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Wetland city accreditation in Nepal: an approach to wetland management for livable cities and urban resilience

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The Ramsar wetland city accreditation encourages conservation and wise use of urban and peri-urban wetlands and promotes sustainable socio-economic benefits for local communities. It recognizes cities that value and protect their wetlands, fostering positive relationships with these ecosystems and increasing awareness in municipal planning and decision-making processes. A city's commitment to wetland conservation, awareness, active engagement in sustainable practices, and integration of wetland conservation into planning makes it a strong candidate for this recognition. Currently, 43 cities worldwide have achieved this accreditation since 2017; however, Nepalese cities, endowed with rich wetlands, are yet to be accredited. This study delves into the wetland-rich cities of Nepal, identifying five potential candidates for accreditation based on a comprehensive assessment. Following the assessment aligned with the Ramsar Convention requirements, Pokhara City (Kaski district) emerged as the top candidate for Ramsar Wetland City Accreditation in Nepal. The subsequent rankings include Sandakpur Rural Municipality (Ilam district), Bharatpur Metropolitan City (Chitwan district), Ghodaghodi Municipality (Kailali district), and Kapilvastu Rural Municipality (Kapilvastu district), respectively.

Keywords: *Conservation, RAMSAR Convention, Urban wetlands, Wise-use*

Wetlands are among the most productive ecosystems with significant ecological, cultural, and economic importance. They support health, welfare, safety, and sustainability of people and biodiversity (CBD, 2015). Wetlands are considered critically important due to different functions like water filtration, storage, groundwater recharge, regulating flood, nutrients, & sediment, and providing habitat for fish and wildlife. Wetlands also provide recreational opportunities, aesthetic benefits, sites for research & education, and production advantages (USEPA, 2015). Wetlands, including Ramsar Sites, preserve and shelter many threatened and endangered flora & fauna, and provide suitable habitats for internationally important migratory birds, aquatic life, and other wildlife (IUCN, 2004). They also have important cultural, traditional, and religious values (Verschuuren, 2016). Nepal possess a variety of inland freshwater wetlands, encompassing high-altitude glacial lakes, hot springs, ponds, ox-bow lakes, river floodplains, marshes, and swamps (Siwakoti & Karki, 2009; MoFE, 2018a). These wetlands have beautified nature and cities, catering people's wellbeing.

Wetland city accreditation is a voluntary scheme launched in June 2017 by the Convention on Wetlands of International Importance, especially as aquatic habitats (Hui *et al*., 2017). The 'wetland city accreditation' of Ramsar Convention also means fostering conservation and wise utilization of urban and peri-urban wetlands and sustainable socio-economic benefits for nearby people (Ramsar Resolution XII.10, 2015).

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The 'wetland city accreditation' program promotes a positive connection between urban areas in close proximity to, and reliant upon, wetlands—especially those of international significance. This initiative aims to enhance public awareness of wetlands and foster engagement in municipal planning and decision-making processes. Cities demonstrating a commitment to the preservation and enhancement of their natural or human-made wetlands can voluntarily participate in this scheme, gaining international recognition and positive publicity for their endeavors (Ramsar, 2015).

The Ramsar Convention Resolution XII.10 established a 'wetland city accreditation' system, from which contracting parties can apply for 'wetland city accreditation' for those cities which are located in close proximity to Ramsar Sites or other significant wetlands. In order to qualify for Ramsar Convention's accreditation of wetland cities, contracting parties must submit a proposal for each candidate city that is consistent with the framework provided. After being proposed by contracting parties and completing the accreditation protocol stated, the candidate city accreditation shall be accepted as an accredited wetland city by the independent advisory committee.

The advantages of 'wetland city accreditation' includes: (i) delivering wise-use of wetlands and avoiding any further degradation or loss of wetlands as a result of urban development or management, and (ii) promoting the contribution that wetlands make to social and environmental sustainability of a wetland city (Ramsar: Resolution XII.10, 2015).

Cities that have received accreditation are granted the privilege of utilizing the Ramsar brand for duration of six years. This enables them to promote their agricultural products and ecotourism activities, establishing a close connection between Sustainable Development Goal 11 - "Make cities and human settlements inclusive, safe, resilient, and sustainable" and SDG 6 - "Ensure availability and sustainable management of water and sanitation for all" (WWF, 2018).

At COP14, the Ramsar Convention accredited additional 25 cities with exceptional efforts in protecting their wetlands. With this addition, the total number of cities accredited for their conservation actions increased from 18 to 43 cities, spanning 17 countries across 5 continents (Table 1).

Table 1: List of recognized world wetland cities (Ramsar, 2022)

S. N.	Continent	Country	2018	2022
1.	Asia	China	Changde, Changshu, Dongying, Haerbin, Haikou, Yinchuan	Hefei, Jining, Liangping, Nanchang, Panjin, Wuhan, and Yangcheng
2.		Republic of Korea	Changnyeong, Inje, Jeju, Suncheon	Gochang, Seocheon, and Seogwipo
3.		Sri Lanka	Colombo	-
4.		Indonesia	-	Subaraya and Tanjung Jabung Timur
5.		Islamic Republic of Iran	-	Bandar Khamir and Varzaneh
6.		Japan	-	Izumi and Niigata
7.		Iraq	-	Al Chibayish
8.		Thailand	-	Sri Songkhram District
9.	Africa	Tunisia	Ghar el Melh	-
10.		Morocco	-	Ifrane
11.		Rwanda	-	Kigali
12.	Europe	South Africa	-	Cape Town
13.		France	Amiens, Courteranges, Pont Audemer, Saint Omer	Belval-en-Argonne and Seltz
14.		Hungary	Lakes by Tata	-
15.		Spain	-	Valencia
16.	North America	Canada	-	Sackville
17.	South America	Madagascar	Mitsinjo	-

For 'wetland city accreditation' of the Ramsar Convention, a candidate city must fulfill the national standards used to implement each of the international criteria mentioned in the Point 13 of the Framework for Wetland City accreditation of the Ramsar Convention (Ramsar: Resolution XII.10, 2015).

Nepal has been a party of the Ramsar Convention on wetlands since 1989, and to date, 10 wetlands are designated as Ramsar Sites, the wetlands of International importance. The Koshi Tappu Wetland is the first site appended to Ramsar list on December 17, 1987, and the Lake Clusters of Pokhara Valley is the latest wetland included. Wetlands in Nepal cover approximately 60,561 hectares (nearly 5%) of the country's total area (MoFE, 2018a) belonging to 15 types of natural and 10 types of human-built inland wetlands (Shiwakoti, 2006). The country's Ramsar Sites play a crucial role in maintaining and enhancing the diversity and population of globally threatened flora, fauna, and supporting the ecosystem services these wetlands provide (Shrestha *et al*., 2020). They also provide feeding and breeding places for many threatened birds, fishes, and wildlife (USEPA, 2015). These sites are important for their ecological value and have significant implications for sustainable urban development and city accreditation. Wetlands provide habitats for: 27% of threatened bird species (Inskipp *et al*., 2017), 85% of endemic vertebrates (IUCN, 2004), 230 indigenous fish species (Rajbanshi, 2013), and 24% of protected plant species in Nepal (WCN, 2020).

By recognizing the value of Ramsar Sites and integrating their conservation into urban planning and development processes, cities can highlight their commitment to sustainable urban development and conservation. Incorporating wetlands' protection and sustainable use into city accreditation frameworks can showcase a city's efforts to protect and use wetlands responsibly and contribute to sustainable development goals. Additionally, city accreditation programs can encourage urban areas to engage in community-based conservation efforts and raise awareness among people about the importance of Ramsar Sites or other important wetlands. It could involve the local communities in monitoring and protecting these wetlands. Connecting the ecosystem services offered by the Ramsar Sites or other important wetlands to city accreditation, cities can emphasize that wetland conservation and their services extend beyond rural regions, becoming integral aspects of urban planning, decision-making, and development (Ramsar, 2015). Based on the criteria for 'wetland city accreditation', this study identifies the potential cities and recommends them for 'wetland city accreditation'.

Materials and methods

Study area

The selection of cities was based on the Ramsar guidelines and criteria for national standard outlined in Ramsar: Resolution XII.10, 2015. The cities in the vicinity of all ten Ramsar Sites of Nepal were considered for the study. A preliminary survey was conducted, which involved reviewing literature and evaluating the proximity of the urban or peri-urban areas to the wetlands. After evaluation, five cities meeting the criteria for national standards were chosen (Figure 1; Table 2).

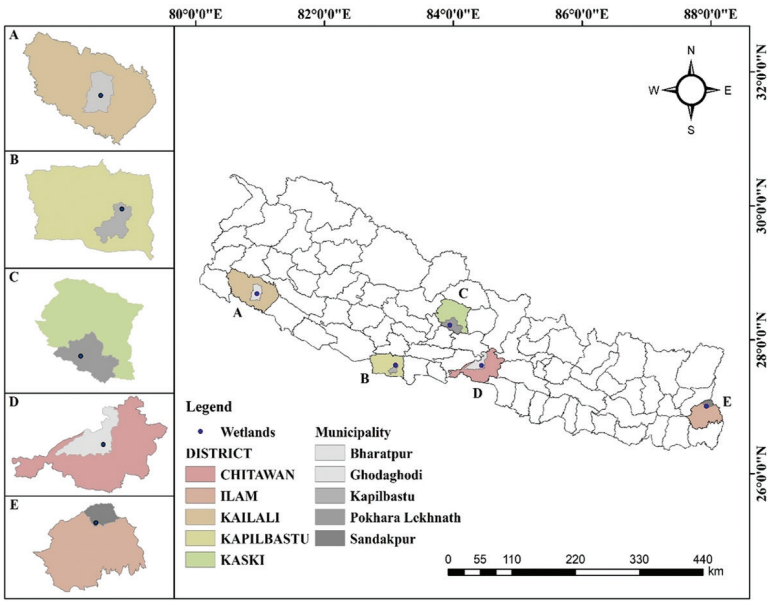

Figure 1: Location map of the selected Ramsar Sites with their local administrative boundaries (A: Ghodaghodi Lake Complex; B: Jagadispur Reservoir; C: Lake Cluster of Pokhara Valley; D: Beeshazar and Associated Lakes; and E: Mai Pokhari)

Table 2: Description of the selected cities with wetlands (Ramsar Sites) for the study

S.N.	Name of cities	Description
1.	Pokhara	Pokhara Metropolitan City (PoMC) stands as a naturally captivating and historically significant metropolis in Nepal. Serving as the headquarters of Gandaki Province, it is located approximately 200 kilometers west of Kathmandu, the capital city of Nepal. Recently, it has been declared as the biggest Metropolitan City, occupying an area of 464.24 sq. km and a population of 414,141. The PoMC encompasses the Mahabharata Range, Mid-hills and the Great Himalayan Range of Nepal between 83°48' – 84°13'11"E longitudes and 28°4'39" – 28°36'18"N latitudes (Rimal *et al*., 2015). The Lake Cluster of Pokhara Valley (LCPV) is distributed across the POMC, Annapurna Rural Municipality, and Rupa Rural Municipality and was declared as a Ramsar Site in 2016. Majority (over 90%) of the LCPV falls within the PoMC, comprising nine ecologically significant cluster lakes viz. i) Phewa, ii) Begnas, iii) Rupa, iv) Dipang, v) Maidi, vi) Khaste, vii) Neurani, viii) Kamalpokhari, and ix) Gunde. The lakes are located within the Chitwan-Annapurna Landscape (CHAL), close to the boundaries of the Annapurna Conservation Area in the northeastern part of Nepal (MoFE, 2018b).
2.	Sandakpur	Sandakpur is a rural municipality in Ilam District of Koshi Province in eastern Nepal. It spans over an area of 156 sq. km with the total population of 16,065. Within the boundary of Sandakpur Rural Municipality lies Mai Pokhari, a mid-hill wetland of religious significance in the eastern Ilam. In 2008, Mai Pokhari was declared as a Ramsar Site, recognizing its international significance. The area of Mai Pokhari lies in the middle of Kanchenjunga- Singhalila landscape complex and is considered as one of the biodiversity hotspots. Mai Pokhari serves as a significant habitat for native animal species, including a tree frog and the Himalayan newt, commonly referred to as 'Thakthake'. It is a habitat for more than 300 species of birds, and 42 species of bryophytes (Pradhan & Heimstad, 2018) including one endemic species *(Sphagnum nepalense)*. Riparian vegetation serves as a home for noteworthy epiphytic orchids and shelters various protected species, including the White-rumped Vulture (*Gyps bengalensis*), Leopard cat (*Prionailurus bengalensis*), and Eurasian Otter (*Lutra lutra*), along with endemic species such as the Variegated Mountain Lizard (*Japalura variegata*). Additionally, Mai Pokhari bears cultural and religious importance for pilgrims following the Buddhist and Hindu traditions.

S.N.	Name of cities	Description
3.	Taulihawa	Taulihawa, an ancient city of Nepal, serves as the Headquarters of Kapilvastu District, spans over an area of 137 sq. km with the total population of 88,874. It is located within Kapilvastu Municipality, approximately 22 km north-east of Lumbini, at 107m above sea level. It shares its southern border with Khunwa, Uttar Pradesh State of India. Kapilvastu Municipality is notable due to the presence of Lumbini, the birth place of Lord Buddha, and Jagadispur reservoir. In 1972, the reservoir was created by diverting the Banganga River for irrigation purpose. The reservoir is one of the internationally important wetlands listed as the Ramsar Site. The reservoir serves as the primary water source for irrigating approximately 406 hectares of land in the Kapilvastu district. It is a habitat for more than 108 species of birds including migratory birds (Baral, 2008). The water level in the reservoir experiences fluctuations, ranging from a maximum of 5–7 meters to a minimum of 2–3 meters (Shah *et al.*, 2011).
4.	Ghodaghodi	Ghodaghodi Municipality lies along the East-West Highway in the Kailali District of Sudurpashchhim Province. It spans over an area of 354.44 sq. km with the total population of 87,679. The Ghodaghodi Lake Area is situated within the Ghodaghodi Municipality, covering approximately 2500 hectares of 14 ox-bow lakes of various sizes. These wetlands include marshes, swamps, streams, springs, seasonal marshy grasslands, and artificial wetlands like canals, irrigated fields, and ponds. The area is encircled by a tropical deciduous mixed Sal forest, located on the lower slopes of the Siwalik hills. The inhabitants of Ghodaghodi Lake Area are mainly the indigenous Tharu and the migrants from the adjoining hilly areas. This lake complex is also a habitat of 17 mammal species, 6 reptile species including mugger crocodiles, 8 amphibian species, 148 bird species, 29 fish species, and 32 butterfly species (Shrestha *et. al.*, 2020; Kafle, 2019; Kafle, 2005; Lamsal *et al*., 2014; Kafle *et al.*, 2007). Ghodaghodi Lake Area was declared as a bird sanctuary in March 2022.
5.	Bharatpur	Bharatpur is the headquarter of Chitwan District. It spans over an area of 433 sq. km with the total population of 369,377. Within the Bharatpur Metropolitan City and the buffer zone of Chitwan National Park, Beeshazar and Associated Lakes cover about 3,200 ha area. These lakes are of extensive typical ox-bow lake system of the tropical inner Tarai, in central Nepal, situated within the Barandabhar Corridor Forest (BCF), which is an important wildlife corridor connecting the Chitwan National Park in the south and Mahabharat hills up to the Annapurna Mountain Range in the north. This wetland provides good habitat as a water hole and corridor for endangered wildlife species. The area is characterized by its forested wetlands featuring finger-like projections with associated lakes, meadows, swamps and marshes (Bhattarai, 2006). This area is also a habitat for various wildlife including, 32 species of mammals, 31 species of herpetofauna, 329 species of birds, 37 species of fish, 16 species of butterflies, and 10 species of aquatic fauna (Lamichhane *et al*., 2016). Beeshazar and Associated Lakes are also an important wetland in the Tarai Arc Landscape (TAL) and CHAL.

Methods

The study was conducted in the Year 2022 following the standard protocol of Ramsar Criteria for national standard for wetland city accreditation (Table 3). The study involved a comprehensive review of reports from relevant authorities such as the Ministry of Forests and Environment, Department of National Parks and Wildlife Conservation (DNPWC), Department of Forests and Soil Conservation (DOFSC), local government bodies, International Union for Conservation of Nature (IUCN), National Trust for Nature Conservation (NTNC), and World Wildlife Fund (WWF). Additionally, the assessment included on-site visits to wetlands, a direct questionnaire survey targeting local government authorities, wetland committee representatives, and other key stakeholders. The purpose was to evaluate indicators for wetland selection and prioritize them. These indicators were developed in accordance with the Ramsar Guidelines for city accreditation (see Table 4).

Table 3: Criteria for national standard for 'wetland city accreditation'

S.N.	Criteria
1.	Candidate city must have one or more Ramsar Sites or other significant wetlands fully or partially situated in its territory.
2.	Has adopted measures for the conservation of wetlands and their services.
3.	Has implemented wetland restoration and/ or management measures.
4.	Has adapted information to raise public awareness about the importance of wetlands and encourage wise use principle for wetland conservation, establishing education sector.
5.	To fulfill the convention criteria, different approaches should be established such as appropriate standards regarding water quality, sanitation and management, sustainable agriculture, forest, tourism, pastoral production system, evaluation of socio-economic and cultural values as well as the ecosystem services of the Ramsar Sites and other significant wetlands and plan for disaster prevention and management.

Table 4: Indicators based on Ramsar Guidelines for wetland city accreditation

S. N.	Indicator type	Indicator name	Score of each item (1 to 10)	Components	Supporting documents
1.	Resources baseline	Important wetlands site		Has established one Ramsar Site (necessary condition).	Ramsar Site designation/approval document
2.	Protection and management conditions	Wetlands protection rate			
3.		Wetlands management plan		Has mainstreamed wetland conservation in local development plan, developed a special plan on wetlands conservation that meets the needs for the investment in wetlands conservation and restoration.	Integrated Lake Basin Management Plan, Site Management Plan

S. N.	Indicator type	Indicator name	Score of each item (1 to 10)	Components	Supporting documents
4.	Protection and management conditions	Special organization for wetlands management		Has established a special committee for wetlands conservation & management, and deployed full-time staff	Lake conservation committee
5.		Wetlands management regulation		Has wetlands-related policies	Local Government Operation Act, 2017; Wetland Policy, 2012; National Ramsar Strategy & Action Plan, 2018–2024
6.		Assessment indicator system on eco-civilization		Has incorporated the indicators on wetlands conservation and wise use	Environment Friendly Local Governance
7.		Organization structure		Has established a committee on the application for 'world wetland city'	Relevant files (e.g., minute of the meeting approving the committee)
8.		Water management		Has incorporated wetlands conservation and restoration in water management infrastructure development and water pollution control efforts	Measures to prevent/ control non-point and point source pollution, measures to secure the quantity of important wetlands, water quality guidelines
9.		Wise use of wetlands		Has wisely used the wetlands, taking into full account of wetlands conservation and wetlands ecological, economic and cultural functions	Related activities and reports

S. N.	Indicator type	Indicator name	Score of each item (1 to 10)	Components	Supporting documents
10.	Public education and volunteer system	Wetland publicity and education		Has established a special center for wetland publicity & education, and conducted campaigns on wetlands conservation and wise use	Establishment of Wetlands Information Center, Awareness Campaigns, Activities conducted on World Wetlands Day
11.		Wetlands conservation volunteer system		Has established a wetlands conservation committee, sub-committee, wetland clubs and other volunteer groups, and actively engaged the general public in wetland conservation and other activities related to knowledge dissemination	Wetland conservation committee/ sub-committees; number of clubs, bird-watching groups/ societies, Community Based Organizations, etc.
12.	Management of important wetland site	Wetlands protection or restoration measures		Has taken wetland protection/ restoration measures on important wetland site and has achieved good results	Wetland related project approval letter; proof on fund input; implementation/ results of protection or restoration projects
13.		Wetlands-monitoring, management plan, ecological status, early-warning mechanism		Has conducted assessment and monitoring of wetlands, prepared 'wetland health report card', prepared management plan, taken measures to prevent and address the sudden and catastrophic incidents	Wetland monitoring data, monitoring reports, Wetland Health Report Card
14.		Negative indicators		Conversion of wetlands, dumping/ draining wetlands/ changing wetlands use, permanently blocking the water source of wetlands; discharging pollutants; wetlands resource exploitation	Journal articles/ newspapers, reports

The indicators were evaluated by assigning a score to each indicator on a scale from 1 to 10. This rating system allowed for a quantitative assessment of each indicator's performance and significance. A score of 1 indicates poor performance or low significance, while a score 10 indicates excellent performance or high significance.

Data analysis

The scoring was done based on the information gathered through the questionnaire survey to facilitate the nomination process for Ramsar Wetland City Accreditation. Each indicator type was assigned a score ranging from 0 to 10. The city attaining the highest score secured the top rank, while the one with the lowest score was positioned last, aiding in the prioritization of nominations.

Results

Among the studied cities with wetlands, the Pokhara Metropolitan City ranked top prioritized city for Ramsar Accreditation followed by the Sandakpur Municipality, the Bharatpur Metropolitan City and the Ghodaghodi Municipality while the Kapilvastu Municipality ranked the lowest (Table 5, Annex 1).

Table 5: The cities potential for Ramsar World Wetland City Accreditation with their respective calculated indicator value

S. N.	City	Indicator value	Remarks
1.	Pokhara Metropolitan City	123	First
2.	Sandakpur Rural Municipality	115	Second
3.	Bharatpur Metropolitan City	110	Third
4.	Ghodaghodi Municipality	111	Fourth
5.	Kapilvastu Municipality	108	Fifth

Discussion

Wetlands of urban areas have been directly linked with human population from the beginning of human civilization, and are the base of sustainable cities that provide economic benefits and human well-being (Alikhani *et al*., 2021). Wetlands play an important role in providing ecosystem services to the urban area, and there is increasing evidence of the importance of managing and restoring urban wetlands (Tong *et al*., 2007). Ramsar established the scheme of 'wetland city accreditation' to encourage cities close to wetlands to promote, conserve and wise use of wetlands. This accreditation aims to encourage regional and international cooperation and to generate sustainable socio-economic benefits for local populations (Ramsar Resolution XII.10, 2015).

All five cities examined in proximity to the wetlands are anticipated to be considered for inclusion in the "world wetland city" list during the accreditation process. They meet the majority of the criteria set by Ramsar for 'wetland city accreditation.' The local governments in these cities have actively formulated plans and regulations for conserving and managing their wetlands designated as Ramsar Sites that provide essential ecosystem services for the cities. These cities have worked towards organizing awareness-raising campaigns related to wetlands conservation, conducting educational programs, and celebrating "wetlands day". These cities have also implemented policies for wetlands conservation and wise use; actively engaged in waste management and sanitation efforts; managed the wetlands for multiple functions like recreation, flood regulation, and different provisioning ecosystem services; and established special committees and educational centers for wetlands conservation. Moreover, these cities have established a division related to wetlands conservation which works on formulating plans, regulations, monitoring wetlands and conducting different programs engaging the local people for better wetlands conservation.

1. Pokhara Metropolitan City

The Lake Cluster of Pokhara Valley (LCPV) comprising nine lakes, including the renowned Phewa Lake, is under the authority of the Pokhara Metropolitan City (PMC) office. The LCPV offers various ecosystem services, creating income-generating opportunities for trade and business communities (MoFE, 2018b). Additionally, these wetlands serve as crucial drinking water sources for local residents and hold significant biodiversity, fishery, irrigation, and hydropower values in the Pokhara Valley. The LCPV hosts 168 species of birds, including globally threatened migratory birds, such as the critically endangered Baer's Pochard (*Aythya baeri*) and Indian vulture (*Gyps indicus*) (MoFE, 2018b). Furthermore, the LCPV records 28 fish species, 11 frog species, 28 reptile species, and 36 mammal species (Tamrakar, 2008). Overall, 362 plants species have been recorded in the lake cluster, with 286 terrestrial species and 61 aquatic species including 32 orchids, of which 10 are endemic. Likewise, Dipang Lake, one of the lakes of the LCPV, hosts 156 insect species, including 29 dragonfly species. Notably, two new species have been documented in Nepal: the Indian Violet Dartlet (*Aciargion hisopa*) and the Orange-tailed Marsh Dart (*Ceriagrion cerinorubellum*) (K.C. & Gurung, 2020). The surrounding forests of each lake basin are overseen by the communities through a Community Forest User Group (CFUG). PMC is the key implementing institution for the management of the Lake Cluster of the Pokhara Valley. The local government works for wetland conservation and its wise use to maintain and sustain ecosystem services and conserve indigenous biodiversity, socio-economic prosperity of the lake-basin, minimizing degradation by climate resilience programs, inclusivity of local people in implementation, practice, governance, and execution of plan, policy and regulations.

The Pokhara Valley Lake Conservation Committee collaborates with the individual lake conservation committees within the valley. Additionally, the Lake Conservation and Development Authority (LCDA), founded in 2020, serves as an institution dedicated to the conservation and sustainable utilization of wetlands in Gandaki Province. The LCDA actively promotes an ecosystem-based approach to wetland management, focusing its initiatives on the restoration and improvement of all nine lakes within the Pokhara Valley. Furthermore, a "women's lake conservation committee", functioning as an NGO, has been established for the preservation of the Gunde and Khaste-Neureni lakes within the Pokhara Valley. Additionally, the Pokhara Metropolitan City is actively involved in several crucial initiatives which include the enforcement and restoration of laws, budget allocation for the implementation of management plans, execution of annual planning and monitoring as part of the management plan, development and transfer of technology tailored for the sustainable conservation and prudent use of the LCPV, establishment of a knowledge-based management system derived from research, and dissemination of knowledge through appropriate mechanisms. The city also focuses on capacity building for local government and non-government personnel, as well as communities, ensuring their active involvement in the sustainable conservation and judicious utilization of the lake cluster. This comprehensive approach extends to engaging community organizations and lake-dependent communities to promote the sustainable conservation and wise use of lake resources for their collective prosperity (MoFE, 2018b).

2. Sandakpur Rural Municipality

The Mai Pokhari area consist of a botanical garden, a religious forest, and community forests (Rijal, 2011). The Mai Pokhari was a natural, rainfall-fed lake, but at present, it is fed by Puha River. The surrounding vegetation serves as a habitat for notable epiphytic orchids and supports the protected species, including the White-rumped Vulture (*Gyps bengalensis*), Leopard cat (*Prionailurus bengalensis*), Eurasian Otter (*Lutra Lutra*), and endemic species like the Variegated Mountain Lizard (*J. variegata*). Additionally, the site holds substantial religious and cultural importance, serving as a convergence point for Buddhism, Hinduism, and Mundhum (animism) traditions. Wetlands provide habitat to wildlife and endemic plants, and support the livelihood of

the local communities (Siwakoti, 2006; Bhattarai, 2018; Kafle & Savillo, 2009). The municipality has included the Mai Pokhari in its annual plan for conservation, protection, and management. Different activities are currently in progress for the proper management of the wetland, such as gradual removal of exotic pine trees and exotic fish from the Mai Pokhari.

The Mai Pokhari management plan was formulated in 2012. Additionally, the local government initiated a community-centric wetland conservation project, and established a dedicated "Mai Pokhari Wetland Conservation Committee". Moreover, a wetland education center was established, complemented by an awareness campaign on wetlands. Other efforts by the local government in the conservation and management of the Mai Pokhari wetlands include heightening public awareness about the significance of wetlands and ecosystem services. They also focus on enhancing coordination among the Site's community forest user groups through workshops and awareness campaigns alongside providing capacity building on wetland management (WWF, 2008).

3. Kapilvastu Municipality

The local government of the Kapilvastu Municipality has formulated environment and wetland-related regulations for the conservation and management of Jagadispur Reservoir. The municipality is also directly involved in formulating and managing different committees, forums, and centers, such as Jagadispur Lake Conservation Program, Jagadispur Lake Management Forum, and Jagadispur Lake Conservation & Tourism Promotion Center for the conservation of Jagadispur Reservoir. Additionally, the municipality engages in monitoring and restoration initiatives, including sediment removal, measures to enhance water quality, wetland biodiversity conservation, livelihood improvement, tourism development, agro-biodiversity conservation, and more.

Constructed in 1979 for irrigation purpose, Jagadispur Reservoir is one of the largest human-made wetlands in Nepal. It receives water from the Banganga River in the Churia Hills catchment. The reservoir, with an area of 157 ha, can store 4.7 cubic meters of water, facilitating irrigation across 6070 hectares of farmland. The total catchment area of the reservoir is 225 ha, which was also designated as a Ramsar Site in 2003 (Thapa & Lindner, 2023). The reservoir provides shelter for an assemblage of some rare, endangered, monogenetic plant species that hold importance for the conservation of a number of important flora and fauna, e.g. endangered plant Serpentine (*Rauvolfia serpentine*), rare Pondweed (*Potamoge tonlucens*), threatened Lotus (*Nelumbo nucifera*), endangered 'Sarus Crane' - the tallest flying bird (*Grus antigone*), and resident stork species (*Open-bill and White-neck*), and also serves as the buffer zone for the migratory birds (Thapa & Saund, 2013; Siwakoti & Karki, 2010). Moreover, in 2022, Jagadishpur Reservoir was declared a bird sanctuary, marking the second bird sanctuary in Nepal after the Ghodaghodi bird sanctuary in the Kailali District.

4. Ghodaghodi Municipality

The Ghodaghodi Lake, situated between the Bardiya National Park to the east and the Suklaphanta Wildlife Reserve to the west, serves as a crucial corridor for wildlife movement between these protected regions and the Tarai and Siwalik Hills. The surrounding forest plays a vital role in facilitating this wildlife migration. The wetlands system is bordered by Sandepani, Darakh, and Ramshikharjhala villages with a combined population of 43,687. The indigenous Tharu community, constituting 51.3% of the local population, traditionally relies on wetland resources. The wetland holds significant cultural and religious value for the Tharu community, influencing their way of life. The local community relies on the wetlands for various activities, including fishing, livestock grazing, and gathering fodder, firewood, and non-timber forest products (NTFPs). Furthermore, the water from the wetlands is utilized for irrigating the surrounding agricultural land (Kafle, 2018; Siwakoti & Karki, 2010).

The Ghodaghodi Lake, which has been declared as the first bird sanctuary of Nepal in 2022, is

the largest natural ox-bow lake in the Tarai, and has finger-like projections with associated marshes and meadows. The wetlands area harbors 473 species of plants, including critically endangered tree species "Bijayasal" (*Pterocarpus marsupium*) and over 95 aquatic macrophytes (IUCN, 2004) and wild rice *(Oryza rufipogon*). Similarly, about 16% avifauna (140 species) of the country, including critically endangered White-rumped Vulture (*Gyps bengalensis*), Slender-billed Vulture (*G. tenuirostris*), endangered Ferruginous Duck (*Aythya nyroca*), Lesser Adjutant Stork (*Leptotilos javanicus*) and nearly 1% population of Cotton Pygmy-goose (*Nettapus coromadelianus*) have been reported from the Ghodaghodi wetland area (Baral 1992: from Kafle *et al*., 2007). Similarly, it supports several species of vulnerable animals such as Smooth-coated Otter (*Lutra perpiscillata*), Common Otter (*L. lutra*), Marsh Crocodile (*Crocodyl uspalustris*), Golden Monitor Lizard (*Varanus flavescens*), and so on (IUCN, 2004). For generations, indigenous communities have been incorporating wetlands resources into their livelihood activities. Their knowledge encompasses the harvesting, utilization, and management of wetlands resources, along with various social and cultural beliefs, taboos, and religious practices (Adhikari & Poudel, 2018).

The local government has also included conservation and management of the Ghodaghodi Lake Area in its fiscal year plan & program and conducted several programs on its management, including restoration and monitoring of the lake. The municipality is also directly involved in formulating and managing different committees, forums and a center such as Ghodaghodi Area Conservation and Public Awareness Forum, Bird Conservation Network (Sukhad), Basanta Protected Forest Council, Community Forest Users Group (CFUG) and other community-based organizations for its conservation. Different organizations collaborate with the municipal bodies in conducting community-based conservation awareness programs, various technical trainings and workshops for forest user groups and home stay management for the local communities, targeting forests protection and biodiversity conservation. Likewise, local communities and community-based organizations (CBOs) play an active role in conservation endeavors, engaging in community forestry initiatives and programs that focus on local institutional development. Initiatives such as the establishment of eco-clubs and women's groups are undertaken. IUCN Nepal and WWF Nepal have been instrumental in guiding and supporting these efforts for the wise use and sustainable management of wetlands resources in the area. A participatory community-centered management plan has been prepared for the conservation of the lake area. Furthermore, there are ongoing initiatives to form eco-clubs, women's groups, and a community-based anti-poaching unit committed to wildlife conservation in the area.

5. Bharatpur Metropolitan City

The Beeshazar and Associated Lakes, designated as a Ramsar Site, is situated within the buffer zone of Chitwan National Park. Positioned in the heart of the Barandabhar Corridor Forest, a crucial wildlife corridor linking Chitwan National Park (CNP) to the north and Valmiki Tiger Reserve in Bihar, India, to the south. This lake is bordered by the East-West Highway to the north, Rapti River to the south, some villages of Ratnanagar Municipality to the east, and Bharatpur Metropolitan City to the west (Thapa, 2011; Thapa & Tuladhar 2021). The lake system is surrounded by seven buffer zone community forests (BZCF). This region serves as the habitat for numerous endangered or threatened wetlands fauna, including various migratory birds (Adhikari et al., 2018), globally threatened species such as the Royal Bengal Tiger (*Panthera tigris*), Great One-horned Rhino (*Rhinoceros unicornis*), and White-rumped Vulture (*Gyps bengalensis*). Beeshazar and Associated Lakes records a total of 17 fish species, including the threatened Swamp hurb (*Puntius chola*), the endemic Asiatic Knife Fish (*Notopterus notopterus*), and the Large Razorbelly Minnow (*Oxygaster bacaila*). Moreover, the site supports the largest population of Marsh Crocodile (*Crocodylus palustris*).

For over a decade, management activities have been performed by the Beeshazari Lake Management Committee (BLMC) and the

Chitwan National Park Office (CNP) for the conservation of the Beeshazar and Associated Lakes. Furthermore, the local communities actively engage in the manual removal of the invasive species collaborating with the relevant buffer zone user committees, BLMC, and the CNP. Boating is strictly prohibited in the lake. The site management plan for the Beeshazar and Associated Lakes was also formulated by the DNPWC in 2014, and currently, the action plan is under revision. Most of the programs are conducted by the BLMC and the CNP.

Among the aforementioned five different cities and their corresponding wetlands studied, Pokhara Metropolitan City stands out for its commendable efforts in wetland conservation. The municipality has excelled in involving the local communities in decision-making processes, enhancing human well-being through the sustainable use of wetland resources, and integrating comprehensive management and conservation programs into its overall plan. In contrast, some other wetlands exhibit deficiencies, such as the absence of educational and information centers, awareness programs initiated by municipal authorities, a lack of proper monitoring and conservation plans, and insufficient utilization of wetlands resources to sustain human well-being. These factors collectively position Pokhara Metropolitan City as a top-priority city for 'wetland city accreditation'.

Conclusion

The 'wetland city accreditation' not only acknowledges but also provides favorable branding opportunities for cities demonstrating strong and positive connections with wetlands. Among the five cities examined in this study, Pokhara Metropolitan City is dignified to receive 'wetland city accreditation' recognition, while Sandakpur, Ghodaghodi, Kapilvastu, and Chitwan lag behind, falling short in fulfilling certain indicators for accreditation. These cities must exert additional efforts in alignment with the Ramsar guidelines and criteria, as outlined in Ramsar: Resolution XII.10, 2015, to attain the national standard for accreditation.

References

Adhikari, J. N., Bhattarai, B. P., & Dhakal, D. N. (2018). Conservation value of Beeshazari Lake: an insight into diversity and abundance of wetland birds. *Our Nature*, 16 (1): 17–26.

Adhikari, S.& Poudel, A. (2018). Indigenous knowledge for wetland conservation and resource utilization: a case study of Ramsar Sites, Nepal. pp. 80.

Alikhani, S., Nummi, P., & Ojala, A. (2021). Urban wetlands: a review on ecological and cultural values. *Water*, 13(22): 3301.

Baral, H. S. (2008). Birds of Jagdishpur Reservoir, Nepal.*Forktail* (Journal of Asian Ornithology)*,* 3: 115–119.

Bhattarai, B. (2006). Conservation Implications of Beeshazari Lake Cleaning Campaign.

Hui, W., MingXin, L., YaWen, Z., & YaLi, W. (2017). International wetland city accreditation and suggestions for its implementation in China. World Forestry Research, 30 (6): 6–11

Inskipp, C., Baral, H. S., Inskipp, T., Khatiwada, A. P., Khatiwada, M. P., Poudyal, L. P., & Amin, R. (2017). Nepal's national red list of birds. *Journal of Threatened Taxa*, 9 (1): Article 1.

IUCN. (2004). A Review of the Status and Threats to Wetlands in Nepal. International Union for Conservation of Nature, Kathmandu, Nepal, pp. 78.

K.C., S. &Gurung, J. (2020). Records of dragonflies and damselflies (Insecta: Odonata) of Dipang Lake, with two new records to Nepal. *Journal of Threatened Taxa*. 12: 15955–15961.

Kafle, G. (2018). Avifaunal Survey and Vegetation Analysis at Ghodaghodi Lake of Nepal. 35.

Kafle, G. and Savillo, I. T. (2009). Present status of Ramsar Sites in Nepal. *International Journal of Biodiversity and Conservation*,1 (5): 146–150.

Kafle, G., Balla, M., Baral, H., &Thapa, I. (2007). Ghodaghodi Lake Area: Resources, Opportunities and Conservation. 16, 1–6.

Lamichhane, S., Kandel, R. C., Pokharel, C. P., Dahal, T. P., & Bhattarai, S. (2016). Biodiversity profile of Beeshazar and associated lakes, Chitwan. Department of National Parks and Wildlife Conservation, Chitwan National Park, National Trust for Nature Conservation, NORAD(Norwegian Agency for Development Cooperation), and Ramsar Site International.

Lamsal, P., Pant, K. P., Kumar, L., &Atreya, K. (2014).Diversity, uses, and threats in the Ghodaghodi Lake Complex, a Ramsar Site in western lowland Nepal. *ISRN Biodiversity*, 2014: 1–12. https://doi.org/10.1155/2014/680102

MoFE. (2018a). *National Ramsar Strategy and Action Plan, Nepal (2018–2024)*. Ministry of Forests and Environment, Singha Durbar, Kathmandu, Nepal

MoFE. (2018b). Integrated Lake Basin Management Plan of Lake Cluster of Pokhara Valley, Nepal (2018–2023).Ministry of Forests and Environment, Kathmandu, Nepal.

Pradhan, N. & Heimstad, R. (2018). Diversity and local status of bryophytes in Mai Pokhari of Ilam district, east Nepal. *Journal of Natural History Museum*, 30: 39–46.

Rajbanshi, K.G. (2013). Bio-diversity and distribution of fresh-water fish of central Nepal Himalayan region. *Nepal Fisheries Society*, pp. 136.

Ramsar (2015). Ramsar Wetland City Accreditation. https://www.ramsar.org/activity/wetland-city-accreditation [Retrieved on October 31, 2022]

Ramsar (2022). Ramsar Wetland City Accreditation. https://www.ramsar.org/activity/wetland-city-accreditation

Ramsar Resolution XII.10. (2015). Wetland City Accreditation. Resolution XII.10.Rijal, K. (2011). Wetland and Biodiversity Conservation: a case study on Maipokhari, Ilam [PhD Thesis]. The Central Department of Sociology/Anthropology.

Shah, D. N., Tachamo-Shah, R. D. T., & Pradhan, B. K. (2011). Diversity and community assemblage of littoral zone benthic macroinvertebrates in Jagdishpur Reservoir. *Nepal Journal of Science and Technology* 12:211–219.

Shrestha, B., Shrestha, S., Shrestha, A., & Khadka, U. (2020). Ramsar Sites in Nepal: conservation, present scenario, biodiversity value and threats. *Journal of Wetlands Ecology*, 2020: 15. https://doi.org/10. 3126 /jowe.v2020i0.24782

Siwakoti, M. & Karki, J.B. (2009). Conservation status of Ramsar Sites of Nepal Terai: an overview. *Botanica Orientalis* (Journal of Plant Science), 6: 76–84

Siwakoti, M. & Karki, J. B. (2010). Conservation status of Ramsar Sites of Nepal Terai: An overview. *Botanica Orientalis* (Journal of Plant Science), 6. https://doi.org/10.3126/botor.v6i0.2914

Siwakoti, M. (2006). An overview of floral diversity in wetlands of Terai region of Nepal. *Our Nature*, 4 (1): 83–90.

Thapa, J. & Saund, T. (2013).Water Quality Parameters and Bird Diversity in Jagadishpur Reservoir, Nepal. *Nepal Journal of Science and Technology*, 13. https://doi.org/10.3126/njst.v13i1.7453

Thapa, K. & Lindner, A. (2023). Beyond protected areas: assessing management effectiveness of a Ramsar Site in Nepal. *Diversity*, 15(5):593. https://doi.org/10.3390/d15050593

Thapa, K. & Tuladhar, S. (eds.) (2021). *Connecting Corridors*.World Wildlife Fund Nepal, Kathmandu, Nepal.

Thapa, T. B. (2011). Habitat suitability evaluation for leopard (*Panthera pardus*) using remote sensing and GIS in and around Chitwan National Park, Nepal. Faculty of Wildlife Sciences, Wildlife Institute of India, Dehradun and Department

of Biosciences, Saurashtra University, Rajkot, Gujrat, India. (Ph.D. Thesis), pp. 252.

Tong, C., Feagin, R., Lu, J., Zhang, X., Zhu, X., Wang, W., & He, W. (2007). Ecosystem service values and restoration in the urban Sanyang Wetland of Wenzhou, China. *Ecological Engineering*, 29: 249–258. https://doi.org/10.1016/j.ecoleng.2006.03.002

WCN. (2020). Wetlands: a source of rich biodiversity. Wildlife Conservation Nepal. https://wcn.org.np/ feature/wetlands--a-source-of-rich-biodiversity/4/[Retrieved on January 6, 2023]

WWF. (2018). Ramsar announces first 18 wetland cities. World Wildlife Fund. https://wwf.panda.org/ wwf_news/ ?337222/Ramsar-announces-first-18-Wetland-Cities

Annex 1: Indicators based on Ramsar Guidelines for wetland city accreditation are scored for selected cities. [POK- Pokhara Metropolitan City, SAN- Sandakpur Rural Municipality, KAP- Kapilvastu Municipality, GHO- Ghodaghodi Municipality, BHA- Bharatpur Metropolitan City]

SN	Indicator type	Indicator name	Value of each item				
			POK	SAN	KAP	GHO	BHA
1	Resources baseline	Important wetland site	10	10	10	10	10
2		Wetland rate	9	9	8	7	9
3	Protection and management conditions	Wetland protection rate	9	9	7	7	8
4		Wetland conservation plan	10	7	6	7	6
5		Special organization on wetland conservation	9	9	9	9	8
6		Wetland conservation regulation	10	10	10	10	10
7		Assessment indicator system on eco-civilization	7	7	7	5	7
8		Organization structure	0	0		0	0
9		Water management	8	7	6	8	8
10		Wise use of wetlands	9	8	7	8	8
11	Public education and volunteer system	Wetland publicity and education	9	8	6	8	6
12		Wetland conservation volunteer system	8	7	8	8	8
13	Management of important wetland site	Wetland protection or restoration measures	8	8	8	8	7
14		Wetland monitoring and management plan and ecological status early-warning mechanism	8	7	8	8	8
15		Negative indicators	9	9	8	8	7
		Total	123	115	108	111	110