

# Good Practices Handbook for INTEGRATING URBAN DEVELOPMENT AND WETLAND CONSERVATION





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# 1 HANDBOOK SUMMARY

## A Handbook purpose

This Handbook provides guidance to individuals, businesses, organizations or government involved in the design, planning, management and/or construction of urban wetlands.

By showcasing examples from all over the world and sharing valuable experiences, it is hoped that the best practice principles, illustrated throughout the handbook, will be widely adopted.

Whether it is a recognised wetland of international importance or a humble pond in the middle of a busy park, good planning, design and management practices go hand in hand with healthy wetlands, and we are collectively responsible for safeguarding the health of our wetlands in order to guarantee the vital role that they play in our lives.

The Handbook has been produced as a result of discussions held at the “Good Practices for Integrating Urban Development and Wetland Conservation Workshop” in Changshu (China) in January 2018.



## B Handbook structure

The Handbook is divided into four main sections:

- Background: introductory chapter about wetlands, their role in the urban environment and the Ramsar Convention on Wetlands
- Planning and design: best practice in integrated urban and wetland planning and design
- Construction and management: best practice in construction and wetland management
- Recommendations to policy makers, planners and developers

The Handbook also contains a glossary of commonly used terms and useful links for further reading.

## C Case studies

The following case studies are referenced within the Handbook.

- Changshu City, China
- Colombo, Sri Lanka
- Haikou, China
- Kranji Marshes, Singapore
- London Wetland Centre, United Kingdom
- Mai Po Inner Deep Bay Ramsar Site, Hong Kong S.A.R., China
- Manila Bay, Philippines
- New Orleans, United States
- Panama City, Panama
- Suncheon Bay, Republic of Korea
- Sydney Olympic Park, Australia
- Toyooka City, Hyogo, Japan



Colombo, Sri Lanka





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## 2

## BACKGROUND

### A Wetlands

Wetlands are places where water meets land and are found from the coast to the mountains. Typically, wetlands have water near or above the ground surface for all or some time of the year. As a result, the soils develop differently in wetlands and the plants and animals that live in wetlands are adapted to changing water levels.

Wetlands are defined as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres” (Ramsar, 2018).

Wetlands are one of the world’s most productive ecosystems. They are also vital for human survival and play a valuable role in providing numerous economic, ecological and wellbeing benefits, known as wetland ecosystem services.

Although wetlands are crucial for providing important ecosystem services such as food provision, protecting us from flooding, providing clean water and storing carbon they have traditionally been undervalued, which has resulted in widespread loss and degradation. This has led to a loss in the services that maintain our health and wellbeing and also a loss in biodiversity.

64% of the world’s wetlands have disappeared since 1900. In some regions, like Asia, the loss is even higher. Inland wetlands (including urban wetlands) are disappearing at a faster pace than coastal ones, but the overall trend is clear that wetlands and their benefits are being lost.



# The Ramsar Convention

The International Convention on Wetlands, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Ramsar is the oldest of the modern global intergovernmental environmental agreements. The treaty was negotiated through the 1960s by countries and non-governmental organizations concerned about the increasing loss and degradation of wetland habitats. It was adopted in the Iranian city of Ramsar in 1971 and came into force in 1975.

The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world" (Ramsar, 2018).

Under the "three pillars" of the Convention, the Contracting Parties commit to:

- work towards the wise use of all their wetlands
- designate suitable wetlands for the list of Wetlands of International Importance (the "Ramsar List") and ensure their effective management
- cooperate internationally on transboundary wetlands, shared wetland systems and shared species



That Luang Marsh, Laos



## © Urban wetlands

Today, over half of the world's population lives in urban areas and this is expected to increase in the future with over 60% living in cities by 2050. As more and more people move to cities and as populations grow there will be an increased challenge to make our urban areas sustainable and healthy places to live.

Urban wetlands are those that have survived historical development around which urbanisation gradually took place or that are newly constructed in an urban setting. Urban wetlands are essential to making cities liveable. During storms urban wetlands absorb excess rainfall, reduce flooding and minimise subsequent infrastructure and economic damage. Urban wetlands also act as a filter for pollution improving water and air quality, and help moderate extreme city temperatures.

At present development of human settlements is a major concern for wetland conservation and wise use. As cities grow and demand for land increases, there is a tendency to encroach on wetlands or cause direct or indirect impacts on nearby wetlands. Water and other natural resources associated with wetlands also attract the human settlements and economic activities, which result in the degradation of those wetlands (Ramsar, 2013).

When conserved and sustainably used, urban wetlands can provide cities with multiple economic, social and cultural benefits. They are prize land, not wasteland, and therefore should be integrated into the development and management plans of cities.

In summary, some of the exceptional benefits provided by urban wetlands include:

- Water supply
- Flood regulation



Ras Al Khor Wildlife Sanctuary, Dubai

- Climate moderation
- Wastewater treatment
- Habitat for biodiversity
- Agriculture and aquaculture
- Tourism
- Recreation and leisure
- Education
- Culture and heritage
- Research
- Human wellbeing



## D i. Existing wetlands

Human settlements have historically evolved around wetlands and watercourses. Increased urbanisation has put natural wetlands under threat from conversion to land for development or through degradation from pollution.

Wetlands located in the urban and urban fringe are particularly sensitive to unsustainable use; they are usually not included within urban planning decisions and are often not the responsibility of a single agency, thus leading to poor governance.

Urban wetlands need to be conserved, restored and managed to maintain the multiple services they provide. However, the fact that they are not usually included within urban planning decisions makes their conservation and wise use a very challenging issue. Wetland conservation needs to be mainstreamed into urban decision making.

The main threats to urban wetlands include:

- Draining and infilling for housing or other developments
- Loss of biodiversity by conversion to open public parks and recreational lakes
- Solid waste and wastewater pollution
- Channelization of rivers and streams
- Hydrological disconnection of the wetlands from watercourses
- The use of hard infrastructure solutions rather than green infrastructure
- Invasive species resulting in the loss of native species



Sustainable wetland living, Nepal

The consideration of wetlands within urban planning needs to be integrated fully with wider elements of spatial planning, such as Integrated River Basin Management (Ramsar, 2013).





## ④ ii. Wetlands within new developments

Urban developments, if designed with green infrastructure and environmental sensitivity at their heart, can deliver numerous financial, environmental and socio-cultural benefits.

Targeted at places where it can have a positive environmental impact, and designed integrating space for both wildlife, people and prosperity, newly built developments can make a positive contribution to nature and promote health and wellbeing of citizens.

The use of green infrastructure (such as such as Water Sensitive Urban Design approaches, e.g. Sustainable Drainage Systems) in new developments is recognised as a key approach to retrofitting wetlands into the urban environment; green infrastructure plays a key role in improving the quality of surface water and storing stormwater therefore reducing flooding.

In the case of housing developments in particular, the implementation of green infrastructure is known to deliver benefits for wildlife, residents, the economy and developers. Some of the key “benefits for all” include:

- Benefits for wildlife: creation of habitat for biodiversity; habitat connectivity
- Benefits for residents: enjoyment of nature; sense of community; contributing to health and wellbeing
- Benefits for the economy: financially sustainable green infrastructure; employment; reduced health care costs
- Benefits for developers: higher market value; satisfied customers; improved environmental performance (The Wildlife Trusts, 2018)



## D Trends in urban development

According to recent estimates, nearly 4 billion people now live in urban areas (United Nations, 2014). This growth presents enormous environmental challenges as increased demand for land and resources has a direct detrimental effect on wetlands.

Whilst cities currently only occupy 2% of the Earth's surface, they use 75% of the world's natural resources and generate 70% of all the waste produced globally (ICLEI, 2010).

Continuing population growth and urbanisation, are projected to add 2.5 billion people to the urban population by 2050 (United Nations, 2014).

With an ever increasing global urban population, sustainable development challenges will be increasingly concentrated in cities, especially in the lower income countries where the pace of urbanisation is predicted to be fastest.

Wetlands should be considered as solution providers within an urban and peri-urban context, which can mitigate risks from a changing climate, support food production for a growing population and generate income through tourism and recreation (Ramsar, 2013).





## E Planning context and drivers of an integrated approach

There is a growing body of evidence that integrated urban planning can enable densification and agglomeration and at the same time reduce per-capita resource use (UN-Habitat, 2012 in Ramsar 2013).

During the Ramsar Convention's 11th Conference of the Parties (COP 11) in 2012, Resolution XI.11 was formulated which recognised that urban development should be planned and managed in a sustainable way and invited all relevant stakeholders to raise awareness of, and provide guidance on, the importance of wetlands as providers of benefits to the urban population.

The principles adopted in Resolution XI.11 provide a sound basis for ensuring the wise use of wetlands within urban and peri-urban environments. However, the Resolution also emphasised that the principles must be implemented in towns and cities across the world if this is to happen (Ramsar, 2013).

The drivers of sustainable urban wetland planning and management have been identified as:

- International and national city initiatives and accreditations such as Wetland City, Sponge City, City and Biodiversity, and Garden City
- Recognition of the importance of small wetlands, in addition to larger scale wetlands, within urban planning
- Water quality improvements

- Flood management
- Water resource conservation
- Remediation of urban areas
- Wetland agriculture and aquaculture – wetland products
- Tourism



Wetland education, WWT London Wetland Centre, United Kingdom



## 3 PLANNING AND DESIGN

### A Best practice in integrated urban and wetland planning and design

The ecosystem services provided by wetlands and green infrastructure in general, are often undervalued (and even ignored) during the planning and design stages for urban developments.

The need to integrate green infrastructure in the urban environment has become more evident, especially where sustainability has been set as an objective for the development. Wetlands play a key role to achieve sustainability in cities, and it is crucial to identify and integrate the wider benefits they provide.

Urban planning and design should explicitly include wetlands as natural infrastructure for nature conservation, water management (stormwater management, water supply and water treatment) and recreation. Examples, showcased in this manual, demonstrate how the integration of wetlands in the urban environment can deliver tangible benefits for the economy, biodiversity and local communities.

The benefits provided by wetlands in the urban environment have been illustrated in a series of case studies (see section 3b) including key successes and lessons learnt for each example.

The following general principles have been identified as key to ensuring an integrated approach to urban and wetland planning and design:

- Legislative and regulatory measures for wetland protection
- Wetland specific management planning
- Early engagement with stakeholders
- Mapping and demarcation of all wetland features
- Monitoring and baseline surveys of wetland physical, ecological and social characteristics
- Specific wetland regulatory and management agencies for wetlands
- Joint committees for development and environmental protection
- Coordination among relevant government agencies that have a role in wetland planning
- Partnership among private and public bodies within wetland planning and design
- Communication, education and public awareness raising regarding the importance of wetlands
- Community involvement in planning and design of wetland features
- Appropriate economic activities to promote sustainable livelihoods such as tourism or aquaculture, within wetland areas
- Management and activity financing through subsidies, payment for ecosystem services, economic activities
- The use of green infrastructure means better homes for people and the creation of habitat for wildlife



Key case study lessons for urban wetland planning and design		
Lessons learnt	Example	Page
Involve all stakeholders from the beginning to ensure that everyone has their voice heard and can provide input	Panama	25
Set environmental objectives and targets as well as regulations (by government)	China	34
Adapt the development to the existing environment (not the other way around)	Australia	28
Holistic thinking is key - financial, cultural, social and environmental considerations need to be taken into account from the beginning	Australia	28
Negative experiences from the past can serve as a “wake-up” call for government to change attitudes and consider wetlands as protection against floods and as stormwater storage	United States	26
At the design stage, take into account the restoration of the ecological functions; use native species during restoration	China	27
Ensure designs are in tune with the project objectives and integrate key elements to be successful (e.g. wildlife and culture; people and nature; legacy; facilities and operations; and learning)	United Kingdom	36
Establish partnerships between different sectors (non-governmental, government and private businesses) as it proves to be highly beneficial for the successful delivery of the project	United Kingdom	36
Establish a committee to oversee the process through to construction as it can be highly beneficial in ensuring project objectives are achieved	Republic of Korea	37
Wetlands cannot be conserved as stand-alone water bodies without the involvement of the community. Hence, the use of consultative and participatory methods during design stage should enhance restoration outcomes	Sri Lanka	41
Involvement of multidisciplinary teams ensures integrated plans	Sri Lanka	41



- A. The team looking at a map of the area
- B. Scoping mission in Juan Diaz, Metro Park
- C. Panama City's mangroves protecting high end real estate

## Panama City, Panama

The Juan Diaz River runs through a densely populated district in Panama City. It ends in a large strip of mangroves, designated as a Ramsar Site. However, most of its wetlands have been encroached and channelized due to development, which has led to an increased frequency of flood events.

Every year 236,000 people are at risk from flooding. Due to these recurrent floods Panama ranks 1st on the Local Disaster Index of Latin America.

Wetlands International coordinated the Water Dialogues program, which mobilized the community and stakeholders to work together on sustainable flood solutions. This led to the incorporation of wetland reservoirs, with biodiversity benefits, into planning.

It was shown that flood risk interventions do not need to be ugly storage ponds but can be developed as water plazas, recreational green spaces with biodiversity benefits, which improve human well-being as well as increase property value.

**Location:**  
Panama City, Republic of Panama.

**Size:**  
The Juan Diaz watershed is 120km<sup>2</sup> and includes the Juan Diaz River, its floodplains, mangroves and mudflats.

**Ownership:**  
Mangrove protected area and riverbed: national government.  
Urban areas: privately owned.

**Stakeholders:**  
Community groups; private developers; national authorities; local authorities (Communal Boards, different municipal departments); knowledge institutes (Universities, research institutes, Regional Ramsar Centre CREHO); and environmental NGOs.

**Local community:**  
The neighbourhood groups were involved in the dialogue sessions along with developers and government officials. They participated in the drainage-system clean-up campaign and were invited to speak at an international forum.

**Funding:**  
Funded by the Municipality of Panama City, the Dutch Enterprise Agency RVO, the Inter-American Development Bank (IDB).

**Wetland type:**  
River floodplain wetlands; mangroves; mudflats; and wetland biodiversity reservoirs.

**Drivers:**  
Recurrent and more frequent floods; community mobilisation; a new municipal administration; engagement with international experts.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
		✓	✓	✓	✓		✓	✓	✓		✓	





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B



C

- A. Before wetland restoration
- B. Restored wetland habitat
- C. Restored wetland habitat

## New Orleans, United States

The planning and protection of wetlands and other natural systems, falls under the overall masterplan for New Orleans. A community participation process identified the importance wetlands play for the future of the city.

The city's masterplan covers key aspects such as environmental protection, green infrastructure, climate resilience and environmental quality. The plan sets goals and action steps for protecting the City's environment, including shared participation in and advocacy for the state and federal programs to protect Louisiana's coastal wetlands.

A new "Curb to Coast" strategy and a new city-level Water Collaboration, focuses on building multiple lines of defence against flooding, from better managing water within the city limits, to protecting wetlands around the city, to protecting coastal wetlands and barrier islands further south on the edge of the Gulf.

The city recently commissioned an Urban Water Plan which functions currently as an innovative design document. The city has also recently enacted a stormwater management policy, requiring developers of new buildings to manage stormwater on site, or pay a stormwater fee.

**Location:**

Southern coast of the United States.

**Size:**

City area: 906 km<sup>2</sup> (91,000 ha); of this 439 km<sup>2</sup> are dry land and 467 km<sup>2</sup> are under water or wetlands.

**Ownership:**

Majority of wetlands are privately owned.

**Stakeholders:**

Residents and community groups; city employees; NGOs and coalitions; transportation and shipping companies; oil and gas companies; other major wetland owners.

**Local community:**

All communities were targeted for outreach and for extensive community meetings. Particular focus was paid to the communities that have suffered most in the major storms and flooding, including them in city planning for water management.

**Funding:**

Almost entirely from federal and state government.

**Wetland type:**

A mix of saline, brackish and freshwater wetlands: flooded forest (palustrine) wetlands, inland open marshes, and expansive coastal salt marshes (estuarine emergent).

**Drivers:**

The loss of coastal wetlands and the gradual subsidence of the city; the massive flooding and economic (and human) losses from Hurricane Katrina.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
	✓	✓	✓	✓	✓							



© A, B & C - Haikou City



B



C

- A. Changwangxi wetland
- B. Dongzhaigang Ramsar Site of Haikou
- C. Dongzhaigang Ramsar Site of Haikou

## Haikou, China

In order to establish a sound long-term mechanism for wetland conservation, Haikou paid attention to top-level design, strengthened organizational participation and legislation and integrated within planning.

In March 2017, Haikou presented the "Implementation Plan for Haikou Wetland conservation and Restoration Work" and "Haikou Wetland conservation and Restoration three- Year Action Plan (2017-2019)".

The Haikou Municipal Government has also formulated the "Haikou Wetland conservation and Restoration Master Plan (2017-2025)", which clarified the goal of wetland conservation and restoration. In addition, the wetland conservation concept and specific measures were reflected in the main related plans of "Haikou Master Plan (Space Category 2015- 2030)" and other relevant plans. The Haikou Municipal people's congress reviewed and approved the "Decision of Haikou Standing Committee of the People's Congress on Strengthening Wetland conservation Management" in July 2017.

**Location:**

North of Hainan Province, China.

**Size:**

The area of Haikou is 228,909 ha, the wetland area is 29,093 ha.

**Ownership:**

Two third of the wetlands (coastal wetlands, reservoirs, lakes, marshes, etc.) are state-owned; aquaculture ponds and rice fields are owned by the government and private land owners.

**Stakeholders:**

Haikou Municipal Forestry Bureau; Haikou Municipal Ocean and Fisheries Bureau; Haikou Municipal Ecological and Environmental Protection Bureau; Haikou Municipal Water Affairs Bureau; Haikou Municipal Agricultural Bureau; Haikou Municipal Tourism Development Committee; local governments at different levels in Haikou; and the local community.

**Local community:**

Local communities in 14 village committees of Haikou have participated in the activities of wetland conservation awareness and education.

**Funding:**

In the past four years, Haikou has invested 8.654 billion yuan in wetland work, of which 8.083 billion yuan has been invested in 2015-2017 and 571 million yuan has been invested in 2018 for wetland conservation and restoration.

**Wetland type:**

Coastal wetlands (including mangroves); riverine wetlands.

**Drivers:**

Habitat improvement and added value to surrounding land; the achievement of a balance between conservation and development.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓





- A. Urban wetland receiving stormwater from the sports town
- B. Constructed wetlands next to housing estate with staggered building
- C. Urban Core

## Sydney Olympic Park, Australia

The wetlands are managed under an overall vision of the Sydney Olympic Park Authority for protection, conservation and enhancement of its natural assets, including remnant and constructed wetlands.

The aims were to be a pioneering example in Australia of environmental sustainability, integrated water management, a friendly co-existence of nature and urban development, an effective partnership between public and private entrepreneurs and a world class sporting facility.

Wetlands are within the mosaic of the precinct's urban sprawl. Because of the mosaic nature of the wetlands embedded within development structures, the design and management principles have been sympathetic to each other, thereby forming a 'wetland city'.

The 'wetland city' has become a great example of successful co-existence of development and nature protection.

**Location:**  
In the greater city of Sydney in the State of New South Wales, Australia.

**Size:**  
The City's total area is 630 ha. Out of the 630 ha, 430 ha is parklands that hosts 175 ha of wetlands.

**Ownership:**  
The State (provincial) Government of New South Wales owns these wetlands, which are managed by the Sydney Olympic Park Authority.

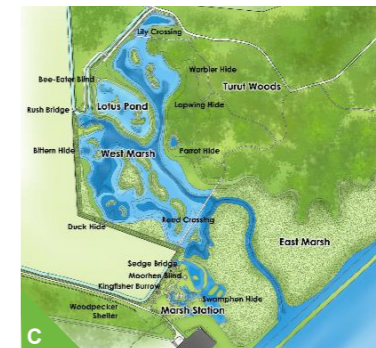
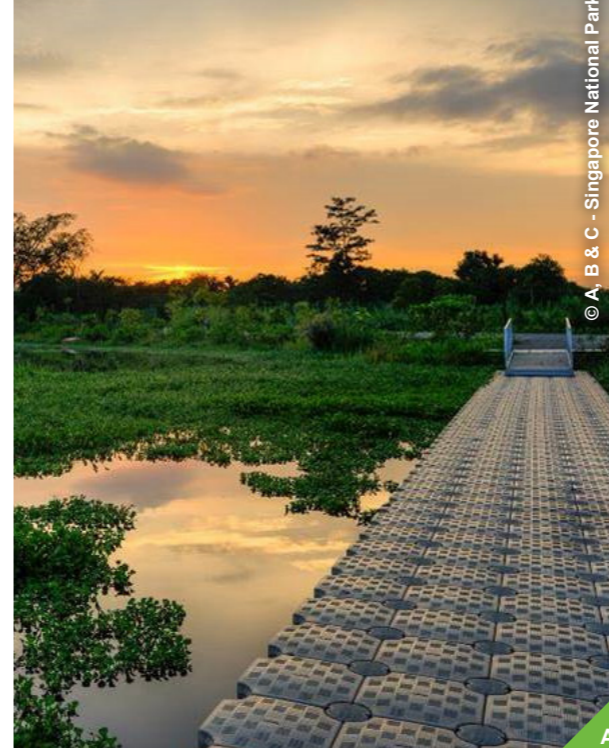
**Local community:**  
Aboriginal and traditional owners, local residents, scientific and volunteer communities and many other groups have been involved in the design and construction process and further involved in monitoring and assessment.

**Funding:**  
Funding mainly provided by the State (provincial) Government of New South Wales. At a smaller scale from other government and NGO grants initiatives.

**Wetland type:**  
Restored: Estuarine lagoons, saltmarsh, reedbed, freshwater ponds.  
Created: Freshwater ponds; detention basin; leachate ponds.

**Drivers:**  
Ceasing wetland degradation and losses; wetland restoration; endangered species re-establishment; biodiversity protection; water quality enhancement; migratory shorebird habitat; flood mitigation; contaminated land remediation; aesthetics and recreation; and education and healthy living.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓



- A. Kranji Marshes walkway
- B. Birdwatching tower
- C. Kranji Marshes Map

## Kranji Marshes, Singapore

The Kranji Marshes were formed in the 1970s when the Kranji River was dammed to create the Kranji Reservoir, which led to the loss of mangroves near the river mouth and prevented the natural discharge of sediment into the Johor Straits. Upstream, however, the same damming led to the formation of rare freshwater marsh habitats.

The bulk of the habitat enhancements efforts were carried out in the marsh areas to ensure that there are aquatic habitats with different water levels, plant composition and density as well as other landscape elements in order to encourage a diverse range of wetland-dependent birds and other wildlife to thrive in this nature area.

These restoration efforts were conducted very carefully due to the sensitive nature of the site. The enhancement was completed at the end of 2015. Today, the Kranji Marshes is a rare environment that supports a rich array of flora and fauna and provides important habitat in the Kranji area for the conservation of biodiversity, especially waterbirds.

**Location:**  
11 Neo Tiew Lane 2 Singapore 718814, northwest Singapore.

**Size:**  
56.8 ha.

**Ownership:**  
Ministry of National Development.

**Stakeholders:**  
Public Utilities Board, Nature Society (Singapore).

**Local community:**  
No data.

**Funding:**  
Funded by the government.

**Wetland type:**  
Freshwater marshes and ponds.

**Drivers:**  
Wetland restoration; biodiversity protection; education; and recreation.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
	✓				✓		✓		✓		✓	



## A Best practice in integrated urban wetland construction and management

Unplanned construction has the potential to negatively impact on existing wildlife, habitats and local people. Measures should be put in place to minimise any impacts on the environment or people living in the local area.

The benefits wetlands provide to people and wildlife can be reduced if good wetland management practices are carried out before construction. Therefore, wetland management plans need to be developed and integrated into urban development and water resource management.

If managed correctly, urban wetlands can become important wildlife areas whilst sensitively integrating people. As an example, good management practices at London Wetland Centre (UK) led to its designation as a nationally protected wildlife area (Site of Special Scientific Interest) in recognition of the important wildlife the site attracted.

The following general principles have been identified as key to ensuring an integrated approach to urban and wetland construction and management:

- Sustainability – a comprehensive approach to construction that ensures green supply chains, low carbon, energy neutral construction occurs limiting or mitigating the impact on environment and specifically wetland areas
- Use of native, local species in any wetland habitat or green infrastructure construction or management to protect native biodiversity
- Maximise biodiversity through an understanding of habitats, hydrology, soils, and landform
- Maximise wetland functioning to provide multiple benefits
- Restore and rehabilitate degraded urban sites
- Establish communication, education and public awareness (CEPA) programmes to engage with the community
- Develop bespoke, local solutions
- Involve the local community in management activities whenever possible
- Follow Ramsar principles as far as possible





## Key case study lessons for urban wetland construction and management

Lessons learnt	Example	Page
Integration of sustainable tourism practices	China	34
Government financial support on restoration	China	34
To set up governance on wetland protection	China	34
To establish CEPA activities when formulating a management plan	China	34
Establishment of action groups and volunteering programmes	China	34
Integration of sustainable water management practices (e.g. treatment water into irrigation)	China	34
Consider reuse of materials, even if it is for another project on the site or use of recycled materials	Australia	28
Management needs to be adaptive and requires specific action plans with a timeline, budget and responsibility	China Australia Japan	27 28 38 & 39
The development of eco-tourism activities as a win-win situation (financially and environmentally)	China	27
Establishment of monitoring & evaluation systems to measure success	China	27
Sensitive habitat zonation according to use	China	27
Good management practices bring benefits for the population (protection against disasters), not only environmental benefits	United States	26
Undertake a phased – approach if needed – take into account ecological cycles (e.g. breeding seasons) as well as meteorological conditions	Singapore	29
Engagement with stakeholders must be continuous through the management and construction process to allow solutions to be found	Panama China Republic of Korea	25 34 37
Sensitive management (zonation) is key to the integration of people and wildlife. Proof of its success for biodiversity was the designation as SSSI (Site of Special Scientific Interest) in 2002	United Kingdom	36
For the initiative to be sustainable, there is a need to effectively communicate the wetlands' value. This was then appreciated within the community	Japan	39
Water level and quality monitoring during construction can be a good monitoring strategy	Sri Lanka	41
Capacity building is needed for integrated approaches in wetland construction/restoration	Sri Lanka	41

## B Case studies



Diyasaru Park wetland visitor attraction, Colombo, Sri Lanka





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## Changshu City, China

Changshu gives full consideration to the importance of wetlands within spatial planning and city management.

The Urban Master Plan of Changshu (2010) explicitly designates areas such as drinking water sources, lakes, rivers and wetlands as prohibited and restricted construction areas and proposes control measures.

The Implementation of the Strictest Water Resource Management Regulations (2014) and Functional Zoning of Surface Water Environment in Jiangsu Province (2014), both require comprehensive and strict management of the city's water resources with water functional zone standardization, ecological treatment of rivers and lakes, and recycling of irrigation water.

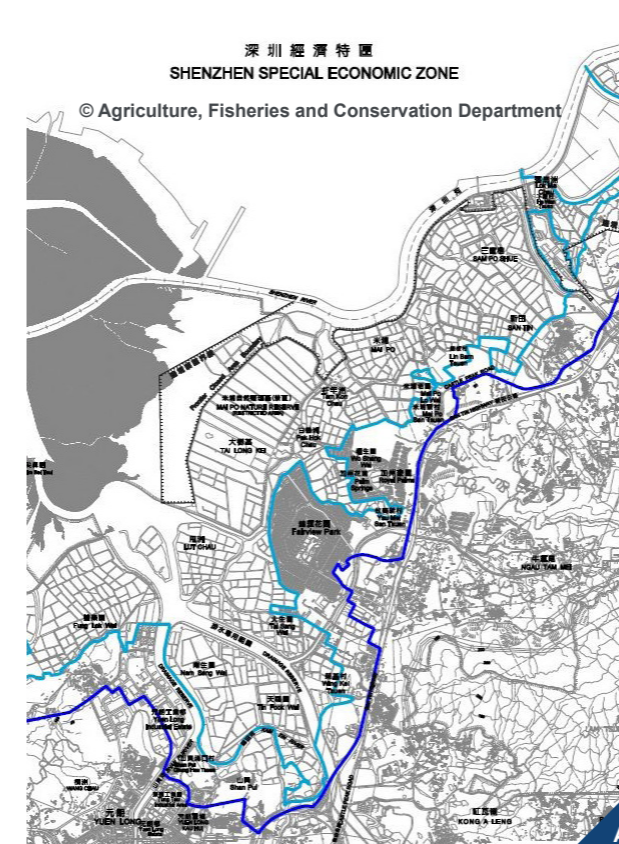
The Plan for Smooth Water Flow in the Urban Area of Changshu and the Special Plan of Changshu for Sponge City, developed in 2015, explicitly define urban wetlands as the key to ecological protection and restoration and aims to make them part of flood control and drainage of the city.

The wetland restoration has been integrated into a sustainable tourism plan providing recreation opportunities for local people and visitors that promotes health and wellbeing. To measure success a monitoring and evaluation system has been developed.



- A. Shajiabang marsh, before and after restoration
- B. Rural wetland and city landscape
- C. Wetlands and city

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



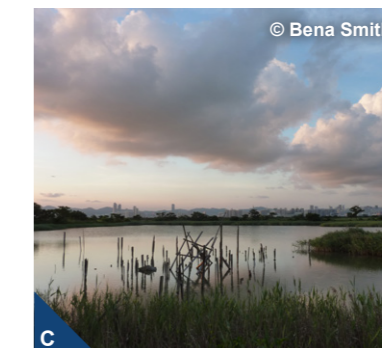
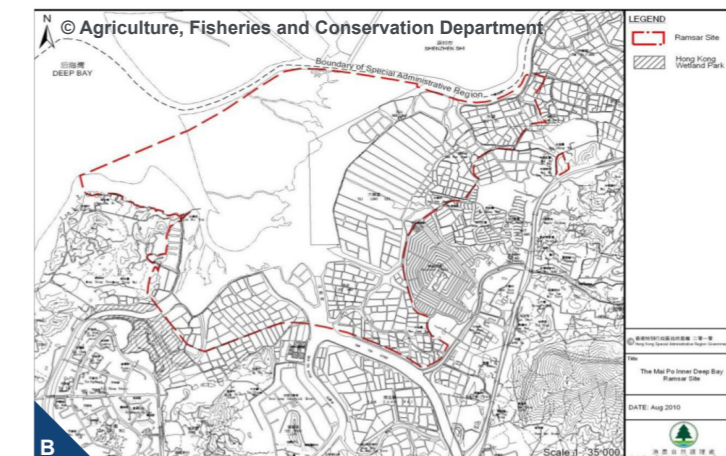
## Mai Po Inner Deep Bay Ramsar Site, Hong Kong S.A.R., China

In September 1995, the Hong Kong S.A.R. Government designated the 1,540 ha Mai Po Inner Deep Bay Ramsar Site which consists of inter-tidal mudflats, mangroves, traditionally managed shrimp ponds (*'gei wai'*) and fish ponds.

The Town Planning Board (TPB) has established two zones within Deep Bay to support land use planning:

- **Wetland Conservation Area:** This includes all the landward part of the Ramsar wetland but also some additional fish ponds, with the intention to conserve the ecological value of the Deep Bay fish pond. New development within the area would not be allowed unless it is required to support the conservation of the ecological value of the area, to promote research and educational use, or is an essential infrastructural project with overriding public interest.
- **Wetland Buffer Area:** a wetland buffer area where development is allowed, requiring an Environmental Impact Assessment to prevent any pollution to Deep Bay.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



- A. Deep Bay buffer zone
- B. Ramsar site boundary
- C. Wetland habitats

**Location:** Yuen Long, New Territories, Hong Kong S.A.R.

**Size:** 1,540 ha.

**Ownership:** The Hong Kong S.A.R. Government and private ownership.

**Stakeholders:** No data.

**Local community:** The community were consulted on the draft plans.

**Funding:** The work to designate the planning guidelines for the Ramsar Site was funded by the Hong Kong S.A.R. Government.

**Wetland type:** The Site consists of inter-tidal mudflats, mangroves, traditionally managed shrimp and fish ponds, as well as ponds which are now managed as wildlife habitat, e.g. reedbeds, waterbird high-tide roosting sites and feeding sites.

**Drivers:** The wise use of the Mai Po Inner Deep Bay Ramsar Site by balancing conservation and development.





- A. London Wetland Centre and housing development
- B. Created wetland habitats
- C. Visitor centre and wetland habitats

## London Wetland Centre, United Kingdom

The Wildfowl & Wetlands Trust's (WWT) London Wetland Centre was the first project of its kind in the world where more than 40 hectares of wetlands were created in the heart of a capital city. Disused reservoirs, owned by a private water company, were transformed into a range of wetland habitats and visitor facilities.

The centre offers visitors the chance to see rare and beautiful wetland wildlife just a short distance from central London. It brings the countryside to London and is a haven of tranquillity for both wildlife and people.

The centre is internationally renowned as a conservation and development success story where a housing development, in a small proportion of the site, helped fund the creation of diverse wetland habitats and visitor facilities. In 2002 the site was designated as a Site of Special Scientific Interest on account of its national importance for wildlife.

In addition to a visitor centre the site has a range of multi-purpose areas for education and facilities specifically designed to allow visitors close views of wildlife without disturbing them. The strong partnership of private companies, government agencies and non-governmental organizations was key to the success of delivering the project.

**Location:**  
London, UK.

**Size:**  
Area of Greater London: 1,572 km<sup>2</sup> (157,200 ha).  
42 ha of wetland habitats and visitor facilities.

**Ownership:**  
Privately owned – Thames Water owns the wetlands at London Wetland Centre.

**Stakeholders:**  
Developer (Berkeley Homes); WWT; government agencies; private companies (Thames Water).

**Local community:**  
The community were consulted on the draft plans.

**Funding:**  
The scheme for the visitor centre and wetlands habitat was funded by the residential development of part of the site (69%) and private donations (31%).

**Wetland type:**  
Wet grassland; grazing marsh; reedbed; open freshwater; and marsh.

**Drivers:**  
The main driver was the restoration of four disused reservoirs for the benefit of wildlife and people.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓



- A. Wetland habitats
- B. Boardwalk through the reedbeds
- C. Wetland habitats

## Suncheon Bay, South Korea

In the 1990s Suncheon Bay was seen as barren land. A few years later, some of the local NGOs and professors, in particular Suncheon National University, realized the need to immediately address these issues to prevent further deterioration of Suncheon Bay.

The Suncheon City Government formulated a policy and comprehensive land use plan that identified specific zones to aid in the conservation of Suncheon Bay while maintaining and providing economic opportunities for citizens. The plan defined four zones: urban zone, transition zone, buffer zone and core zone.

Large-scale infrastructure development will only be allowed within the urban zone. The core zone is represented by Suncheon Bay where wetland restoration projects are implemented.

The government established a committee to ensure the effective management and conservation of Suncheon Bay; it's composed of 20 representatives from the city government, city council, experts, media, citizens, local communities, and local NGOs, and acts as a decision-making body.

**Location:**  
South Jeolla Province, Republic of Korea.

**Size:**  
Suncheon City occupies an area of 90,720 ha; the area of wetlands is 27 km<sup>2</sup>.

**Ownership:**  
Owned by the government.

**Stakeholders:**  
Local government, city council, university, media, NGOs and the local community.

**Local community:**  
Suncheon City has a wetland management system that involves the local communities by providing livelihood opportunities.

**Funding:**  
Funded by income from the visitor centre, which donates 10% of its profit to the preservation of wetlands at Suncheon Bay.

**Wetland type:**  
21.6 km<sup>2</sup> of mudflats and 5.4 km<sup>2</sup> of reedbeds.

**Drivers:**  
Wetland degradation of Suncheon Bay due to sand extraction and pollution were the main drivers.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
		✓			✓	✓	✓	✓	✓	✓	✓	





- A. Branded “Natural Stork Rice”
- B. Oriental white stork
- C. Recreation within the paddy field

© A, B & C - Toyooka Municipal Government

A

B

C

### Toyooka City, Japan - Stork Friendly Farming

In 1971 the oriental white stork (*Ciconia boyciana*) became extinct in Japan, Toyooka being its last remaining habitat. The use of modern agricultural practices, especially at paddy fields, was the main cause of the stork’s extinction as fields were drained losing their biodiversity value and at the same time the storks’ feeding habitat.

To solve this, a drastic change on agricultural practices was needed; Toyooka City proposed the “Stork Friendly Farming Method”, in which the management of water was a key factor in order to restore the ecological value of the paddy fields so that they could sustain the oriental white stork population again.

The sustainable use of wetlands for the benefit of biodiversity became compatible with the establishment of livelihoods. Focused on the conservation of oriental white storks. The success of this project is regarded as the most important example under “Environment and Economic Strategy” proposed in 2007 by Toyooka City.

**Location:**  
Toyooka City, Hyogo, Japan.

**Size:**  
407.1 ha.

Over 250 ha of wetland habitats in total.

**Ownership:**  
Privately owned (farmers).

**Stakeholders:**  
Hyogo Municipality, the local community (customers).

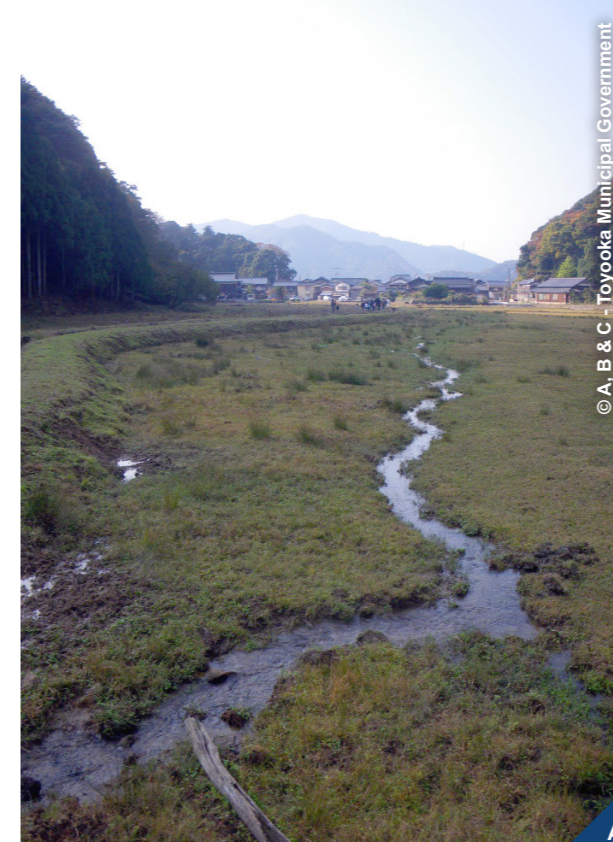
**Local community:**  
Farmers are key members of the local community as recreational activities take place in farmland.

**Funding:**  
Funded by Toyooka City.

**Wetland type:**  
Agricultural wetland (paddy fields).

**Drivers:**  
Recognition of the need for wetland restoration and cultural change required within the farming sector to embrace environmentally-friendly practices.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
		✓			✓	✓		✓	✓	✓	✓	✓



- A. Restored wetland area
- B. Community education
- C. Oriental white stork

© A, B & C - Toyooka Municipal Government

A

B

C

### Toyooka City, Japan - Community wetland management

In Japan, the abandonment of agricultural fields has mainly been due to the aging of farmers. Paddy fields, located on mountain ridges, are often heavily used by wild animals, such as deer and wild boar, and are then difficult to manage.

Toyooka has experienced this problem, and in 2001, the city started a project to restore abandoned paddy fields as feeding areas for the Oriental white stork, as well as many other wetland species.

Many in the community were upset that they had to give up farming and abandon their paddies so were delighted to see storks use the restored fields. It gave great community pride and they began to regenerate more areas and conserve nature.

Toyooka City is leading the efforts for the Oriental white stork re-introduction, as well as supporting the civil society to restore wetlands by establishing effective partnerships. These activities have a beneficial effect in the local economy.

**Location:**  
Toyooka City, Hyogo, Japan.

**Size:**  
12 ha.

**Ownership:**  
Owned by the local community.

**Stakeholders:**  
Universities, companies, volunteers and schools.

**Local community:**  
Involvement included: management of wetlands; hands-on activities for children; informative tours for tourists.

**Funding:**  
Oriental White Stork Fund and private donations.

**Wetland type:**  
Constructed wetlands.

**Drivers:**  
Recognition and action by Toyooka City of the need to restore the abandoned paddy fields.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/Biodiversity gains	Sustainable Agriculture/Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
		✓			✓		✓	✓	✓	✓	✓	





© A, B & C - Wetlands International



- A. Natural mangrove regeneration
- B. Nula-tula site mangrove planting
- C. Black-winged stilts

## Manila Bay, Philippines

The Manila Bay Sustainable Development Master Plan guides decision-makers in the approval of programs/ projects/ activities that are consistent with national, regional and local development plans and promotes inclusive growth, ecosystem protection, climate change adaptation, disaster risk reduction, water quality improvements and upgrades to informal settlements.

The Integrated Coastal Protection Strategy for the Tacloban and Palo and Mayor of Palo, aims to provide safety and create economic value for 1 million people. The strategy combines nature-based infrastructural solutions to render the area 'future proof', following the Building with Nature concept. Tacloban City has adopted coastal wetland protection and management as part of its Comprehensive Land Use Plan and the city's development plan.

**Location:**  
Tacloban City and Metro Manila.

**Size:**  
Tacloban City: 201.7 km<sup>2</sup> of which wetlands > 270 ha.

Manila Bay: 1,994 km<sup>2</sup> of which more than 816 km<sup>2</sup> are shallow wetlands. Metro Manila covers 619.6 km<sup>2</sup>.

**Ownership:**  
Mangrove areas are publicly owned, other wetland habitats are privately owned/ owned by the City.

**Stakeholders:**  
Tacloban: Government agencies, academia, local governments, Global Resilience Partnership Water Window and the Embassy of Netherlands.

Manila Bay: National Economic Development Authority, line agencies (flood control, fisheries and ecosystem protection) and local government, national academia, and CSOs.

**Local community:**  
Local councils and communities participated in the transfer of knowledge sessions and inputted into priority setting.

**Funding:**  
Government of Netherlands; and the Global Resilience Partnership Water Window.

**Wetland type:**  
Mangroves and beach forests in Tacloban; none as yet in Manila Bay.

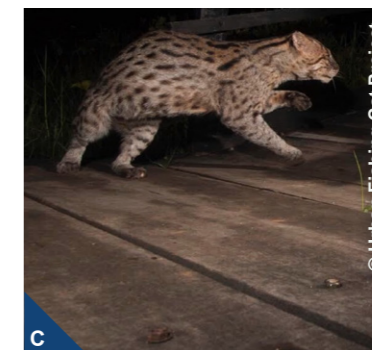
**Drivers:**  
Tacloban: Reducing disaster risks in the aftermath of typhoon Haiyan.

Manila Bay: The increasing number of unsolicited reclamation and infrastructure projects with irreversible negative impacts.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/ Biodiversity gains	Sustainable Agriculture/ Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓



© SLLRDC Media Unit



- A. Heen Ela Marsh
- B. School awareness program at Diyasaru Park
- C. Fishing cat at Diyasaru Park

## Colombo, Sri Lanka

City wetland management is embedded in the Wetland Management Strategy (WMS), 2016. It is based upon global best practices and a series of underlying principles; key amongst these is the concept of the wise use of wetlands.

The WMS has 5 objectives: Recognise the benefits of wetlands; Prevent loss and degradation of wetlands; Restore degraded wetlands; Engage all stakeholders; and Govern with improved legal and management approaches.

A Colombo Wetland Management Strategy (CWMS) subcommittee constituted under the National Wetland Steering Committee, will be responsible for overseeing the implementation activities.

**Location:**  
The Colombo Wetland Complex is a network of wetlands in the Colombo Metropolitan Region (CMR), Sri Lanka.

**Size:**  
CMR: 22,680.17 ha.

Hydrological catchment: 12,150 ha.

Colombo Wetland Complex : 1,900 ha.

**Ownership:**  
Government and private ownership.

**Stakeholders:**  
National Wetland Steering Committee; government regulators (Department of Wildlife Conservation, local authorities, Central Environment Authority, Department of Agriculture Development, Irrigation Department); wetland communities; NGO/Civil Society; universities; research institutes.

**Local community:**  
The local community was consulted in: the design, development and management of the Beddagana Wetland Park and Diyasaru Park; balancing water user-conflicts; the design and execution of the Talangama lake restoration; the design and execution of the Kimbulawela Model Organic Paddy Farm.

**Funding:**  
Funding came from the government of Sri Lanka, the World Bank and Global Environmental Facility (through UNDP).

**Wetland type:**  
Complex mosaic of freshwater (85%)/ marine/brackish wetlands that broadly fall into the categories of open water, marshes, canal systems, herb-dominated and wet woodland habitats.

**Drivers:**  
Increased flood risk over the past couple of decades given climate change and rapid, unplanned urbanisation.

Ecosystem service benefits	Water supply	Flood regulation	Climate regulation	Wastewater treatment	Habitat/ Biodiversity gains	Sustainable Agriculture/ Aquaculture	Tourism	Recreation	Education	Culture	Human Wellbeing	Other
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



## 5

# RECOMMENDATIONS TO POLICY MAKERS, PLANNERS AND DEVELOPERS

The appendix to Resolution XI.11 (Principles for the planning and management of urban and peri-urban wetlands) suggests a range of potential solutions to overcome the degradation of urban wetlands.

These principles, aim to raise awareness and encourage action towards the recognition and positive impact of wetlands in the urban environment. They have been summarised below as a series of guidance measures for policy makers, planners, and developers.

Recommendations to policy makers:

1. Recognise the importance of wetlands and their services as key elements for supporting green infrastructure in the urban environment
2. Set up governance on wetland protection
3. Promote the wise use of wetlands by enhancing policy and establishing regulations for protection
4. Proactively avoid wetland degradation as a result of urban development and consider the role wetlands play in urban protection (such as protection against flooding and regulation of temperature) when planning
5. Achieve more sensitive urban planning policy development, including development frameworks and spatial zonation to protect ecosystem services; (especially those of wetlands), and addressing water management issues at the appropriate scale
6. Involve local communities and promote stakeholder participation during planning and management processes

Recommendations to planners:

1. Increase the level of understanding of the key role and benefits of wetlands
2. Achieve more sensitive urban planning policy development, including development frameworks and spatial zonation to protect ecosystem services (especially those of wetlands), and addressing water management issues at the appropriate scale
3. New developments should be adapted to the existing environment (not the other way around)
4. Explicitly include wetlands as natural infrastructure in urban planning, including all aspects of water management, such as stormwater management, water resources and water treatment
5. Treat wetlands not merely as areas that are important for nature conservation per se, but as key elements within urban water management infrastructure and essential components in providing water resources
6. Include the value of wetlands – the costs of wetland loss and degradation and the value wetlands can add should be taken into account when considering urban and infrastructure development
7. Set standards to use selected wetlands as natural wastewater treatment systems to mitigate urban pollution and sedimentation
8. Ensure appropriate stakeholder participation and empowerment, in both problem setting and problem solving, which can be an essential element in delivering sustainable cities
9. Think holistically - financial, cultural, social and environmental considerations need to be taken into account from the beginning
10. Undertake integrated planning: wetland management should be integrated into the wider elements of urban spatial planning and development. Urban planning should always include wetlands as natural infrastructure for nature conservation



Recommendations to developers:

1. Avoid destroying or degrading wetlands as a result of new developments
2. Highlight the recreational, educational, health and wellbeing benefits from incorporating wetlands within a development
3. Explicitly promote wetlands as natural infrastructure in urban developments, including in landscape planning and all aspects of water management, such as stormwater management, water resources and water treatment
4. Seek support from the local government (if appropriate) and gather information about possible funding for wetland creation/restoration
5. Involve the local community in the decision making and management process
6. Consider Health & Safety issues: wetlands can be associated with insect-borne diseases and pose a drowning risk if not designed or managed correctly. These issues need to be appropriately addressed on a case by case basis

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<https://www.ramsar.org/news/wetlands-are-essential-for-a-sustainable-urban-future> (Accessed 22/05/2018)

[https://www.ramsar.org/sites/default/files/documents/library/factsheet3\\_global\\_disappearing\\_act\\_0.pdf](https://www.ramsar.org/sites/default/files/documents/library/factsheet3_global_disappearing_act_0.pdf)

<https://www.ramsar.org/document/resolution-xii10-wetland-city-accreditation-of-the-ramsar-convention>

Wetland City Accreditation Guidance Note for Ramsar Administrative Authority

[https://www.ramsar.org/sites/default/files/documents/library/wca\\_guidance\\_for\\_raas\\_e.pdf](https://www.ramsar.org/sites/default/files/documents/library/wca_guidance_for_raas_e.pdf)

Wetland City Accreditation – Application pack

<https://www.ramsar.org/news/wca-applications>



Hong Kong Wetland Park, Hong Kong S.A.R., China



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## Workshop and handbook sponsors and organizers

Good Practices for Integrating Urban Development and Wetland Conservation Workshop was held on January 29th to February 1st 2018 in Changshu City, Jiangsu Province, China.



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- Manila Bay, Philippines – Wetlands International
- New Orleans, United States – Paulson Institute
- Panama City, Panama – Wetlands International
- Suncheon Bay, Republic of Korea – Ramsar Regional Centre - East Asia
- Sydney Olympic Park, Australia – Sydney Olympic Park Authority
- Toyooka City, Hyogo, Japan – Toyooka Municipal Government



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CEPA – communication, capacity building, education, participation and awareness programme led by Ramsar.

Climate change adaptation – measures seeking to lower the risks posed by the consequences of climatic changes.

Conference of the Parties – Meeting of the representatives of the governments of each of the Contracting Parties to agree on a work programme and budgetary arrangements for the next triennium.

Ecosystem services – the benefits of nature communities, wildlife and economies.

Flood management – actions to prevent and/or minimise the detrimental effects of flood waters.

Green infrastructure – the use of natural infrastructure for solving urban and climatic challenges by building with nature.

Human settlement – area with a permanent human population.

Management plan – document that provides a guide for land managers to facilitate works that will result over time in maintenance of, or increase in, the biodiversity value of retained and/or newly created habitats.

Masterplan - long-term planning document that provides a conceptual layout to guide future growth and development. Master planning is about making the connection between buildings, social settings, and their surrounding environments.

Payment for ecosystem services – (or payments for environmental services) are incentives offered to landowners in exchange for managing their land to promote ecological benefits (ecosystem services).

Ramsar Convention on Wetlands – intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources around the world.

Remediation (habitat) - the process of stopping or reducing pollution that is threatening the health of people or wildlife.

Spatial planning - the coordination of practices and policies used by the public sector to influence the distribution of people and activities in spaces of various scales.

Stakeholder engagement - the practice of interacting with, and influencing project stakeholders to the overall benefit of the project and its advocates.

Stormwater - water that originates during precipitation events and snow/ice melt.

Surface water – water that collects on the surface of the ground.

Sustainable development – human development that is conducted without depletion of natural resources.

Sustainable Drainage Systems – natural approach to store and re-use surface water in and around properties and other developments.

Urban development – the development or improvement of an urban area.

Urban planning - Urban planning is a technical and political process concerned with the development and design of land use and the built environment.

Urban wetlands – natural or constructed wetlands that can be found in the urban environment.

Values of wetlands – the benefits to society, either direct or indirect, that result from wetland functions. These values include human welfare, environmental quality, and wildlife support.

Wetland products – variety of plant, animal and mineral products used by people all over the world.

Wetland restoration – modify wetland features to recover their ecological function.

Wise use of wetlands - the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.



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