

Full Length Research Paper

Present status of Ramsar sites in Nepal

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Wetlands cover significant area in Nepal. However, these wetlands are highly under pressure from adverse anthropogenic and natural factors, keeping associated biodiversity under threat. Few wetland inventories have been carried out in Nepal, so the total coverage of wetlands in Nepal is yet to be explored. Nine wetland sites of Nepal are included in Ramsar List till 2009. This article provides a review of updated status of Ramsar sites in Nepal.

Key words: Nepal, Ramsar sites, status, wetlands.

INTRODUCTION

World's wetlands cover about six percentage of total global land area. Nepal's wetlands cover about five percentage of Nepal's land area. Nepal showed its conservation commitment by signing the Ramsar Convention on April 17, 1988 (HMGN/MFSC, 2003). Till 2009, nine wetland sites of Nepal have been included in Ramsar List covering total area of 34,455 hectares (Ramsar Convention on Wetlands 2009). Nepal has formulated National Wetlands Policy in 2003 aiming at involving the local people in wetland management and conserving wetlands biodiversity with wise use of wetland resources. Till date, Nepal does not have any specific wetland law, and the responsibility of wetland management solely has not been specified. Comprehensive national wetlands inventory has not been initiated in Nepal, though few surveys have been carried out in lowland Terai and High Mountains. Wetlands in middle hills of Nepal are yet to be explored (Bhandari, 2009). The invasion of wetlands with Water Hyacinth (*Eichhornia crassipes*) is one of the global problems also affecting most of the Nepal's wetlands. Moreover, Nepal's wetlands are under pressure from sedimentation, encroachment and agricultural expansion, water pollution, overuse of wetland resources, eutrophication and poverty (Kafle, 2008).

OBJECTIVES

This paper aims to present an overview of current status of Ramsar sites and associated biodiversity in Nepal.

METHODS

This paper is based on the desk review of the published and unpublished literatures from different sources including World Wide Web. The information on all nine Ramsar sites in Nepal was collected and systematically reviewed for logical discussion and conclusion. The English and Scientific Names of the fauna follow IUCN (2009).

RESULTS AND DISCUSSION

Updated status of Ramsar sites in Nepal

Till 2008, Nepal has nine wetland sites designated as Wetlands of International Significance that is, Ramsar Sites (Table 1). Koshi Tappu wetland is the first wetland site included in Ramsar List in December 17, 1987 (Poudel, 2009). Ramsar Bureau has designated and listed the Beeshazar Tal (Lake) of Chitwan District, Ghodaghodi Tal of Kailali District and the Jagadishpur Reservoir of Kapilvastu District of Nepal as Ramsar Sites in August 13, 2003. Moreover, in September 23, four new wetland sites namely Rara Lake, Phoksundo Lake, Gokyo and Associated Lakes, and Gosainkunda and Associated Lakes have been added in the Ramsar List. Mai Pokhari is the latest wetland of Nepal included in Ramsar List in October 28, 2008 (Ramsar Convention on Wetlands, 2009).

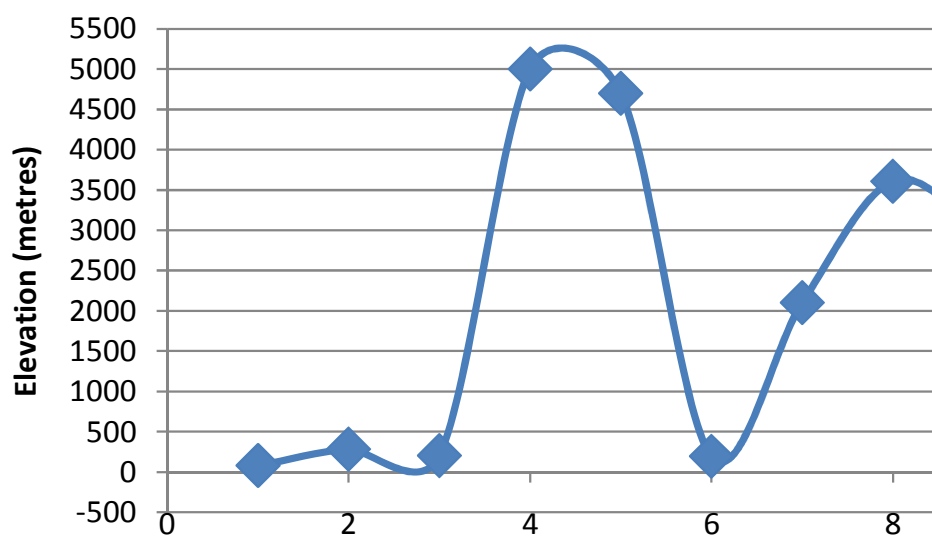
The area of Ramsar sites throughout the world is 181,365,679 hectares (as of August 17, 2009). The area of Nepal's Ramsar sites is 34,455 hectares (as of August

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Table 1. A brief overview of Ramsar sites in Nepal until 2009.

Ramsar Sites	Area (hectares)	Location (districts)	Zone	Elevation (m) approx.
Koshi Tappu	17500	Koshi	Tarai	90
Beeshazar and Associated Lakes	3200	Chitwan	Tarai	285
Ghodaghodi Lake Area	2563	Kailali	Tarai	205
Gokyo and Associated Lakes	7770	Solukhumbu	Himal	5000
Gosaikunda and Associated Lakes	1030	Rasuwa	Himal	4700
Jagadishpur Reservoir	225	Kapilvastu	Tarai	195
Mai Pokhari	90	Ilam	Mid Hills	2100
Phoksundo Lake	494	Dolpa	Himal	3610
Rara Lake	1583	Mugu	Himal	2990
Total	34455			

Source: Modified from Wetlands International/Ramsar 2009.

**Figure 1.** Altitudinal distribution of Ramsar sites in Nepal.

11, 2009) representing 0.019% of total area of global Ramsar sites. More than 1845 wetland sites have been included in Ramsar List in the world (Ramsar Convention on Wetlands, 2009). Nepal's Ramsar sites represent less than 0.5% of total number of Ramsar sites in the world.

While analyzing altitudinal distribution of the Ramsar sites of Nepal, it is found that designated wetland sites are below 500 m and above 2000 m elevation from mean sea level (Figure 1). No wetland sites between 500 - 2000 m elevations are in the Ramsar List. It shows the essence of comprehensive wetland inventory in mid hills region of Nepal.

While analyzing the area of the Ramsar Sites of Nepal, it is found that Ramsar sites range from 90 hectares to 17500 hectares in size (Figure 2) (Poudel, 2009; Wetlands International/Ramsar, 2009). The area of most of the Ramsar sites fall below 3200 hectares. Koshi Tappu wetland is the biggest Ramsar site of Nepal covering

17500 hectares area. Mai Pokhari is the smallest Ramsar site of Nepal covering only 90 hectares area.

While analyzing the period of designation of Ramsar sites in Nepal at five years interval, it is found that the designation process took speedy momentum after early 2000s (Figure 3). Between 2000 - 2005, three wetland sites were included in Ramsar List. Between 2005 - 2009, this number was increased to five making altogether 9 wetland sites in Nepal. There was not any progress in the Ramsar site designation process between late 80s and early 2000s. This chronological progress in Ramsar site designation process reflects the pace of wetland survey and inventory in Nepal. The common problems in Ramsar sites of Nepal are overuse of resources, proliferation of alien invasive species, encroachment, wildlife killing, chemical input, erosion, sedimentation, limited research, low level of conservation awareness among local people and the claim by multiple authorities on the ownership

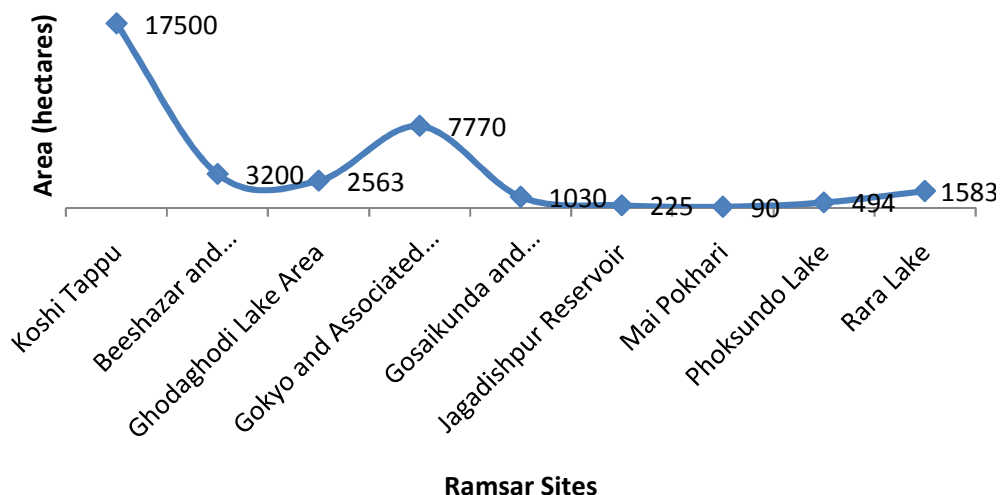


Figure 2. Area of the Ramsar sites in Nepal.

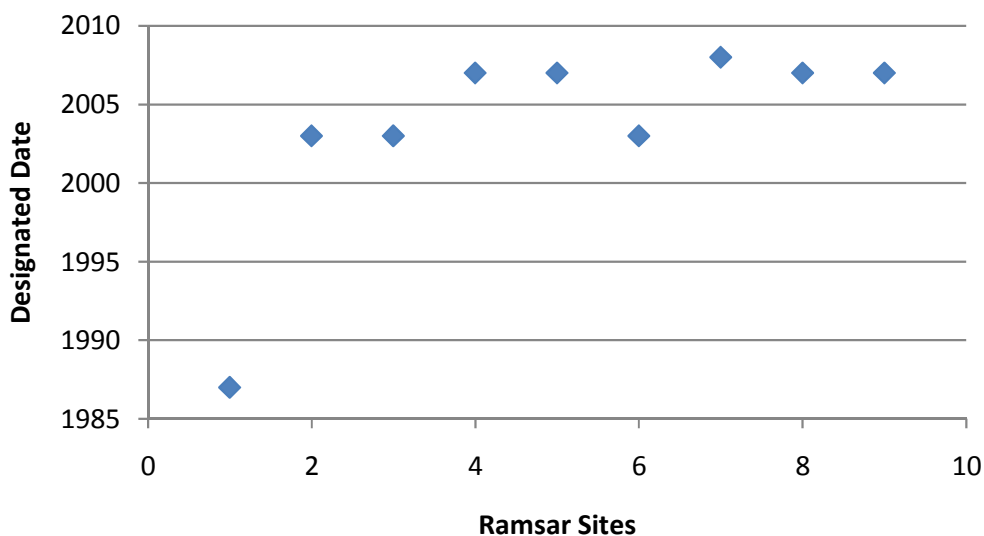


Figure 3. Period of designation of Ramsar sites in Nepal.

and resource use on the wetlands. The major impacts of wetland degradation and loss are vegetation succession, eutrophication, water pollution, fragmentation, subsidence and change in species abundance and diversity (Kafle, 2008; HMGN/MFSC, 2002; IUCN Nepal, 2004). However, all the Ramsar sites do not have the same problem. The specific threats to each Ramsar Site are presented below (Wetlands International/Ramsar, 2009; DNPWC/WWF Nepal, 2008):

1.) In Mai Pokhari Ramsar Site, invasion of exotic Japanese Pine (*Cryptomeria japonica*) in the watershed and gold fish (*Carassius auratus*) has adversely affected the indigenous floral and faunal species especially birds and amphibians respectively.

2.) In Rara Lake Ramsar Site, principal threats come from pollution caused by army personnel and tourists and unregulated fuelwood collection, especially during festivals.

3.) In Phoksundo Lake Ramsar Site, overgrazing and pollution from the nearby people of Ringmo village are considered as potential threats to the site.

4.) In Gosaikunda and Associated Lakes Ramsar Site, threats to the site include pollution from the huge gathering of worshippers during the festivals.

5.) In Gokyo and Associated Lakes Ramsar Site, garbage and sewage left by visitors is difficult to dispose of and such pollution pressures represent a potential threat, as does overgrazing and deforestation caused by mountain-

ering expeditions seeking firewood.

6.) In Jagadishpur Reservoir Ramsar Site, the current threats to the site include fishing, grazing, fuel wood and fodder collection, domestic use and supply of water for irrigation.

7.) In Ghodaghodi Lake Area Ramsar Site, the threats to the site include highway traffic at the southern edge, construction of unplanned new temples, over grazing, poaching and hunting as well as illegal tree felling and smuggling of Sal (*Shorea robusta*) and Khair (*Acacia catechu*) timber, natural eutrophication accelerated by human religious and agricultural activities.

8.) In Beeshazar and Associated Lakes Ramsar Site, the major factors putting pressure on ecology of the site include unsustainable use of natural resources from wetlands and surrounding areas, water allocation between the wetlands and for irrigation, invasion with Water hyacinth and other invasive species, and leaching of inorganic fertilizer and pesticide from farmlands into the water of the wetlands.

9.) In Koshi Tappu Ramsar Site, the major threats to the site are siltation, overgrazing, over fishing, fish and bird poisoning, deforestation in the catchments and human disturbance.

A Glimpse on biodiversity values of Ramsar sites in Nepal

Beeshazar and Associated Lakes provide excellent habitat as water holes and corridor for endangered wildlife species, including the critically endangered White-rumped Vulture (*Gyps bengalensis*), endangered Tiger (*Panthera tigris*), Indian Rhinoceros (*Rhinoceros unicornis*) and Fish-eating Crocodile (*Gavialis gangeticus*), vulnerable Smooth-coated Otter (*Lutrogale perspicillata*), Sloth Bear (*Melursus ursinus*), Broad-snouted Crocodile (*Crocodylus palustris*), Lesser Adjutant (*Leptoptilos javanicus*), Ferruginous Duck (*Aythya nyroca*) and Pallas's Fish-eagle (*Haliaeetus leucoryphus*). The aquatic vegetation in the lake is represented by extensive coverage of floating leafed species mainly Water Hyacinth (*Eichhornia crassipes*), Water Chestnut (*Trapa bispinosa*) followed by Evening Primrose (*Ludwigia adscendens*).

Ghodaghodi Lake and associated thirteen lakes support critically endangered Red-crowned Roofed Turtle (*Kachuga kachuga*), the endangered Tiger, Leopard (*Panthera pardus*), and Three-striped Roof Turtle (*Kachuga dhongoka*), and the vulnerable Smooth-coated Otter (*Lutrogale perspicillata*), Eurasian Otter (*Lutra lutra*), Barasingha (*Rucervus duvaucelii*), Lesser Adjutant (*Leptoptilos javanicus*) and Broad-snouted Crocodile. Threatened plant species include the endangered Orchid (*Aerides odorata*), religiously important and threatened Lotus (*Nelumbo nucifera*), and rare Wild Rice (*Hygrorrhiza aristata*). They support six threatened bird species. They

include Critical: White-rumped Vulture and Slender-billed Vulture (*Gyps tenuirostris*); Vulnerable: Lesser Adjutant and Indian Spotted Eagle (*Aquila hastata*); and Near-threatened: Oriental Darter (*Anhinga melanogaster*) and Ferruginous Duck. The resident population of Cotton Pigmy-goose (*Nettapus coromandelianus*) makes up nearly one percent of the total Asian population.

Jagadishpur Reservoir provides shelter for an assemblage of some threatened species of conservation importance. These include plants such as endangered Serpentine (*Rauwolfia serpentina*), rare Pondweed (*Potamogeton lucens*), threatened and religiously important Lotus (*N. nucifera*), rare Wild Rice (*H. aristata*), as well as the IUCN red-listed and tallest flying bird species Indian Sarus Crane (*Grus antigone*).

Koshi Tappu wetland offers an important habitat for a large variety of wildlife. The threatened Gharial, birds Bengal Florican (*Houbaropsis bengalensis*) and Spot-billed Pelican (*Pelecanus philippensis*), and Leopard occur in the site. Koshi Tappu forms an ideal habitat for resident as well as migratory water birds and substantial numbers of waders. Out of these 485 species of birds recorded in the area, 12 species are globally threatened and 101 species are nationally threatened. It is the only area in Nepal where Water Cock (*Gallicrex cinerea*) and Abbott's Babbler (*Malacocincla abbotti*) are found. Of the 31 species of mammals recorded, Nepal's last remaining population of Indian Water Buffalo (*Bubalus arnee*) inhabits the area and the South Asian River Dolphin (*Platanista gangetica*) has been recorded in the Koshi river. 514 species of plants have been recorded in the area including threatened species: *Rauwolfia serpentina*, *Alstonia scholaris*, *Oroxylum indicum*, *Acacia catechu*, *Butea monosperma* and *Dalbergia latifolia*. Smooth-coated otter—one of the least studied animals of Nepal is also found in this site (Wetlands International/Ramsar, 2009; WWF Nepal/DNPWC, 2008).

The alpine pasture meadow and sloping mountain terrain of Gokyo and Associated lakes support a number of threatened species, such as the Kutki plant (*Neopicrorhiza scrophulariifolia*), the Himalayan tahr (*Hemitragus jemlahicus*), the Snow Leopard (*Uncia uncia*), Wood Snipe (*Gallinago nemoricola*), endemic species like the flowering plant *Kobresia fissiglumis*, and many important birds like Ferruginous Duck and Demoiselle Crane (*Grus virgo*). This Ramsar site is a vital source of water for downstream communities.

Gosainkunda and Associated Lakes support a considerable number of IUCN Red listed endangered and vulnerable species of fauna and flora. The site has religious associations for Hindus and Buddhists and is the locus of the important Gangdashahara and Janaipurnima festivals. Wetlands birds recorded in Gosainkunda are Ruddy Shelduck (*Tadorna ferruginea*) and Common Teal (*Anas crecca*). This site is one of the most important sites for collection of type specimens of plants for botanical purpose including 100 species of

flowering plants with threatened and endemic species.

Phoksundo Lake, its alpine meadows, and bogs provide habitat for a number of rare and vulnerable plants and animals, including the Snow Leopard (*U. uncia*), Alpine Musk deer (*Moschus chrysogaster*) and Grey Wolf (*Canis lupus*). About 155 species of flowering plants have been recorded from the catchments including threatened species *N. scrophulariifolia*, *Dactylorhiza hatagirea*, *Dioscorea deltoidea*, *Aconitum spicatum*, *Nardostachys grandiflora*, *Podophyllum hexandrum* and *Megacarpa polyandra* (Wetlands International/Ramsar, 2009; WWF Nepal/DNPWC, 2008).

Rara Lake and adjacent areas have developed unique floral and faunal assemblages with a number of rare and vulnerable faunal and floral species. The wet alpine pasture, moraines, and damp stream banks along the lake area are the natural habitats for endemic species of plants. The endemic frog Rara Paha (*Paa rarica*) is found at only one other location in the Central region, and three endemic species of Snow Trout - Asala Fish (*Schizothorax macropterus*, *S. nepalensis*, and *S. raraensis*), are found only here out of eight endemic fish species of Nepal. It is the habitat and resting site of winter visitor water birds such as Gadwall (*Anas strepera*), Mallard (*Anas platyrhynchos*), Northern Shoveler (*Anas clypeata*), Common Teal, Tufted Duck (*Aythya fuligula*), Common Golden Eye, Common Merganser (*Mergus merganser*), Common Coot (*Fulica atra*), and Solitary Snipe (*Gallinago solitaria*) (Wetlands International/Ramsar, 2009; WWF Nepal/DNPWC, 2008).

Mai Pokhari wetland lies in the eco-tone of *Schima-Castanopsis* and Oak-Laurel vegetation providing habitat for significant epiphytic orchids as well as for protected species such as White-rumped Vulture, Leopard cat (*Prionailurus bengalensis*) and Eurasian Otter (*L. Lutra*), and endemic species like Hariya Cheparo (*Japalura variegata*).

Conclusion

Nepal is with satisfactory pace in demonstrating its commitment to wetland conservation by increasing the number of wetland sites in the Ramsar List during 2000s. Nine wetland sites of Nepal have been designated as Ramsar Sites until 2009. The wetlands and Ramsar Sites

in the country have global significance in terms of maintaining threatened floral and faunal species. However, these wetlands are under adverse pressure from intense anthropogenic and natural factors. All the wetlands of the country have not yet been explored yet. So a detailed national wetland survey and inventory programme is essential in generating knowledge on diverse wetland ecosystems and associated biodiversity – as an initial step to propose more wetland sites for inclusion in Ramsar list.

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