

# Wise use of Wetlands in Nepal

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The paper attempts to throw light on Nepal's stride towards the wise use of wetlands in the country. The paper begins with the statement that wetland is a nascent term, which means many things to many people. In general wetlands are taken as the area covered with water for a part of the day or year. Biologically wetlands become the most productive when they dry out periodically. The Ramsar Convention defines wetlands as the "area of marsh, fen, peatlands or water". The global importance of Nepal's wetlands are manifested by the presence of the rare and endangered species of flora and fauna, rest place for migratory birds, waterway for the migratory fishes and availability of wild native rice. Nepal in its journey to the wise use of wetlands has passed through the four stages; primary, awakening, take-off and mass consciousness stages. Nepal's wetlands have been the victim of human conversion, over-exploitation, pollution of water, invasion of invasive species, human encroachment and deposition of sediments. Nepal has already designated wetlands in the Ramsar list and adopted a National Wetland Policy. The paper suggests that the loss of wetlands can be ameliorated by developing a national wetland act and national inventory, forming an interdisciplinary body to look over the issue, controlling invasive species etc.

**Key words:** Wise use, Ramsar site, wetlands, wetland loss, invasive species

**W**etland was a nascent term for common people until recently. The same holds true for Nepal too. It is said that only in the 1970's it appeared in the Oxford Dictionary. Before that wetlands were known by different names such as lake, pond, marsh, swamp, bog, fen etc. Wetlands were named according to the landscape in which they were found. Therefore, even today, the term "wetland" does not have even a universally accepted definition because of the plurality of users, regional variations, biological diversities and richness in cultural values. The meaning vary from place to place and person to person. It has many forms but the common content, i.e. water, which is the bloodstream of wetland. Some of the common meanings that are in use around the world are briefly presented below.

1. A wetland is simply an area that is covered with water for a part of the day or year.
2. Wetland is a place where people can get their feet wet without being able to swim.
3. Wetland is neither a firm "land" nor a body of open water; hence they occupy terrestrial position between land and water. The ecosystems that develop on such lands are dominated by the persistent presence of excess water, or saturated, or has the water table at, near or above the land surface.

4. The important feature is that a wetland has to be wet. However, they do not have to be wet all the time. They become biologically the most productive when they dry out periodically.
5. The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, Iran, 1971) has defined wetlands in a broader sense. Article 1 of the text of the Convention stipulates, "*For the purpose of this Convention, wetlands are areas of marsh, fen, peat lands 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 at low tide does not exceeds six meters.*" While designating suitable wetlands for inclusion in the List of Wetlands of International Importance, "*the boundaries of each wetland shall be precisely described and also delimited on a map and they may incorporate riparian and coastal zones adjacent to wetlands and its lands or bodies of marine water deeper than six meters at low tide lying within the wetlands, especially where those have importance as waterfowl habitat*" (Article 2.1 of the Text of the Convention on Wetlands).

The paper is intended to acquaint the readers with the current status of the wetland activities in Nepal, especially its global importance, distribution and factors responsible for their loss and deterioration.

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It also summarizes challenges and opportunities for catalyzing the wise use of wetlands in Nepal.

### Global importance of Nepal's wetlands

Nepal is a mountainous country dotted with small wetlands such as rivers, lakes, ponds, marshes, swampy lands, irrigation canal, fishponds and reservoirs. Even though they are small, their strategic importance is no less than any other big wetlands. The global importance of Nepal's wetlands can be summarized as follows:

1. *Habitat for endangered species:* Several globally endangered and vulnerable species of fauna are found in the wetlands of Nepal. Some selected species are briefly described below

- Asiatic wild buffalo (*Bubalus bubalis*) (IUCN category = endangered and CITES Appendix I) is found only in the Koshi Tappu area in Nepal. It is rare in Asia and is the last surviving population of wild water buffalo in Nepal. The wild buffalo is the progenitor of domestic water buffalo.
- Greater one-horned rhinoceros (*Rhinoceros unicornis*): Rhinoceros belongs to the IUCN Category of endangered species and falls in Appendix I of CITES. Its habitat is marshy grasslands and riverine forests along the river-courses of central and western Nepal. They are terrestrial but spend considerable time wallowing during summer months. A healthy population is found in Chitwan National Park.
- Gangetic dolphin (*Platanista gangetica*): Dolphin is found in the Karnali, Koshi and Narayani rivers. The construction of barrage and dams are the biggest threats to this animal. It is grouped as vulnerable in the IUCN category and is in CITES Appendix I.
- Swamp deer (*Cervus duvauceli duvauceli*): Categorized as Indeterminate in IUCN category and included in Appendix I, it is found surviving in the parks of Chitwan, Bardia and Kailali.
- Gharial (*Gravialis gangeticus*): The Gharial is an endangered species throughout its range. Gharial and mugger crocodiles are the largest reptiles. The later is threatened in Nepal.
- Bull frog (*Rana tigrina*): Bullfrog has been listed in Appendix II of CITES. Himalayan newt (Thakthake in Nepali; *Tylototriton verrucosus*) is endemic to Nepal and the common otter

(*Lutra perspicillata*) is vulnerable under the IUCN Category.

2. *Rest place for migratory birds:* The wetlands of Nepal serve as rest areas for the migrant birds as well as habitat for some globally threatened birds. For examples, Demoiselle crane (*Anthropoides virgo*) is the guest bird of Nepal. This bird breeds in Mongolia, northern China and southern Russia. They cross the Himalayas to go to the Indian sub-continent, especially in September and October. They stop over a few days in Nepal. They travel about 300 km /day covering about 3,000-4,000 km in a year. Their rest place is rice fields, floodplains and fords of Bardia and Kailali districts. Other birds that use Nepal as their short rest place are (1) cinereous vulture, (2) common greenshank, (3) common teal, (4) Eurasian curlew, (5) godwall, (6) great cormorant, (7) greater spotted eagle, (8) imperial eagle, (9) Kentish plover, (10) northern pintail, (11) northern shoveler, (12) Pallas gull and (13) Ruddy shelduck (Hem Sagar Baral, *per. comm.*). The bar-headed goose (*Anser indicus*) is reported to be flying above Mt. Everest at the altitude of 9,375 m, which is undoubtedly the highest flying migratory bird in the world and Ibis ibis (*Ibidorhyncha struthersii*), which breeds in the braided river valleys of Himalaya is declining in the region and can be an indicator species for climate change in the Himalayan region (Baral, 2008). Likewise, it was reported in the newspaper that the Syke's nightjar (*Caprimulgus mabratensis*) is a frequent visitor to Nepal that breeds in Pakistan and northwest India and winters in south of Central China.
3. *Riverine wetlands:* The Salmon lives in the sea but spawns in the river. The eel lives in the river but spawn in the sea. Likewise, fish and pawn need wetland for spawning and then migrate through river. Nepal's riverine wetlands are the waterways for the migratory fishes. Similarly, Himalyan trout (*Schizothorax molesworthii*) is found in the cold waters of the Himalayas.
4. *Sources of genetic materials:* Rice is a staple diet of over 3 billion people. Many commercially bred-varieties of rice are in use. Wetlands harbour 3 species of wild rice: *Oryza rufipogon*, *O. officinales* and *O. nivara*. These varieties are recorded in the Ajingara swamp of Kapilvastu. *Hygroryza aristata* is the wild relative of rice varieties found in the

Terai. These species have the potential to provide genetic materials for the improvement of commercial varieties. A commercially bred crop variety has a life span of 5-10 years before new genetic materials are required to improve its ability to combat pests and diseases.

### Evolution of wetland activities

The wetland conservation in Nepal was formally inaugurated in 1987 by DNPWC (Department of National Parks and Wildlife Conservation) when Koshi Tappu Wildlife Reserve was designated as the List of Wetlands of International Importance, popularly known as Ramsar site. The Reserve is the first site from Nepal designated as Ramsar site. A quick glance over the past history of wetland activities can be summarized as having passed through following four stages.

1. *Primary stage*: The 1970's is the primary stage at which Koshi Tappu Wildlife Reserve was established and gazetted in 1976 along the Koshi River covering riparian areas of three districts of Sunsari, Saptari and Udaipur in eastern Nepal. The Reserve was protected as the habitat of the last surviving species of Asiatic wild water buffalo. The Reserve later became the first Ramsar site of Nepal.
2. *Awakening stage*: The awakening stage began in 1980's with the designation of Koshi Tappu Wildlife Reserve as the first Ramsar site in Nepal. The designation highlighted Nepal's commitment to the conservation and wise use of wetlands.

This was the first formal commencement of the wise use and conservation of wetlands and their resources in Nepal.

3. *Take-off stage*: During the 1990's, wetland efforts took off the ground when the first national workshop was organized on wetland management. Systematic efforts were underway to collect data and information on wetlands. A Nepal-brewed methodology for inventorying wetlands of Nepal's Terai wetlands was developed and employed to collect data. Various action research works began in this period. This period is the watershed era in the history of wetland conservation and management in Nepal.
4. *Mass consciousness stage*: During this stage, i.e. 2000's, eight wetland sites were declared as the Ramsar sites of Nepal; the Government of Nepal adopted national wetland policy in 2003; research works on high altitude wetlands were undertaken; GEF grant was awarded to Nepal for the conservation and sustainable use of wetlands in Nepal.

Despite our tremendous efforts, the loss and deterioration of wetlands and their resources is continuing in an alarming way. Thanks are due to the efforts of scientists, planners, managers and practitioners. This is the reason why wetland has become *Cause Celebre*, not only in Nepal but also in the international arena. Major events on the wise use of wetlands are presented in Box A.

#### Box A: Milestones of Wetland Activities in Nepal

1976 – KTWR established and Gazetted as a habitat of Asian Wild Buffalo  
 1987 – KTWR nominated for inclusion in the Ramsar List  
 1988 – Designation of KTWR as the first Ramsar site of Nepal  
 1992 – Establishment of an Informal Wetland Group under IUCN Nepal  
 1993 – National Workshop on Wetland Management in Nepal  
 1994 – Publication of a treatise "Safeguarding Wetlands in Nepal"  
 1996 – An Inventory of Nepal's Terai Wetlands (Interim report)  
 1998 – Setup of Wetland Database in IUCN  
 1998 – Revision of Aquatic Life Protection Act of 1961  
 2003 – Endorsement of the National Wetlands Policy  
 2003 – Designation of three Ramsar sites  
 2001 – Publication of the Inventory of Glaciers and Glacial Lakes  
 2006 – Publication of monographs on high altitude wetlands  
 2007 – Designation of four high altitude wetlands in the Ramsar list  
 2007 – Five-year GEF Wetland Project on board  
 2008 – Designation of Mai Pokhari as the 9<sup>th</sup> Ramsar site

Sources: Various sources including personal knowledge

## Loss of wetlands

Lakes and ponds are facing formidable threats to their survival because of the following problems, which are designated by the acronym of COPIES.

C = Conversion of wetlands for other purposes

O = Over-exploitation of resources

P = Pollution of water

I = Invasion of alien species

E = Encroachment to the area

S = Sedimentation of the water body

i. *Conversion of wetlands for other purposes*: Nepal is a country whose staple diet is rice and its production gets the topmost priority. That is the reason why marshy and waterlogged areas are immediately converted into rice fields for paddies. In some places, they are converted into fishery ponds. In urban area they are filled-up and then used for real state or other purposes. They were left untouched only in places where neither rice could be grown nor fisheries raised. From this perspective it can be said that these waterlogged areas and marches are considered as the number one public enemy. Previously, they were considered counter-cultural and counter-productive. Every wetland was the victim of diversion, drainage, dredging (like many riverine wetlands) and development (conversions) due to above reasons for other purposes. Those destroyers were regarded as the social heroes.

ii. *Over-exploitation of resources*: Wetlands and allied resources have been over-used in many places due to conversion, pollution, invasion of alien species, encroachment and sedimentation. This is further aggravated by growing population, abject poverty and conflict of different nature.

iii. *Pollution of water*: Many of our wetlands have become the victim of natural as well as socio-economic pollutions such as direct discharge of sewage and domestic waste water, run-off from the surrounding areas, deforestation at the watershed scales and dumping of rubbish into the wetland sites. The burning examples can be seen in the Bagmati river and sacred lakes like Gosainkunda, where over 20,00 pilgrims take sacred bath on the day of Janai Purnima every year in the monsoon season.

iv. *Invasion of alien species*: Wetlands are heavily infested by alien or invasive species of plants. This is a

serious problem for the conservation of wetlands and their resources in Nepal. Some of the species that have invaded our wetlands are (1) water hyacinth (Jal Kumbhi, *Eichornia crassipes*), (2) Kumbhika (*Pistia stratiotes*), (3) Jaljambhu (*Alternanthera philoxeroides*), (4) Besharm (*Ipomoea carnea* sub sp *fistulosa*), (5) Karaunte grasses (*Leersia hexandra*), (6) Lahare Banmara (*Mikania micrantha*), (7) Lajjawati (*Mimosa pudica*) and (8) Amla Patte Jhar (*Myriophyllum aquaricum*).

v. *Encroachment to the area*: Many of our wetlands have been in the state of claustrophobia primarily due to human intervention for human welfare. The burning examples can be seen in many sites, where they have been invaded for settlement and farming, especially rice field such as in the Bagmati and Ghodaghodi Tal.

vi. *Sedimentation of the water body*: The gradual deposit of silt, sediments and debris in any wetland sites are threatening the survival of wetlands. The gradual deposit of moraine, debris and others in the lake like the Tilicho of Mustang district and the process of sedimentation have further exacerbated the conditions of many lakes and ponds in Nepal's Terai as well as mid-hills.

## Spatial distribution

No documentation on the overall picture of wetlands and their resources in Nepal is available. Neither has any organization initiated this kind of work nor is it in the offing. Only piece-meal works are available and these include the inventories of Nepal's Terai, the Kathmandu Valley and the Himalayan Region. However, these bits and pieces of works are not enough to draw up the general picture of wetlands in Nepal particularly their number, forms, types, extent, status etc. Nor is it possible to develop a national classification system of wetlands in Nepal. Therefore, it is difficult to integrate wetland issues into national planning framework and processes. Some of the piecemeal works related to inventorization of wetlands are briefly presented below.

### i) Inventory of Nepal's Terai

An inventory of Nepal's Terai was prepared by IUCN Nepal. The methodology was developed natively in collaboration with different agencies and organizations and was pre-tested before its adoption by IUCN Nepal to collect data from the Terai. The

data recorded in the inventory are the primary ones and were collected by teams of experts representing various disciplines. The inventory presents detailed information of 163 wetlands in the Terai. Although it is not a comprehensive inventory, it is the first attempt at gathering information with the help of an inter-disciplinary team. Table 1 below presents the distribution of these wetland sites by development regions. The Terai region of the Far-Western Development Region contains the maximum percentage of wetlands (38%) (Bhandari, 1998). The inventory also records that Kailali district has the highest percentage of wetlands (21%) with Kanchanpur following with 16% of the sites in the Terai (Data not included in the table).

**Table 1: The distribution of wetland in the Terai**

Development Region	Frequency	Percent
Eastern Development Region	18	11%
Central Development Region	37	23%
Western Development Region	34	21%
Mid-Western Development Region	12	7%
Far-Western Development Region	62	38%
Total	163	100

Source: Bhandari (1998)

Similarly, IUCN Nepal has compiled a record of wetland sites covering all the ecological zones of Nepal. The information was collected from secondary sources. Their total number is 297 in which 133 (45%) are from low land.

**Table 2: Wetland distribution according to ecological zones**

Geographical zone	N	Percent
Highland	78	26%
Mid-Hills	86	29%
Lowland	133	45%

## ii) Wetlands in the Kathmandu Valley

The Ministry of Population and Environment conducted a study of wetland sites of the Kathmandu valley in 2001. The report summarizes the information of 42 sites in the valley. Their distribution is given in Table 2. Kathmandu and Bhaktapur have almost the same percentage of ponds (43%), slightly higher number of sites in Kathmandu (19) than in Bhaktapur (18). Nagdah is the largest one (5 ha) in Lalitpur. Taudah and Kamal Pokhari are the second and third largest ones in Kathmandu, having areas of 4 ha and 2 ha, respectively. The rest of the ponds are small and human constructed (Data not presented in the Table).

**Table 3: Wetlands in Kathmandu Valley**

District	Frequency	Percent
Bhaktapur	18	43%
Lalitpur	5	14%
Kathmandu	19	43%
Total	42	100

Source: MOPE (2001)

## iii) Inventory of Glaciers and Glacial Lakes

ICIMOD (International Center for Integrated Mountain Development) conducted a study on glaciers and glacial lakes (Mool *et al.*, 2001). The work is based on the digital data and images. According to the work, there are about 2,323 glacial lakes and 3,252 glaciers in Nepal's Himalayas. These lakes and glaciers cover the total area of 5,428 km<sup>2</sup> of which glacial lakes alone occupy only 75 km<sup>2</sup> of the total glacial areas (Mool *et al.* 2001). The highest freshwater lake is the Tilicho at 4,917 m asl covering an area of 354 ha. This is probably the highest and the largest freshwater lake in the world. And there are many smaller glacial lakes above this altitude. For example, an unnamed lake at Humla District is found at the altitude of 5,742 m (data not included in the table).

**Table 4: Basins, glaciers and glacial lakes in Nepal's Himalayas**

Basins	Glaciers		Glacial lake	
	No	Area	No	Area
Koshi	779	1,410	1,062	25
Gandaki	1,025	2,030	338	12
Karnali	1,361	1,740	907	37.6
Mahakali	87	143	16	0.4
Total	3,252	5,323	2,323	75

Source: Mool *et al.* 2001:75-110)

## Nepal's efforts towards wise use

Nepal made its first international commitment to the cause of wise use of wetland in Nepal after it formally nominated the Koshi Tappu Wildlife Reserve for inclusion in the List of Wetlands of International Importance, popularly known as Ramsar site in 1987 (Table 1 for the overview of Ramsar sites). Since then Nepal has been doing some wetland conservation activities in the country. As a contracting party it was involved in the revision of the definition of the phrase "Wise Use of Wetlands" in Ramsar COP9 in 2005. The new revised definition is as follows:

*"Wise use of wetlands is the maintenance of their ecological characteristics achieved through the implementation of*

*ecosystem approaches within the context of sustainable development*' (Ramsar Convention Secretariat, 2006).

The additional guidance for the implementation of the wise use concept, which was adopted by the 5th Meeting of the Parties in 1995, made a recommendation to the Contracting Parties to:

(1) adopt national policies (involving a review of legislation and institutional arrangement to deal with wetland matters; (2) develop the program of wetland inventory, monitoring, research, training, education and public awareness), and (3) take action at wetland sites (involving the development of integrated management plans covering every aspect of the wetlands and their relationships with the catchments (Ramsar Convention Secretariat, 2006:49).

Since the accession to the Convention on Wetlands, Nepal has made the following achievements:

1. Designation of additional eight Ramsar sites
2. Development of an participatory methodology for inventorization
3. Preparation of an inventory of some ecological zones
4. Preparation of participatory site management plans
5. Pilot project on collaborative management
6. Integration of wetlands into national planning
7. Capacity building at both national and local levels
8. Mainstreaming of wetlands into production sectors

The text of the Convention on Wetlands of International Importance, especially Waterfowl Habitat (Ramsar, Iran 1971) properly known as the Ramsar Convention Article 2.2 states, "*Wetlands should*

*be selected for the List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology. In the first instances, wetlands of international importance to waterfowl at any season should be included*". In order to identify wetlands of international importance, nine criteria have been identified and reorganized into two groups; (1) Group A: Site containing representative, rare or unique wetland type and (2) Group B: Site of international importance for conserving biodiversity (criteria based on species and ecological communities, water birds, fish and other taxa). On the basis of these criteria, the wetlands are designated as Ramsar sites by the Convention on Wetlands. Until now, there are altogether 1,828 Ramsar sites from 158 countries.

### Challenges & opportunities

The above-mentioned points help us come to a conclusion that efforts have been made towards the wise use of wetlands and allied resources in Nepal but they are not adequate to catalyze their conservation and sustainable use. As is clear from the threats mentioned above, there is no royal road to the management and conservation of this invaluable resource. Various fragmented laws and by-laws may not be useful to arrest the speed of wetland loss in Nepal. When we want to solve the problem institutionally, non-coordination appears to be the biggest hurdle. However, these obstacles should be seen as windows of opportunities. Some of the problems we have faced while applying the wise use of wetlands on the ground give us opportunities for further championing the cause of wetland management and conservation. In the following table, the major problems and opportunities they provide us have been summarized for the benefit of readers.

**Table 5: An overview of the Ramsar sites of Nepal**

SN	Name	District	Area (ha)	Altitude (m)	Ramsar Designation date
1	Kosi Tappu Wildlife Reserve	Sunsari	17,500	90	17.12.1988
2	Beesh Hazar Tal	Chitwan	3,200	286	13.08.2003
3	Ghodaghodi Lake Area	Kailali	2,563	205	13.08.2003
4	Jagdishpur Reservoir	Kapilbastu	225	197	13.08.2003
5	Gokyo Lake Complex	Solukhumbhu	7,770	975	23.09.2007
6	Gosainkunda Complex	Rasuwa	1,030	4,380	23.09.2007
7	Rara Lake	Mugu	1,583	2,990	23.09.2007
8	Shey-Phoksundo	Dolpa	494	3,612	23.09.2007
9	Mai Pokhari	Ilam	12	2,100	27.11.2008

[Note: It is learnt that the Government of Nepal has endorsed the proposal of designating Khaptad Lake as Ramsar site and the instrument has already been submitted to the Ramsar Convention Secretariat.]

SN	Challenges	Opportunities
1	<p>Many fragmented and weak laws creating a lot of confusion on wetland management.</p> <ul style="list-style-type: none"> <li>- GON/GEF/UNDP has enumerated 31 acts and 17 policy, plans and strategies impacting wetlands. These laws deal only with some components of wetlands. And they contradict with one another. There is no single comprehensive wetland law dealing with wetlands.</li> <li>- Nor is there a legal definition of law in Nepal.</li> <li>- There is no legal basis for implementing National Wetland Policy.</li> </ul>	Efforts should be made towards the development of a national wetland law
2	<p>Inadequacy of basic information about wetlands of Nepal</p> <ul style="list-style-type: none"> <li>- We have an inventory of the Terai based on field observation &amp; that of high Himalayan wetlands based on digital mapping and images. These inventories do not cover the entire Nepal. Moreover, the mid-hills are void of any inventory and these inventories are not consistent with each other as they were prepared for different purposes.</li> <li>- Therefore, it is not possible to draw a general picture of Nepal's wetlands and integrate them into national planning process and framework.</li> </ul>	There is an urgent need of a comprehensive national wetland inventory
3	<p>Inadequacy of coordination among different government agencies and organizations.</p> <ul style="list-style-type: none"> <li>- Three ministries; MFSC, MAC &amp; MWR are directly related to the loss and gain of wetlands. Besides the activities of other agencies and organizations also impact wetlands and their ecosystems.</li> <li>- All have their claims on wetlands but none are responsible for their wise use. As a consequence, duplication, competition, stagnation and conflict are common on the ground.</li> <li>- Indeed, there is an institutional vacuum for the coordinated efforts at the implementation level.</li> </ul>	Establishment of a National Wetland Committee at the apex & In order to catalyze coordinated efforts among various agencies and organizations, an inter-disciplinary body such as National Wetlands Committee at the apex and Wetland Development Authorities at grass root levels should be established.
4	<p>Continuation of loss, mismanagement, deterioration and loss of wetland resources</p> <ul style="list-style-type: none"> <li>- Humans and human actions are the primary cause for their degradation.</li> <li>- Improvement of human actions is the most important factor for the alleviation of wetland degradation.</li> </ul>	Our approach should be to include human actions, i.e. promoting culture as a tool for managing wetland resources.
5	<p>Widespread prevalence of alien invasive species of plants</p> <ul style="list-style-type: none"> <li>- Wetlands are heavily infested by invasive species of plants</li> <li>- Mechanical removal is possible along with many cultural uses but still we lack concrete knowledge and information on their uses.</li> </ul>	Participatory action research should be the agenda to understand their uses as resources.

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