 'I just have a small land holding which can provide eight months' food for my family: however, wild buffaloes come to my field and eat my paddy. Sometimes, I really get nothing from my land. I want to kill all wildlife.'*

Case Study 2: *Asha Lal Mukhiya lives in Jamuwa ward 9. As he doesn't have any land, he is totally dependent on fishing. Every day, he catches fish in the downstream section of the Koshi River and in the wetlands outside the KTWR. He told me that he is always worried about his livelihood because he gets only 1kg of fish and earns Rs 50-60 per day. During the interview, he said to me, 'Now, even having lunch is too luxurious for me!' He continued and said sadly, 'I see so many fish in the Koshi River. I just need to put my hands into the river then the fish come, I really want to catch them but I can't.' he also said in flooding season he along with his friends can have a good income from the fishing but in the off-season it is very hard to sustain livelihood.*

Case Study 3: *The third story was told to me in one of the poorest villages in Koshi Tappu Region- East-Jamuwa village. I met a fisherman. He told me about his night fishing experience. 'In winter, my legs and hands are nearly frozen when fishing in river at night, but I have no choice. Sometimes, I can't get enough food and I just sleep without any food until next day.' He explained that since the establishment of KTWR, his life has become very difficult. He said, 'I'm afraid of the army so I must go fishing at night eventhough I'm scared of the wild animals. I need to provide food for my family.'*

Obviously, the livelihood of respondents had become harder and harder after the establishment of KTWR. However, the result of my household survey showed that an encouraging percentage (81.69 percent) of respondents expressed favorable attitudes toward the KTWR. The co-operative attitudes of the conservation planner and the staffs of the reserve members could

conserve the wetlands in a sustainable way. The reserve alone cannot conserve the wetland inside the reserve where anthropogenic pressure exists.

6.8 Community Involvement in Conservation of Wetlands

Of the total respondents, 74.65 percent of the respondents have said the community involvement is good for them. Respondents had said that it is their right to use the resources available in the reserve and its aside. The landless people had also said the reserve had made them landless and haven't gained any compensation from the government authority. Some people were found rude with the KTWR.

The local people of the Kusaha VDC were found to be satisfied with the present management situation of the wetland site of the reserve. They were of the vision to protect the wild species of wetlands and migratory birds.

Table 6.3: **Opinions on Community Involvement in Wetlands Conservation**

Communities	Opinions			Total
	Yes	No	Don't Know	
Musahar	6	3	1	10
Mukhia	15	-	2	16
Jhangard	9	1	5	15
Bantar	15	2	3	20
Yadav	8	-	1	10
Total	53	6	12	71
Percentage	74.65	8.45	16.90	

Source: Field Survey, 2006

6.9 Mode of Utilization of Wetland Resources by the local Communities

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 areas and it would ultimately increase the income of the people.

In the study area the local communities especially Bantars and Mukhiya were found more or less dependent on the wetland resources. 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 utilize it in a traditionally way. In fact the wetlands have much more benefits than they know. The wetland resources that the Local communities commonly utilize are stated in the following points:

Cattail *(Typha aungustifolia):*

Ethnic groups called Bantars (they like to be called Sardar) are engaged in cattail (*Typah spp.*) collection locally called as Pater and mattress making in the area. Bantars of the study area were found to depend on this resource for their livelihood and this had helped them in managing their economic needs.These people harvest good leaves of cattail from the drowned area of the Reserve as well as from the barrage area. Women and children collect them in a place and dry and cure them under the sun. Once they are dried, they are bundled and stored to build mattress. A special wooden handle and grass ropes are used to set up a loom to weave cattail mattress. Mostly women are engaged to weave mattresses, whereas men collect raw materials. Mattresses are taken to the local market on a bicycle and sold for Rs.30 to 50 per piece. The local markets are held on different locations on different days of the week. But they especially take the mattresses to near area, Lauki which in near to the Kusaha VDC.

With the establishment of the reserve the people are not allowed to collect the cattail inside the reserve, only once in the year. Usually these people collect the cattail form the private lands which are harvested by the land owners.

Fish:

Fishing is an important occupation of the Godi people. Fish capture and sale are the common occupation of these people. After the establishment of eh Reserve in 1976, restriction have been imposed on those people residing near to the reserve area for fishing. Jalkapoor was the endemic fish species of this area.

Fishing in the Koshi River changes with the season and the location. It is very diffused. Most of the fishermen use a small wooden canoe. Canoes made of sal wood last longer than those made of siso wood. Most fishermen use canoe and cast net while the use of canoe and drag net is the second most common method.

A number of fishing devices are used. These are: cast nets, gill nets, lift nets, and various other nets with indigenous names, such as tunny jal, chatti jal, chauki or chanki jal, sohat, hapa, different types of traps, baskets, rod and line. Poisoning, bombing and hand picking are frequent.

One of the several traditional methods is the use of extracts from local plants as fish poison.

Khair (*Acacia catechu*):
Khairs are commonly found in the floodplain of the KTWR especially inside the Reserve. They are also found in the mixed deciduous forest of Dalbergia-Acacia forest. The bark of the khair is extracted and cooked to prepare black dye for coloring purpose.

Simal *(Bombax ceiba):*
Besides its commercial value, the flowers are boiled to prepare curry and pickles.

Narkat *(Phragmites karaka):*
The matured Pragmites are harvested and dried. The dried stems are used for making handicrafts, for fencing and even for thatching and most of the people used it for the alternative source of the fuel wood. This plant is also promoted as the water purifier in the urban areas.

Singra *(Trapa bispinosa):*
Fruits are harvested and eaten as raw. If they dry they keep well. They are rich in protein and is also used as seed as a cereal substitute.

Karmaiya Sag *(Impomoea aquaticca* Forssk*):*

Tender leaves and twigs are used as green vegetables. They are locally called as “karmaiya sag”.

Khar *(Potamogeton spp.):*

The locally available khar is used to thatching materials. In the month Magh of Nepali calendar, the reserve is opened for 15 days for the local people to collect the khar. At that time local people collect the khar from the reserve by paying Rs.5 per bhari (30-45kg.).

Livestock Raising and Grazing

Animal husbandry is one of the vital components of local economy. People tend buffalo and cattle to meet their basic food and monetary needs through the sale of meat, milk and milk products, manure and use their males as draft animals. Only milking animals are kept stall-fed.

6.10 Plants Found in the Study Area

The list of plant species was collected from the people who have the ethno-botanical knowledge. It is totally based on the interview with reference to the checklist of the wetland plant species.

Table 6.4: **Plants Recorded in the Study Area**

Family and Species	Local Name	Available Month
Amaranthaceae *Achyranthes bedentata,* Blume	Datiun	Whole year
Graminae *Echinochloa cruss-gallii,*(L) P. Beav.	Sama,Telar	-
Orchidaceae *Spiranthes sinensis,*(Pers.)Ames.	Tutiya	Jestha-Ashard
Gramine *Saccharum spontaneum,* L.	Kans	-
Plantaginaceae *Plantago major l.*	Palanki	Whole year
Polygonaceae *Persicaria barbata,(L.)* Hara	Bishnair/Pirre	Whole year
Convolvulaceae *Impomoea aquatica,* Forssk.	Karmaiya Sag	-

Pontederiaceae *Monochoria hastate,(L)* Solms	Koka	Ashard – Mangsir
Rhmnanceae *Zizyphus mouritiana,* Lam.	Bair	Mangsir – Poush
Graminae *Phragmites karka,*(Retz.) Trin ex Steudes	Narkat	-
Graminae *Vetiveria zizanoides,*(L.) Nash	Katari Jhar	-
Leguminosae *Acacia catechu*	khair	-
Compositae *Bidens pilosa,* L.	kurro	-
Bombacaceae *Bombax ceiba,* (L.)	Simal	-
Potamogetomaceae *Potamogeton spp.*	Pani khar	-
Rutaceae *Aegle marmalos,*(L.)Corr.	Bel	Not found
Sapotaceae *Madhuc longifolia,* (Koenig.) Macbride	Mahuwa	Ashard –Shrawn
Solanaceae *Datur stramonium,* L.	Dhatur	Whole year
Tamaricaceae *Tamarix dioica,* Roxb. Ex Roth.	Jhauwa	Whole year
Trapaceae *Trapa natans var. bispinosa,*(Roxb.*)* Makino	Singara	Rainy season
Typhaceae *Typha angustifolia,* L.	Pater	Ashard- Mangsir
Pontederiaceae *Eichiornia crassipes*,(Mart.)Solms.	Jalkumbhi	Whole year

Source: Field Survey, 2006

The above data in interpreted with reference to the interview taken to the elder people of the different communities.

Micania Micarantha is a newly introduced invasive species. It is a woodless climber and is covering almost all the ground vegetation of the area and is spreading. It is commonly called mile meter. It is also called"Phohori laharo" in the eastern side of Nepal like in Koshi tappu wildlife reserve. It is not preferred by the domestic and wild herbivores. It is a very rapidly increasing nescience.

6.11 Fish Species Reported in the Study Area and inside the Reserve

For the information on the available species of fish, the Mallah and the Musahar community were asked on the availability of the fish species on the study area. The reported species of fishes are listed below on the table 5.11.

Table 6.5: **Reported Fish Species at the time of Study**

Local Name	Species	Family
Suia	*Gudusia chapra,* Ham.	Clupeidae
Gan Kabai	*Setipinna phasa,* Ham.	Engraulidae
katli	*Acrossocheilus hexagonolepis,* Mc Clelland	Cyprinidae
Mara	*Amblypharyngodon mola,* Ham.	Cyprinidae
Harda , Bhegna	*Aspidoparia morar,* Ham.	Cyprinidae
Chahale	*Barilius barila,* Ham.	Cyprinidae
Pothi	*Barilius barna,* Ham.	Cyprinidae
Guderi	*Barilius bendelisis,* Ham.	Cyprinidae
Jalkapoor(endemic)	*Barilius jalkapoorei,* Shrestha	Cyprinidae
Fageta	*Barilius spp.*	Cyprinidae
Pathar Chatti	*Chagunius chagunio,* Ham.	Cyprinidae
Chelwa	*Chela chaeius,* Ham.	Cyprinidae
Catla	*Catla catla,* Ham.	Cyprinidae
Naini	*Cirrhinus mrigala,* Ham.	Cyprinidae
Rewa	*Cirrhinus reba,* Ham.	Cyprinidae
Buduna	*Crossocheilus latius,* Ham.	Cyprinidae
Chithari Pothi	*Danio spp.*	Cyprinidae
Deduwa, Darai	*Esomus danricus,* Ham.	Cyprinidae
Duduwa	*Garra lamta,* Ham.	Cyprinidae
Rohu	*Labeo angra,* Ham.	Cyprinidae
Tikauli	*Labeo spp.*	Cyprinidae
Chanda Pothi	*Puntius sarana,* Ham.	Cyprinidae
Sahar	*Tor putitora,* Ham.	Cyprinidae
Tite Machha	*Psilorynchus sucatio,* Menon & Dutta	Psilorhynchidae
Lata	*Lepidocephalichthys spp.*	Cobitidae
Tengri, Tengra	*Mytus spp.*	Bagridae
Gonch	*Bagarius bagarius,* Ham.	Sisoridae
Bachwa	*Eutrophichthys vacha,* Ham.	Schilbeidae
Singhi	*Clarias batrachus,* Linn.	Claridae
Mungari	*Xenentodon cancila,* Ham.	Belonidae
Bam	*Amphipnous cuchia* Ham.	Amphipnoidae

Source: Field Survey, 2006

6.12 Wetland Management in Koshi Tappu Wildlife Reserve

Management is the manipulation of an ecosystem to ensure maintenance of all functions and characteristics of the specific wetland type. The loss or impairment of a wetland ecosystem is usually accompanied by irreversible loss in both the valuable environmental functions and amenities important to the society (Zentner, 1988:22).

The NPWC Act, 1973, prohibits a number of activities including livestock grazing, cultivation, fishing, hunting and entry into the reserve without permission from the reserve authority. Royal Nepal Army and the Reserve staff have taken responsibilities of law enforcement.

Park people conflict is not particular in Nepal; it can be seen in most of the developing countries. In developed world, nature of conflict is different; however, still there is conflict. In order to address the conflicts between the park authority and the communities, the Department of National Parks and Wildlife Conservation had implemented Park People Program from 1995 - 2003 with UNDP assistance by adopting community based biodiversity conservation approach. The main objective of this Program was to improve the socio-economic condition of the people living adjoining to the Reserve by promoting alternative energy and livelihood contributing to the conservation of biodiversity. (www.dnpwc.gov.np)

Currently the participatory conservation program (PCP) is doing its work in the Buffer zone area of the KTWR. With the co-existence of the reserve and the PCP, **Kamala Simsar Upabhaokta Samiti** was run in order to uplift the economic conditions of the Godhi people.

KTWR had enforced the law in order to control the pressure of the local people on the reserve resources. KTWR had included the local people in the management of wetlands inside the reserve. It had formed different wetland users groups and forest users groups with the aim of protecting forest resources as well as the wetlands resources presents in the reserve.

The each forest users groups should manage the wetland present within the community forest. The users group should construct the fish ponds with the assistant of the KTWR and they are allowed to raise the hybrid fish verities. The KTWR had included the sub- users groups which include the pro-poor people of certain community, they are provided with the pond in order to help in their livelihood.

Participatory Conservation Program (PCP) in KTWR

Implemented by DNPWC with the support ofthe United Nations Development Program (UNDP), the PCP has been working in the field of conservation of wetlands and improving the livelihood of the people residing in the BZ area. Regarding the conservation awareness, PCP had already conducted conservation education classes for school students of the study area. They are imparting the knowledge on the indigenous plants and animals and their values to their life. They are also focusing in raising the awareness of the participants about the BZ concept, its benefits and the importance of conservation for human survival. Interaction programmes were also running with the local ethnic communities to raise their awareness about the sustainable use of wetland and forest resources and to educate them about alternative means of income generation.

The other major activities carried out by PCP include providing policy and institutional strengthening community- based organizations such as User Groups (UGs) and User Committees (UCs), providing training for the members of UG/UC, and support for income generating opportunities. Other notable achievements were the institutionalization of the savings and credit scheme, the Biodiversity Conservation Facility through cooperatives, conservation education and awareness programs, and support for UGs for self-initiative after social and environmental benefits. PCP also provided support for the preparation of park management plans, resource profiles, habitat and natural resource management and infrastructure development in the area.

Chapter – Seven

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Summary

In Koshi Tappu, the rivers and their associated floodplains sustain the local communities who are dependent upon them for their livelihoods. They provide a variety of products such as thatching material, fuel wood, fodder and timber. Wetlands and around are also sites for livestock grazing, fisheries and recreation. The floodplains, oxbow lakes and other depressions, which retain water after the floodwater had receded, support a rich variety of wildlife including fish. So the KTWR possesses the important value to the people residing in the BZ area of the reserve.

The Kusaha VDC which falls in the buffer zone area of the KTWR was selected for the purpose of the study. In the VDC different ethnic groups reside adjacent to the reserve from generation. From the VDC, 71 households were selected each representing different ethnic communities. The selected households were chosen with the use of the social instruments named as Random Sampling. The study had adopted Musuhar, Jhagar, Yadav Uranw and Sardar communities as the source of information. Of the total respondents, the respondents were chosen in terms of different age group, different economic and educational background.

Results of the study revel that the majority of the people depend on the agriculture and some have adopted the profession of fishing which was adopted by their ancestors. Those people who fully depend on the fishing profession lived in a very poor condition. Their livelihood situation was so miserable. They were mentally tortured by what to feed their children the next day. The output of the study clearly shows there should be taken certain initiatives to uplift the livelihood situation of the wetland dependent people of this area.

7.2 Conclusion

Nepal houses a diverse group of ethnic communities with their own unique cultures, traditions and language. The best thing about this diversity is that, these ethnic communities have been living in perfect social harmony since centuries. This was the reason why late King Prithvi Narayan Shah, the Great, mentioned Nepal as a 'garden 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 lag 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.

No doubt, a country cannot tread on the path of development unless it brings its entire population into the focus of development. The present government is well aware of this fact and is committed to uplift the socio-economic status of these indigenous groups (NHDR2004:61).

Twenty one wetland-dependent indigenous ethnic and caste groups have been identified in Nepal. These groups have traditionally lived off fishing, the sale of fish and crafts produced from wetland resources, and providing river transportation services and most still continue to do so. Only 13 of these are listed in Nepal's 2001 population census, and the total population of these 13 communities alone is about 11 percent of the country's total population. They are some of Nepal's poorest and most marginalized communities.

In the context of the case study done in the Koshi Tappu wildlife reserve Buffer Zone, mostly the musahar, mallah and Bantar were found to dependent in wetland resources and the other yadav and the Jhangard were found to depend indirectly on the wetland resources.

The main findings of this study are as follows

- All the wetland dependent communities except the Yadav community have a measurable life condition. The earnings from the wetland resources cannot support the livelihood of their family.

- In all the communities there were only 1-2 members were involved in the earnings for the livelihood.
- The people of here cannot have a sufficient income for their livelihood from the wetland resources. So these local ethnic people were found to involve in different occupations rather than their traditional occupation.
- Poverty is rampant in the area where single household cannot have Rs. 50 (less than US$ 1) a day.
- High local community dependence on wetland resources but low involvement in their management and low recognition of wetland values.
- On the study there were not any enterprise working in the promotion of the product form the wetland resources.
- In most of the community the agricultural production suppot upto 5 months. In the Musahar & Mallah community 100 percent, Jhangad community 73.33 percent, Bantar community 80 percent and Yadav community 10 percent have agricultural production which support not more than 5 months. This means that all the people are deprive of the sufficient agricultural production.
- Nepal is deemed as multi-religious, multi-ethnic, multi-lingual and multi-cultural country. There are diverse ethnic and multi racial communities with their own identities, cultures and creeds. The governments must focus on the upliftment of economic condition of the local ethnic people. The majority of the people have yearly earning below Rs 5000 except the Yadav community.
- The minority indigenous people such as Mallah, Bantar, Jhangad, Musahar who were found to be landless to this time because they were displaced after being evacuated from the reserve since the establishment. The landless people in the area represents a good percent, 30 percent in Musahar, 37.5 percent in Mallah, 20 percent in Jhangad, 30 percent in Bantar and no landless people were in the Yadav community.
- In general, the education level reached by children determines their overall quality of life in future. Therefore this research work had

explored the educational level of young people below the age of 20. There is inversely proportional relationship between education and the poverty level according to the CBS publications. The educational status of the family is very poor. The main cause is due to the lack of education. Of the total respondents taken in their family most of them are educated under SLC level.

- Proper sanitation management programe should be lunched in order to make the life of local healthy and hygienic. No single house holds a single toilet in the study area.
- Terai region receives the massive sunlight in comparison to other hilly region. Here scope of clean energy use is very wide. The dependency on the fuel wood, animal dung and plants residue holds a good percentage in the area.
- During the study time, 31 fish species were recorded and 22 species of wetland plants were identified with the assistance of the local stakeholders.

7.3 Recommendations

The recommendations are presented in the following two headings.

7.3.1 Recommendation for planning and management

- Identify and develop market- based instruments to price key wetland goods and services according to their full economic value. This would directly help in increasing the earning form the wetland resources.
- Encourage and provide incentive to local people to plant trees that would help to solve some of the problems of energy demand.
- Driftwood collection should be permitted to local people which can decrease the pressure on the forest resources.
- People who are in miserable conditions should be provided with various income generating activities and support with loan schemes.
- Reserve must include as much as local people in the conservation activities making them aware on the loss of the wetlands.

- Reserve should make an effort to provide more wetlands for the pisi-culture to the “Godi” community. This would support greatly in fulfilling the basic needs of the life.
- Reserve must focus on the conservation of the local fish than exotic fish species.
- People do not have grazing land for their domestic animals and they mostly depend on agriculture so they need more oxes and buffaloes for their land preparation. That is why the park must manage the pasture land for the villagers.
- The members of the reserve must maintain brotherhood relationship with the local people for the benefits of the park and raising the living standard of the local people.
- Alternatives technologies should be promoted in the area. Programmes related to the use of clean energy technologies must be given priority in order to minimize the use of fuelwood.
- Area- based riverine fishery development projects should be run in an effective way.
- Effective education and awareness programs on sustainable use of wetland resources should be given priority to local a stakeholder which is found to be lack in the study area.

7.3.2 Recommendation for further research

- There need a detailed study on the socio-economic condition of the people who are truly illiterate, socially and culturally backward and are the wetland dependent ethnic people.
- Various organisations, government, NGOs, INGOs have to launch effective programmes to develop and promote the livelihoods of local people residing in the area.
- 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.

- Detailed survey of the fish fauna in the catchments water bodies is needed for the purpose of updating the knowledge about the basin.
- The government, NGOs should take over the responsibilities for improving the social status of the fishermen communities by uniting them in groups or cooperatives, and providing them with informal education through training with special reference to fish and riverine fisheries in order to develop and conserve precious natural resources.
- The government must find the market for the wetland products especially to the mats made by the Bantar community and should provide various trainings to in making other items from pater i.e. curtains, door mats etc.
- The persistent under-valuation of wetland goods and services means that neither the economic benefits of wetland conservation nor the economic costs of wetland degradation. Thus high priority should be given in the management of wetland resources.

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Annex - 1

Kamala wetland area users group

Established: 20th Falgun, 2062

Number of working committee: 5 members

Objectives:

1. Sustainable management of the wetland with the people participation
2. Controlling the poisoning the wetland while fishing
3. To control the population pressure on wetland
4. To improving the economic conditions of the Mallah people and create alternative opportunity for livelihood

This progrmme had adjusted the 30 households of the Mallah community. In which 10 households were under absolute poverty and 13 households were of medium level and other 7 households were left to include in the users groups. They should pay penalty of Rs.500 per person while illegal fishing for first time and Rs.1000 per person if further noticed.

The selection of pro-poor people

1. Traditional way of fishing form generations
2. Having a skill to catch fish by using fishing nets
3. No alternative occupation other than fishing for livelihood
4. Having a land of 1-2 kattha
5. Possess Nepali citizenship

Sites given permission for fishing inside the KTWR

1. East embankment side
2. West embankment side
3. Inside the koshi river
4. To koshi barrage in south

This UG had selected the people from the ward no. 3, 4 and 9 of Kusaha VDC. This program was lunched by KTWR with the assistance of PCP. The members of the committee were allowed to fish in the reserve from 9am to

4pm. They were allowed to use the “Pat Jal”, “Chatti Jal”, and were not allowed to use the “Maha Jal”.

Problems faced by the members

As whole the programe brought by the reserve is good for the members but they had some problems related to the ponds that are provided to them. Only one pond is provided for the 30 members which was not sufficient for them. Currently they need 3 ponds for the improvement of economic conditions of the members (Source: Amendments made from the UG and PCP).

Annex – 2

"Wetland Resources and the livelihood of local communities: A situation Analysis of Kusaha Area in Koshi Tappu"

Questionnaire for Household Survey

Sample No. Date:

Respondent's Name:

Caste:

Household size:

VDC: Kusaha

Ward no.:

Gender: ☐ M ☐ F Age:

1. How long have you been living here?
   - ☐ 1 to 5 years
   - ☐ 6 to 10 years
   - ☐ 11 to 15 years
   - ☐ Several generation

2. How far is the Wetland of the Reserve from your house?
   - ☐ Near by
   - ☐ Half an hour walking distance
   - ☐ An hour walking distance
   - ☐ More than an hour walking distance

3. What do you do for living (or main occupation)?
   - ☐ Agriculture
   - ☐ Livestock rearing
   - ☐ Labor
   - ☐ Service
   - ☐ Any other (specify)…….

4. Do you have secondary occupation?
   - ☐ Agriculture
   - ☐ Livestock rearing
   - ☐ Wage Labor
   - ☐ Service
   - ☐ Any other (specify)…….

5. How much land do you have?
   - ☐ 0-4 Kattha
   - ☐ 5-8 Kattha
   - ☐ 9-12 Katta
   - ☐ More than 12 Kattha

6. How many months does your domestic agricultural production support your household?
   - ☐ Upto 5months
   - ☐ 6-9 months

☐ 9-12 months ☐ More than 12 months (Surplus)

If less than one year, how do you meet the gap/ shortage?

☐ By doing wage labor ☐ work on different profession

Please specify the profession.....

7. How often do you visit the wetland of the reserve?

☐ Once a day ☐ More than one time a day

☐ Once a month ☐ Haven't visited since ……. years/months

8. What is your annual income?

☐Below 5,000 ☐above 10,000

☐5000 to 10,000

9 No of literate in your family?

a. Pre-primary☐ b.High school☐

c. SLC ☐ d.campus ☐

10. How many cattle do you have?

a.Cow ☐ b.Bufallo☐

c.Goat ☐ d. Other (Specify) ☐

11. How many members of your family are engaged in earnings?

12. What are the usable resources available to you in the wetland of the reserve?

S.N.	Type of Resources	Available Months/Seasons
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

13. Who else from your family visit the Wetland sites of the Reserve?

☐ Children ☐ Wife /Husband

☐ Parents ☐ Others……

14. What is your purpose of visiting the wetland site?

☐ For collection of fodder and Fuel wood ☐ Grazing cattle

☐ Bathing and Swimming ☐ Recreational purpose
☐ Collection of edible plant resources ☐ fishing
☐ Any other purpose (Specify)……..

15. How much quantity of the resources do you collect from the wetland sites on a single visit?

S.No.	Type of resources	Amount collected in single visit (Before)	Amount collected in single visit(Now)	Problems faced in resource collection nowadays
1.				
2.				
3.				
4.				
5.				

16. What do you do to the collected resources?

☐ Used as food ☐ Process for storage for further use
☐ Other use(s) specify.....
☐ Sale in the market

S.No.	Types of resources	Quantity collected annually	Market price(Rs.) per unit
1.			
2.			
3.			
4.			

☐ Used as medicine

S.No.	Types of Resources	Quantity collected annually	Used for
1.			
2.			
3.			
4.			

17. Do you use the collected resources as a non economic benefit material?

☐ For fertilizer ☐ For Soil improvement

☐ As livestock feed ☐ For bedding

☐ Others please specify.....

18. Do you have any occupation enterprise based on wetland resources?

☐ Yes ☐ No

If yes, then fill up the following table

S.No.	Occupation/enterprise	Concerned Resources used	Place of resources collection
1			
2			
3			
4			

19. How long have you been collecting resources from the wetland site of the reserve?

☐ From generation ☐ More than10 years

☐ More than 5 years ☐ Recently

20. Who actually harvests the resources?

☐ Yourself ☐ Wife

☐ Children ☐ By hiring labors

☐ Others specify.....

21. Is there any religiously important wetland in the area?

☐ Yes ☐ No

If yes, name it …….

22. What type of religious value does it possess? Describe it briefly.

…….

23. How often do you take your cattle to graze in the wetland site of the reserve?

☐ Regularly/Daily ☐ Twice a week

☐ Once a week ☐ once in a month

☐ During a certain season (Specify)....

24. Is fishing done in the site? If yes, in which month or season is it done?

25. Do you have conservation knowledge?

☐ Yes ☐ No

If yes, from where/whom did you learn? …….

Would you describe it briefly?

26. Do you agree with the prohibition of the following activities around the wetland sites of the reserve?

☐ Grazing ☐ Firing

☐ Fishing ☐ Timber wood collection

27. In your view, should wetland be preserved?

☐ Yes ☐ No

If yes, give reason /why? ……

28. Do you satisfy with the present management situation of the wetland site of the Reserve?

☐ It's excellent ☐ It is good

☐ It's OK, needs further improvement ☐ It is very unsatisfactory

29. Do you think the community's involvement in conservation is good?

☐ Yes ☐ No

If yes, Give reason /why?

30. Do you know if any the organization(s) is (are) involved in the management of the wetland?

☐ Yes ☐ No

If yes, please name it serially

S.No.	Organization's name	Activity	Its participation (Good/ Fair / Bad)
1.			
2.			
3.			
4.			
5.			

31. Is there any rules and regulation on collection of wetland resources from the reserve?

32. What is the most harmful animal to you and your community?

☐Wild bufallo(Arna) ☐wild elephant

Any other specify.....

Annex – 3

Check List of Plant Species

Local name	Available months	Abundant/moderate/ rare	Used for
Asuro			
Panikhar			
Laph			
Chrchiri			
Datiun			
Saranchi			
Kande			
Latte			
sarwari			
Aam			
Jharkanail			
Indrajau			
Kaner			
Kacchu			
Kumbhi			
Akaun			
Simal			
Bethe			
Surgurejhar			
Kane sag			
Titepate			
Musada			
Thakal			
Galfule			
Bhangrail			
Banmara			
Kure Gandhe			
Lato Ghans			
Thrjhuri			
Mirchaiya			
Lapetuwa			
Karmaiya sag			
Dhatrange			
Motha			
Chatari			
Kaysoor			
Budhe			
Sindure			
Amla			
Pithari			
Khar			
Bubo			
Banso			

Sama			
Sama, Telar			
Kush			
Sawar			
Tutiya			
Chariameli			
Isapgol			
Palanki			
Bishnaire/Pirre			
Halhale			
Jalkumbhi			
Koka			
Panauti Khar			
Panikhar			
Nakore			
Bair			
Kadam			
Bel			
Bimiro			
Bains			
Mahuwa			
Dhatur			
Bhutkul			
Jangli Bhanta			
Kanthaari			
Jhauwa			
Phalsa			
Jaropat			
Singara			
Pater			
Ghodtapad			
Bukuna khar			
Dahigji, dahigw			
Rajbeli			
Nilkanda			

Annex – 4

Checklist of Fish Species

Local name		Abundant/moderate/ rare
Suia		R
Gan Kabai		
Golhai		M
Katli		M
Mara		M
Harda,Bhegna		R
Chahale		A found only in koshi
Pothi		A
Guderi		A
Jalkapoor		R found only in koshi
Fageta		M
Catla		M
Pathar Chatti		A
Chelwa		M
Chalwa		M
Naini		A
Rewa		M
Buduna		R found only in koshi
Chithari Pothi		
Bhitti		
Deduwa, Darai		M
Lahare Buduna		R
Duduwa		Found only in koshi
Rohu		M found in ponds
Tikauli		R
Basrahi		R
Gurda		M
Sidhra		M
Sidri		
Dada Pothi		
Chanda Pothi		
Darahi, Sidhara		
Khasara		R
Sahar		R
Tite Machha		
Baghi		R
Bagha		
Lata		M
Gadela		
Pabata		R
Padani		A
Kanti		
Tengri		A

Tengra		A
Rita		R
Baljung		
Gonch		R
Capre		
Kotel		
Cabre		
Banspatti		
Bachwa		A
Patasi		M
Singhi		A
Mungari		A
chnga		A

Note: A = Abundent, M = Moderate & R = Rare

Annex – 5

Photographs

Photo 1: Cattail field in the private land near the KTWR.

Photo 2: Fiber retting process is going on, in the wetland area.

Photo 3: Mallah people making their nets before going for fishing.

Photo 4: Mallah people selling their fish in the local market.

Photo 5: Harvested cattail (Pater) collect in the Bantar's house.

Photo 6: A Bantar man working to make the mats from cattail (Pater).

Photo 7: A Bantar women weaving a mat.

Photo 8: Locally made mats being taken to the local market for sale.

Photo 9: Researcher in the process of filling the questionnaire.

Photo 10: Researcher interviewing the Jhangard people.

Photo 11: A women preparing the mosquito repellant from animal dung.

Photo 12: Animal dung set to dry in the sun.