Status of important Wetlands of Rupandehi and Kapilvastu Districts of Nepal.

By:

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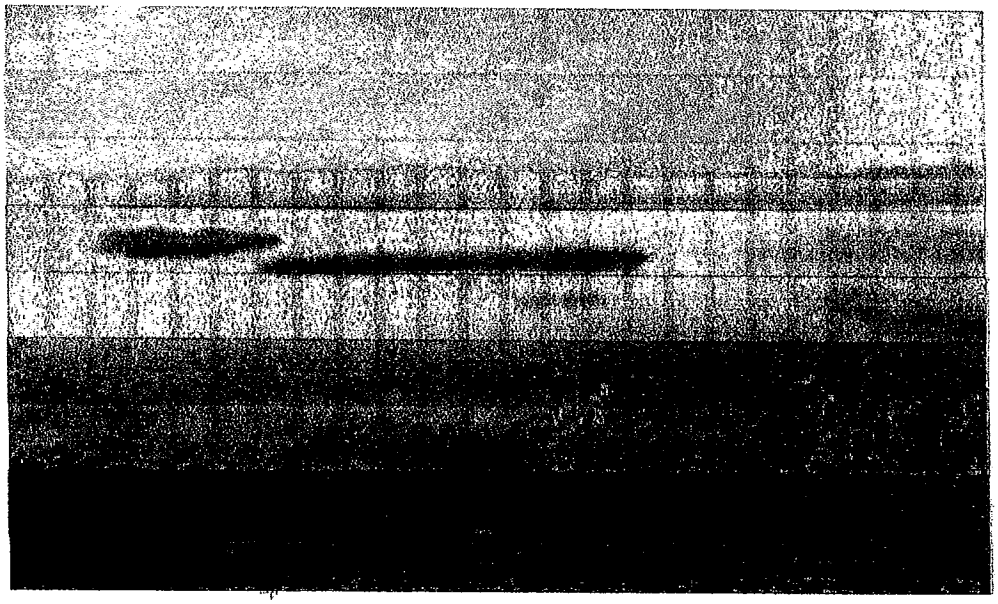

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Cover Photo: Jagadishpur Reservoir (largest Man made wetland of Nepal)

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Table of Content:

Abstract:

Nepal is rich in its wetlands biodiversity where large number of wetland flora and fauna are found, 193 of birds are known to be dependent on wetlands, a total of 185 species of fish are found in the wetlands of Nepal, out of which 8 are endemic. Same a way Rupandehi and Kapilvastu district covered the large number of the wetland which covered the government and private land. The study was carried out in the Rupandehi and Kapilvastu district of Nepal with having aim to find out the existing wetland condition of the Rupandehi and Kapilvastu district and their threats for the proper management of these wetland in regards to conservation point of view for avifauna and herpectofauna. The sizes of these wetlands of the study area were ranged from 1 to 250 ha. In both districts, the number of publicly owned wetlands was greater.

Direct observation techniques were used to find out the status of the wetland of the study area and a set of questionnaire survey were used to know wetland status.

Wetland of the both district suffered many problems such as encroachment, sedimentation, water pollination, and heavy pressure of human and domestic animals, due to these problem the number of the wetland flora and fauna decline year by year.

Abbreviations:

OBC- Oriental Bird Club.

BCN-Bird Conservation Nepal.

NPWC-National Park and Wildlife Conservation.

NPWR-National Park and Wildlife Reserve.

IUCN- The World Conservation Union.

BRTF- The Biodiversity Research and Training Forum.

WTI- Wildlife Trust of India.

VDC- Village Development Committee.

LDT-Lumbini Development Trust.

LCS- Lumbini Crane Sanctuary.

ICF- International Crane Foundation.

DDC- District Development Committee.

NGO- Non-Governmental Organization.

INGO- International Non-Governmental Organization

DAO-District Administration Office

Introduction:

Wetlands are sites distinguished by the presence of water, which often have unique soils that differ from adjacent uplands and support vegetation adapted to wet conditions. They comprise a wide range of inland, coastal and marine habitats characterised by the presence of flood-tolerant vegetation. The Ramsar Convention defines wetlands as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salty, including areas of marine waters, the depth of which at low tide does not exceed 6 meters", and which may include "riparian and coastal zones adjacent to the wetlands, or islands or bodies of marine water deeper than six meters at low tide lying within" (HMG, 2002).

Wetlands in Nepal are rich in biological diversity and are known to regularly support more than 20,000 waterfowl during the peak period between December-February.

Total wetland areas in Nepal

WETLAND TYPE	ESTIMATED AREA (ha)	PERCENT
Rivers	395,000	53.0
Lakes	5,000	0.7
Reservoirs	1,380	0.2
Village ponds	5,183	0.7
Paddy fields	325,000	43.6
Marshland	12,000	1.6
Total	**743,563**	**100.0**

Source: HMG, 2002.

The Koshi Tappu wildlife reserve wetland, Jagadispur reservoir, Bishahajari Tal, Godaghodi lake are considered of international significance and was added to the Ramsar list of wetlands of global importance.

Out of 862 bird species found in Nepal, 193 of birds are known to be dependent on wetlands, Of these wetland-dependent species, about 187 are known to be dependent on the wetlands of the Terai. 180 species of water birds are reported from Koshi Tappu and the Koshi barrage (Baral *et al.* 1996; Choudhary 1996; Halliday 1982; Scott 1989; Inskipp & Inskipp 1991; Suwal & Shrestha 1990; Perennou *et al.* 1994, BCN, 2004). Of the wetland birds in the Terai, 39 species are threatened on a national level. 11 species occurring in the Terai wetlands are described as globally threatened while another 11 species are identified as near-threatened (Collar *et al.* 1994). A total of 185 species of

fish are found in the wetlands of Nepal, out of which 8 are endemic. The Gharial and marsh mugger, two species of crocodile, are the largest reptiles found in the Kali Gandaki River and the major tributaries of the Narayani River. Gangetic dolphin is reported in Narayani River.

Objectives:

The main aim of the research was to find out the existing wetland condition of the Rupandehi and Kapilvastu district, their threats and prescribe for the proper management of these wetlands in regards to conservation point of view for avifauna and herpectofauna.

Specific objectives:

1. To find out the existing condition of importance wetland of Rupandehi and Kapilvastu district.
2. To explore the threats of wetlands.

The Study area

Study area:

Study areas were Rupandehi and Kapilvastu district of Nepal.

Rupandehi district lies in the Terai region and situated in Lumbini Zone of western development region on Nepal and geographical position is at 27^0 20'- 27^0 45' Latitude and 83^0 10'- 83^0 30' Longitude. Palpa district lies to North; Kapilvastu district lies in West; Nawalparasi district lies in East; and Uttar Pradesh (a state of India) lies in South of Rupandehi district. The district is ranging from 100 meters to 1219meters attitude, having 1401 Square kilometer areas. Major rivers of the district are Tinau, Baghela, Dano, Kotlijham, Kanchan, Kothi, Mahab, Rohini, Telar, etc. (District Profile, 2003). It consists of 69 VDCs and 2 municipalities.

Kapilvastu district lies in adjoining district of western boundary. According to LRMP Survey in 1987 district occupies 1651.32km^2 areas. Geographical position is at 27^0 25'- 27^0 84' Latitude and 82^0 75'- $83^0_{\circ}$ 14' Longitude. Dang districts lies in west and Argakhachi district lies in north, Rupandehi district lies in the East and India lies in South. It consists of 77 VDC, 1 municipality. (District profile, 2003)

Climate:

The districts experience tropical sub-tropical type of climate according to the altitudinal variation. Climatically, the year can be divided mainly into three seasons such cold, hot and rainy season. The maximum temperature is 42.4 degree Celsius and minimum temperature is 8.75 degree Celsius and average rainfall is 1391 mm (DDC, 2000) in Rupandehi district. In Kapilvastu district, maximum temperature 43 degree Celsius and minimum temperature is 4.5 degree Celsius and average rainfall is 1500mm (DDC, 2000).

Land use:

There are six major land use types found in Rupandehi district. Dominant land use type is cultivation (60.21%) followed by forest (21.56%). There are small area Covered by

Churia hills and cliffs i.e. (0.29%) and river, river banks and grazing land covers (8.02%). Among them Cultivated land, and wetland area selected for the study.

Table: Landuse types found in Rupandehi district:

S.N.	Landuse Types	Area in (ha)	Percentage
1.	Cultivation	85122	60.21
2.	Forest	30484	21.56
3.	Grassing Land (Grassland)	8882	6.28
4.	River	2460	1.74
5.	Hills and Rocky cliff	414	0.29
6.	Settlements	5953	4.21
7.	Others	8052	5.71
	Total	**141367**	**100**

In Kapilvastu district, there are also six major land use types found. Dominant landuse type is Cultivated land (56.04%) followed by forest and shrub land (41.44%).

Table: Landuse types found in Kapilvastu district:

S.N.	Landuse types	Area in Km^2	Percentage	Remarks
1.	Cultivation	925.41	56.04	49.87% area of its area is wetlands.
2.	Grass land	8.77	0.56	
3.	Forest and Shrub land	684.21	41.44	
4.	River/ pond	3.86	0.23	
5.	Sand Gravels and boulders	27.40	1.66	
6.	Settlements urban areas and built up areas	1.67	0.10	
	Total	**1651.32**	**100**	

Cultivation: Terai is the main food producing area of Nepal. Cultivation area coverage us greater in Rupandehi district than other landuse types. After eradication of Malaria from Terai in 1960s, most of the people immigrated from midhills to lowland Terai.

The farmers chiefly grow paddy crops during the monsoon season. Sugar Cane is also major crop in some part of the Kapilvastu district and Rupandehi district. Most of the lands are left barren during other time of the year except some sugarcanes, winter wheat, lentils and mustards, are grown in some arable fields. Many insects, amphibians, snakes, fished, birds and mammals are found in these fields. The mutual interaction of all the components found in the farmland helps to stabilize the agriculture ecosystem, which is also termed as 'eco-agriculture' the new concept in agriculture field. The irrigation is available from the local river, streams and the artesian wells.

Forest: Rupandehi and Kapilvastu landscapes consists generally two types of forest one is natural forest and another is artificial forest (plantation).

Sal Forest (*Shorea robusta*): Sal forest is associated with *Terminallia tomentosa, Terminallia beleria, Anogeisus latifolia, Largerstomia parviflora, Dillenia pentagyna, syzygium cumini,* and *Semicarpus anacardium.*

Acacia catechu- Dalbergia sissoo forest: Found on newly deposited alluvium, often gravely along streams and rivers of the study area.

Other riverine forest: Small strips of forest are found in moist localities near streams. This forest type includes tropical evergreen forest *Michelia champaca, listea spp, Phoebe cancedata, Actinodophae angustifolia, Cinnamomus spps* and tropical deciduous riverine forest, usually dominated by *Bombax ceiba, Holoptelea integrifolia* and *Trewia nudiflora* together with other species found in the sal forest. The area occupied by this type of forest is not large and does not extend far from the stream banks.

Plantation forest is situated inside the Lumbini Garden, private land and some community forest area which is chiefly composed of Sissoo (*Darbergia sissoo*).

Population & Community: According to National population census 2001, the total population of the Rupandehi district is 543302, of which 263680 Female and 279622 are male. The district is rich also for religions. Most of the people (90.09%) follow Hindu religion, followed by Islam (Muslim) (8.21%), and Buddhist (1.54%).

Kapilvastu district, total population of district is 481976, of which 247875 male and 234101 female, where Muslim population is high than Hindu as compare to Rupandehi district of Nepal.

Methodology:

Preliminary Survey was carried out to find out importance wetland before the actual field work started. Questionnaire survey was used with concern and knowledgeable person; Villagers, local leader, District forest office staffs and Lumbini Crane sanctuary staffs for to find out the importance wetland which plays a significant role to conserve biodiversity specially avifauna and herpectofauna.

Direct observation of the importance wetland was carried out October- December 2003.

I selected 12 wetland sites in both districts to study the present status of wetlands. The selection was based on information collected during the preliminary study. The area of each site was estimated. I categorized the wetlands into village ponds, lakes, oxbow lakes, reservoirs or rainwater basins. Surroundings land use patterns were identified as agriculture, open forest, grassland or settlement. Questionnaire survey was used with these people who living surrounding the wetlands of the study area.

Results and discussion:

Wetland condition of study area:

Study areas have many different types of wetlands that range from areas of permanently flowing rivers to areas of seasonal streams, lowland oxbow lakes, swamps and marshes, paddy fields, reservoirs and ponds. They are broadly classified into two categories: natural and man-made. The natural wetlands comprise lakes and ponds, riverine floodplains, swamps, and marshes, while man-made wetlands include water storage areas and deep-water agricultural lands. Wetlands of study areas provide the major habitat for the Sarus Cranes, Storks as well as the other birds and number of herpectofauna.

The villagers have been using the wetlands for food such as fish and vegetables. Vegetables include the water lily (*Nymphaea spp.*), water chestnut (*Trapa bispinosa*), makhan (*Eurale ferox*), and many other leafy vegetables. The commercial production of water chestnut and makhan has recently become common among the farmers in some wetland of the study area. Fertilizing these crops with phosphates has enhanced the eutrophication of many village pounds in the study area.

The sizes of these wetlands of the study area were ranged from 1 to 225 ha. In both districts, the number of publicly owned wetlands was greater.

Land use pattern surrounding the Wetlands:

Rupandehi district:

S.N	*Land types*	*Percentage*
1.	Agricultural	82
2.	Not use land	18

Kapilvastu district:

S.N	*Land types*	*Percentage*
1.	Agricultural land	89
2.	Not use land	11

The dominant land use in the areas around these wetlands was agriculture. 82% of surrounding area of wetland of Rupandehi and 89% of the surrounding area of wetland of

Kapilvastu district are using for the agriculture purpose and encroachment and extension of agricultural land towards the wetland is running. This may pose a serious threat to wetland ecosystems. There is a greater chance of altering these wetlands in the middle of cultivated areas. The size of the wetlands depends completely on precipitation. The status of privately owned and government owned wetlands were fairly suitable for wildlife use. But many village pounds and seasonal wetlands are threatened by vegetation succession, grazing, and illegal encroachment. Agricultural expansions the primary threat to wetlands. There is great possibility that some of representative wetlands may disappear within the next decade.

The major groups of people of study areas dependent on wetland resources for their livelihoods. They depend primarily on fishing and aquatic resources for their livelihoods. Wetlands of study area are used for fishing, Grazing, irrigation, plant harvest, Domestic use, fuel wood and religious use etc.

Some important wetlands of study areas and their status:

Wetland of Kapilvastu district:

1. **Jagadishpur reservoir:** Ramsar Bureau has recently designated and listed the Jagadishpur reservoir (Largest man made wetland of Nepal) of Kapilvastu district of Nepal as Ramsar site in 2003. These wetlands earned their place in the Ramsar site chiefly because of their support for threatened species of birds and mammals. This site also holds national and international significance by providing conducive habitat for many wetland resident and migratory birds of Nepal. Jagadishpur reservoir occupies 225 ha. area in square shape, which is conserve by the Department of irrigation, water of this reservoir is using for the irrigation of cultivate land of Kapilvastu district of Nepal. This site is supporting > 4% of the Asian population of Ferruginous Duck (*Aythya nyroca*), (whose 1% criterion = 100) with 405 recorded. The same site almost reached the 1% criterion for the Lesser Whistling Duck (*Dendrocygna javanica*) (HMG/Nepal, 2002) .Total one pair of Sarus crane was observed along the canal of this reservoir. It is a very important site for migrating and wintering waterfowl in the western region of the country. It is surrounding by private agricultural lands. There is serious problem

due to sedimentation, vegetation growth inside the lake and draining is an obvious threat to the ecosystem. Other uses of the wetland include fishing, reed and fodder, and vegetable collection, and washing clothes in the canals.

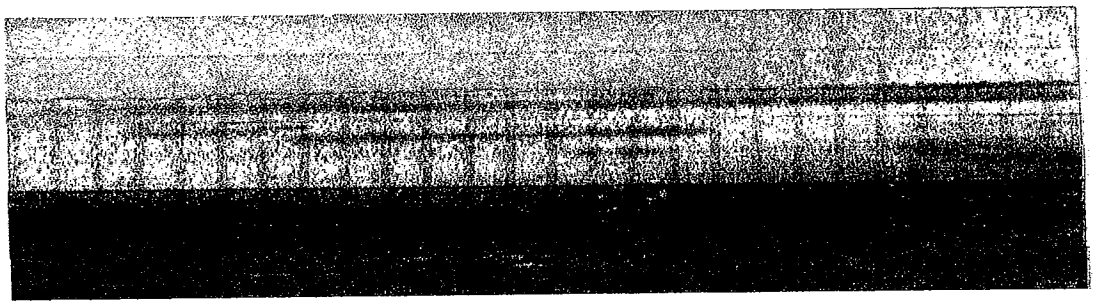


Photo: Jagadishpur reservoir (largest man made wetland of Nepal)

2. **Budhdi Lake:** It is situated in Budhi VDC-7, deurali of kapilvastu district, having 50 ha. area. Major problems are encroachment, sedimentation. And lake is using for the irrigation, fishing and domestic use.

3. **Loharaila Lake**: It lies in Bahadurjung VDC-7 Loharaila of Kapilvastu district, having 5.5 ha. area. It is surrounded by the settlement. Water of lake is use for the irrigation and domesticates use. Major problems are encroachment, cultivation of paddy in lake area. According to local people previously a pair of Sarus Crane was there but now there was not seen Sarus crane, number of stork are seen regularly.

4. **Sakhuniya Lake**: It lies in the Manpur VDC-8, Bhadaikhar of kapilvastu district. It occupies 50 ha. area. The Lake provides habitat for the Sarus crane and other wetland birds of Terai region. Use of this wetland for the fishing, irrigation, and grazing. Major problems of this lake are; local people are encroaching and converted of lake into cultivated land, if the absence of precipitation for the long time it becomes dry. Water is collection in the Lake from the cultivated land of surrounding area where the heavy use of chemical pesticide/insecticide and chemical fertilizer, therefore, water of the lake becomes chemically polluted and that affect to aquatic life.

5. **Ajingara Lake**: It lies in the Ajingara VDC-1 of Kapilvastu district, having 25 ha. area. The Lake provided habitat for the one pair of the Sarus Crane. This wetland is using for the grazing, fishing. Flora and fauna are being reducing due to using of lake for grazing, fishing, vegetation collection, and conversation of cultivate land. It was heavily infected by aquatic weeds.

6. **Badaganga flooding Area wetland**: This wetland is extending up to historical place Tilaurakot of kapilvastu districts, covering with 4000ha. area (IUCN, 1996). The area provide significant habitat for diverse flora and fauna. The water of this wetland is being polluted due to heavy use of chemical pesticide/insecticide and chemical fertilizer in the farmland. The area is encroachment for the cultivation by local people and wetland is sedimentting every year and decreasing the depth of wetland every years.

7. **Niglihawa pond:** Niglihawa is a small village pond about 0.9 ha in size in Kapilvastu District. It is public land, surrounded in all directions by agricultural fields. It was heavily infested by aquatic weeds, before 6 year it was large but now I size decrease due to weeds, sedimentation. The village kids fish in this pond. Surrounding this area provide habitats for globally threats birds Sarus Crane.

Wetland of Rupandehi district:

1. **Gaidahawa Lake**: the most significant lake of Rupandehi district is Gaidahawa Lake, which is proposed by Government of Nepal to including in the Ramsar sites. The Lake covered 23.5 ha. area and situated at ward no.1 of Bishnupur VDC. Lake is providing the suitable habitat for wetland birds. This lake is composed of 40% permanent marshes on the top of inorganic soils, 30% seasonal marshes on inorganic soils and 10% swamp forest (Suwal, 2003). The lake is surrounded by dense forest to west-north, private land to the east and

forest area and settlements to the south. The lake is used for irrigation, fishing, aquaculture, grazing and landfill. Eighty percent of the shoreline of the lake comprised scrub and open forest and 10% is in use for grassland and 10%for pasture (Suwal, *et. al.*, 2003). The major use of this site is for livestock grazing in the surrounding grassland and forest. Draining and degrading of the wetland area notable threats to the ecosystem. Sarus Cranes occur in the surrounding land.

2. **Jignihawa Lake:** Jignihawa Lake is a freshwater lake and another significant wetland of Rupandehi district which is situated in Maryadpur VDC, is surrounding by private farmland and having 10 ha area. Local people use this wetland for grazing during winter season. The land is privately owned and leased for fisheries.The villagers collect aquatic vegetables from the pond. This is a nesting site of Sarus Crane and other resident wetland birds. It is an important wintering site for Gray Headed Plovers. Globally threatened Sarus Crane, Lesser Adjutant Storks, Black Ibises, Grey-headed Lapwings forage in this wetland.

3. **Semari Lake:** Semari is a seasonal wetland, situated at Semari VDC, the land ownership belongs to Government and locally called as "Aath Numberi Jagga" (Eight Number Land) or Public land. This wetland provides a regular nesting site for Sarus Crane and also and important feeding habitat for a number of water birds and storks. The major threat for this wetland is human encroachment. Establishment of two industries near this site has threatened the nesting habitat of cranes. Recently the district development committee has leased this wetland for brick production (Suwal, *et. al.*, 2003).

4. **Siktihawa Lake:** Siktihawa Lake is situated in Ahirauli, ward no.8 Dhamauli VDC in Rupandehi district. It is a meandering oxbow lake, which is situated in the middle of human settlements so this oxbow lake is intensively used for water chestnut cultivation. The lake provides good nesting ground for Sarus Crane. At

least one pair of Sarus Crane builds its nest every year in this wetland. In addition to this, several winter visitors use it as their foraging habitat. Lake is Government land. It is being used for domestic purposes, fishing, irrigation and cultivation. Human encroachment and intensive exploitations of the resources are the manor threats for this wetland. A total of 4,060 people of Dhamauli VDC use the resources of this wetland (Suwal, *et. al.*, 2003).

5. **Lumbini Development Trust (LDT) area:** the total area of LDT is three square miles. It provides forests, grasslands, wetlands and rivers, but not farmland. Wetlands of the Lumbini Crane sanctuary, central Canal and Harahawa floodplain are potential Conservation area of Rupandehi district. This area provides potential habitat for the Sarus Crane, Blue bull, and other flora and fauna of Terai region.

Threats of Wetland:

Conversion of wetlands:

Most of the government wetlands of study area are encroachment by local people for the cultivation of crop especially for the rice production. Also the public owner wetlands are converted in the agricultural land for the production of high quantity of the crop. Wetlands are being converted in non-agricultural purposes such as road construction. These were occurred in the Bithuwa VDC, Bahadurjung VDC, Ajingara VDC Patraya VDC, Niglihawa VDC, Manpur VDC of Kapilvastu district. And Suryapur VDC, Kamaria VDC, Sadi VDC, Bishnupur VDC, Maryadpur VDC, Semari VDC of Rupandehi district of Nepal. Due to these activities, habitats have been becoming unsuitable for nesting, feeding, roosting for wetland birds and reduce the habitat of herpectofauna that make cause to disappearing of the herpectofauna from the district.

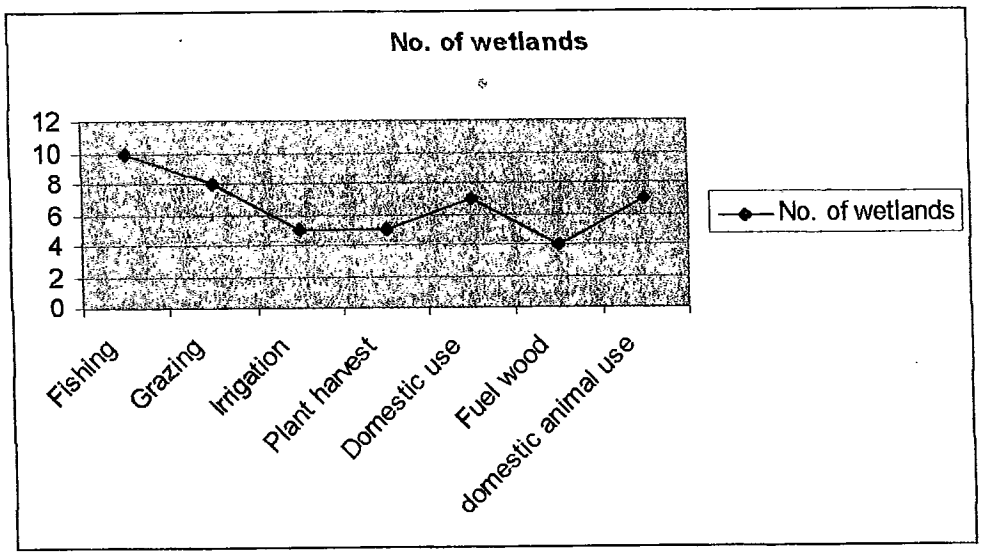
Over exploitation of wetland resources:

The many people of the study area are dependent on wetland resources for their livelihoods. And the human population in the study are also increasing year by year, therefore, the Sarus Carne, stock and other wetland birds population are facing negative impact due to overexploitation of the plants (water lily (*Nymphaea spps.*), water chestnut (*Trapa bispinosa*), makhan (*Eurale ferox*),), animal (i.e., fish, snail) and water resources of these wetlands. Poisoning fish and its over-exploitation from the wetlands is a serious problem for the wetland and biodiversity Conservation in the both district.

Use of wetland:

Survey was carried out the 12 Wetlands of the surrounding area of that wetland. Base on this survey maximum use of the wetland for the fishing (84%), which making serious threats to the wetland ecosystem and the feeding species of the wetland birds decline also people are collecting the snail. Grazing pressure, plant harvest, domestic use includes washing clothes and kitchenware and bathing in the wetland of the study area, and domestic animal also use these wetland.

USE	NO. OF WETLANDS	PECENTAGE
Fishing	10	84
Grazing	8	67
Irrigation	5	41
Plant harvest	5	41
Domestic use	7	59
Fuel wood	4	34
domestic animal use	7	59



Poisoning:

Local people of the both district are use different types of the chemical fertilizers, pesticide, and insecticide in their farmlands for the maximization of the Agricultural crops production. These fertilizers, pesticide, insecticide are soluble in water and become poison and that water reach to rivers and ponds, that water directly affects to wetland

ecosystem. Some of the wetland such as Jagadispur reservoir, Niglihawa Lake, Jignihawa lake, Agingara lake, Bhuddhi lake etc are serious from this threats.

Sedimentation: all of the wetland of the study area has this problem.

Industrial disposal:

We can tell Rupandehi and Kapilvastu district as a extensive industrial area, where more than 150 large and small industries are present in the Both district (DDC, 1999), Paper Mills, Triveni distillery, Resin and tapping industry, Sugar mill and brick industries are the major responsible for the polluting river and air of the study area. They dispose their untreated chemical wastes directly to the river. Dano river, Tinau river, Badganges and others small rivers are facing similar problem. Aquatic lives, some dependent birds (Cranes, Stork, Ibises etc) even cattle and locals have adversely been affected from such polluted water. More than 30 cattle were died of drinking polluted water from Dano River (Suwal, 2003).

Conclusion:

There are many wetland in both districts out of them 12 wetland of the both district were taken for the study. The wetland of the both district suffer many problem and status of these wetland decline due to encroachment, sedimentation, vegetation succession, fishing, grazing, domesticated used etc.

The avifauna and the herpectofauna of the wetland of the study area are facing many problems and according to local people their number is decline vastly as compare to past 4 years it is due to polluted water, heavy pressure of the chemical fertilizer, insecticide, pesticide and industrial pollution and waste disposal in the river.

Recommendation:

1. Wetland Conservation Education program should lunch in this area, and that should be integrated program.
2. Detail study on the avifauna and herpectofauna should be carried out in the wetland of the study area.
3. Awareness program for the especially farmer should be carried out for the discouraging the heavy use of the Chemical fertilizer and insecticide, pesticide in the farmland.
4. Industrial disposal should be managed in the proper ways.
5. Restoration and management of the existing wetlands of both districts are required in order to provide habitat for wetland avifauna and herpectofauna.
6. Water quality of each wetland of the both district should be tested to know it affects to aquatic livings organisms.
7. Government should develop community-based wetland conservation and management projects in both districts.

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Appendix-1

Questionnaire survey form:

1. Respondents/Name: Age: VDC/village/district:.....
2. Occupation:.....
3. Do you know wetland? Y/N.
4. Have you seen birds in that wetland?
5. Have you seen herpectofauna (fish, snail, and others).....
6. your wetland are facing followings which problems
   Fishing, Grazing, Domesticate Use, Firewood collection, Irrigation, and other...
7. Number of birds and herpectofauna **increase or decrease** as compare to past years?
8. What is your opinion about wetland? Good /Bad
   Why.....
15. Do you know any INGO or NGO are working for the it's Conservation? .....
16. What types of pesticides/ fertilizer used by farmer .....quantity.....
17. In your opinion what is it's threaten causes.....
18. Do you have any idea for good management of it?.....
19. Other residing wildlife or birds

Comments or notes:

Showing Sarus crane nest at kapilvastu district

Researcher in Jagdeshpur reservoir at kapilvastu district.