

WORLD WETLANDS DAY, 2002

# WETLANDS: WATER, LIFE AND CULTURE



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## **THE RAMSAR CONVENTION AND THE WORLD WETLANDS DAY**

On the 2<sup>nd</sup> of February 1971 a significant milestone on the conservation of wetland ecosystems was achieved in the city of RAMSAR in Iran, where a global consensus was adopted to identify and protect wetlands of international importance especially as waterfowl habitat. Today, the Convention on Wetlands (popularly known as the RAMSAR Convention) serves as an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 130 Contracting Parties to the Convention, with 1112 wetland sites, totaling 89.37 million hectares, designated for inclusion in the RAMSAR List of Wetlands of International Importance. Sri Lanka became a signatory to the RAMSAR Convention in 1991 by declaring the Bundala Lagoon system as its first RAMSAR wetland site.

In order to commemorate this global convention on wetland conservation, the 2<sup>nd</sup> February has been declared World Wetlands Day by the RAMSAR Bureau. RAMSAR's World Wetlands day 2002 is focussed on the cultural heritage of Wetlands and the need for management strategies that will safeguard this heritage as well as the natural values and functions of the wetlands.

### **RAMSAR WETLANDS IN SRI LANKA**

#### **1. Bundala National Park**

Located in the Hambanthota District, Bundala was declared a Ramsar site in 1991, owing to the high species richness of waterfowl, including migratory species. The principal wetland type in the Bundala National Park is a system of lagoons.

#### **2. Annaiwilundawa Sanctuary**

Located in the Puttalam District. Annaiwilundawa was declared as a Ramsar site in August, 2001, considering its rich biological diversity and historic/cultural significance. The principal wetland type in Annaiwilundawa is a system of ancient cascading tanks established in the 12<sup>th</sup> Century.

## WETLANDS OF SRI LANKA AND THEIR CONSERVATION SIGNIFICANCE

### What are wetlands?

Among the many definitions of wetlands in use throughout the world, the broadest and hence the most widely used on an international scale, is provided by the RAMSAR Convention. Designed to provide international protection to the widest possible group of wetland ecosystems, the RAMSAR Convention defines wetlands as: " areas of marsh, fen, Peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed the 6 meters"

The Wetlands of Sri Lanka that fits into the definition given by the RAMSAR Convention could be divided into three broad categories:

- Inland fresh water wetlands (eg.rivers, stream, marshes, swamp forests, and "Villus").
- Salt water wetlands (eg.lagoons, estuaries, mangroves, sea grass beds and coral reefs).
- Man-made wetlands (eg. tanks, reservoirs, rice fields, salterns).

A short description of major wetland types in Sri Lanka is given below.

### **Inland fresh water wetlands**

#### *Streams and rivers*

Sri Lanka has an extensive network of rivers and streams that drains a total of 103 distinct natural river basins. In terms of length, these flowing water bodies cover more than 4500 km. Mahaweli, Walawe and Kelani rivers originate from the central highlands and flows through all three penneplains. The river basins originating in the wet highlands are perennial while many of those in the dry zone are seasonal. **The river Mahaweli accounts for the largest basin**, covering 16% of the island and thereby has a high socio-economic and ecological value.

#### *The "Villu" wetlands*

Although there are no large natural lakes in Sri Lanka, there are several flood plain lakes, commonly referred to as "Villu", which cover a total area of 12500 ha. Often they are cut-off former river bends. Many of the larger "Villu" are located in the Mahaweli floodplain in the East. A typical example is the inter-connected **Handapan and Pendiya Villu** (796 ha) which is the largest of the entire Mahaweli Villu system. The **Wilpattu National Park** also contains several Villu ecosystems.

#### *Fresh water Marshes*

These are shallow inland depressions located mainly in rural areas either connected to a river or receiving water through surface run-off river flood water and ground water seepage. Partially decomposed organic material in such marshes forms peat, characterized by water logged sticky soil. A typical example is the **Muthurajawela Marsh**, which is the largest peat bog in Sri Lanka.

### ***Fresh water Swamp Forest***

This is a late successional stage of a freshwater marsh ecosystem, comprising of trees that are adapted to grow in shallow stagnant water. Swamp forests are seasonally inundated with river water. It is the most rare wetland type in Sri Lanka and a good example is the **Walauwa Watta Wathurana Swamp forest** (12 ha) located in the **Kalu river basin**.

### **Salt water wetlands**

#### ***Estuaries and Mangroves***

These are inter-connected coastal wetland types. Estuaries are formed in places where rivers enter the sea. The daily tidal fluctuation and the intermediate salinity between salt and freshwater (commonly termed "brackish water") are main characteristics of this ecosystem. There are about 45 estuaries in Sri Lanka. The mangroves comprise very diverse plant communities that are adapted to grow in unstable conditions of estuarine habitat. The mangroves are a rapidly diminishing wetland type in Sri Lanka, consisting of less than 10,000 ha of discontinuously distributed patches along the coastline. Typical example of estuaries with mangrove wetlands in Sri Lanka includes the **Maduganga estuary and the Bentota estuary**.

#### ***Lagoons***

These are salt or brackish water coastal wetlands separated from the sea by a low sand bank with one or more relatively narrow permanent or seasonal outlets to the sea. These can also harbour other coastal wetland types such as mangroves, mud flats and sea grass beds. Around 42 lagoons are found around the coast in Sri Lanka. Examples include the **Bundala Lagoon, Mundel Lake, and Kalametiya Lagoon**.

#### ***Coral reefs and Sea grass beds***

These are two important sub-tidal marine wetlands (below 6 m in depth) in Sri Lanka. Coral reefs consists of calcareous structures secreted by a group of marine invertebrates. Coral reefs are famous for their spectacular beauty and are rich in biological diversity that could be compared to a tropical rainforest. Extensive coral reef habitats occur in the **Gulf of Mannar, Trincomalee to Kalmunai** in the East Coast and in several areas of the South and Southwestern coast. (eg. **Rumassala and Hikkaduwa**)

Sea grass beds are composed of rooted, seed bearing marine plants. These occur in shallow, sheltered marine waters, as well as in lagoons and estuaries. Most extensive sea grass beds occur in the northwest coastal waters of Sri Lanka (eg. **Kalpitiya to Mannar**).

### **Man-made Wetlands**

#### ***Tanks and Reservoirs***

Although there are no natural lakes in Sri Lanka, an array of ancient irrigation tanks have substituted the former wetland type. Numbering nearly 10,000, these man-made wetlands depict the rich cultural heritage of Sri Lanka. The major irrigation reservoirs (each more than 200 ha) cover an area of 7820 ha, while the seasonal/minor irrigation tanks (each less than 200 ha) account for 52250 ha. Typical ancient irrigation tanks include the **Parakrama Samudraya** and the **Minneriya tank**.

### ***Rice Fields***

Rice fields are characterized by the presence of a standing water body, which is temporary and seasonal. Hence, flooded rice fields can be considered agronomically managed marshes. They are temporary and seasonal aquatic habitats, managed with a variable degree of intensity. The total area under rice cultivation at present is about 780,000 ha (approximately 12% of the total land area), which is distributed over all the agro-ecological regions except for areas located at very high elevation. Approximately 75% of rice lands in Sri Lanka are located within inland valley systems of varying form and size while the rest are found in alluvial plains and also on terraced uplands in the interior.

### **Significance of wetlands in Sri Lanka**

All wetlands comprise a mixture of soils, water, plants and animals. The interactions between these elements allow wetlands to perform several functions that are beneficial to mankind, while generating a healthy wildlife, fisheries and forest resources. The combination of these functions, together with the rich biological diversity and cultural heritage of wetlands makes these ecosystems invaluable to people all over the world. The loss of wetlands results in the eradication of these benefits, leading to harmful consequences on human welfare and to the extinction of species that are ecologically dependant on wetlands. **The importance of wetlands can be elaborated under three major categories; uses, functions and attributes.**

### **Wetland Uses**

Uses are direct economic benefits gained by people through exploitation of wetland resources. **Major wetland uses could be highlighted as follows:**

<b>Uses/Products</b>	<b>Examples from Sri Lanka</b>	<b>Wetlands exploited</b>
Water supply and transportation a) For Domestic supply b) For irrigation	Labugama, Kalatuwawa Minneriya tank, Mahaweli river	Rivers, streams, tanks, reservoirs
Agricultural products for human consumption	Rice, Leafy vegetables	Rice fields, marshes, tanks
Medicinal herbs	“Lunuwarana” herb	Marshes
Raw material for handicrafts and mats	“ Kaduru” wood for masks, Pandanus leaves	Marshes, Mangroves
Hydro-electricity	Victoria, Randenigala and Rantambe reservoirs	Waterfalls, Reservoirs
Fish and crustaceans for consumption	Edible Freshwater and brackish water fish and crustacean species	Rivers, tanks, reservoirs, lagoons, estuaries
Fish and plants of ornamental value	Black Ruby Barb, Cherry Barb, <i>Cryptocoryne</i> , <i>Aponogeton</i>	Streams, marshes,
Material for religious ceremonies/offerings	Nelum/Olu/Manel flowers	Marshes, Ponds
Salt	Hambanthota lagoon	Salterns
Recreation/tourism	Bundala wetlands	Tanks, Lagoons, waterfalls

### **Wetland Functions**

These are benefits of wetlands that support or protect human activity without being used directly. Major wetland functions could be summarized as follows:

<b>Major Functions</b>	<b>Contributory Wetlands</b>
Mitigation of floods	Marshes, Tanks, Rice fields
Protection from storms/prevention of coastal erosion	Mangroves, Coral reefs
Retention of sediments	Mangrove, Coastal marshes
Purification of water/removal of toxic compounds	Marshes
Act as a Carbon Sink	Marshes
Breeding habitats of edible fish	Mangroves, Marshes, Sea grass beds

### **Wetland Attributes**

These are benefits to a country that do not provide direct economic benefits. Two important wetland attributes include sustenance of a rich biological diversity and cultural heritage.

#### ***Biodiversity***

The biodiversity of wetlands in Sri Lanka is clearly depicted by the rich array of wetland ecosystem/habitat types, and the higher number of animal and plant species that they harbour. For instance, among the total inland vertebrate species in Sri Lanka, about 30% are ecologically dependent on wetlands. Among the migratory birds that visit Sri Lanka annually, more than 50% are directly dependent on wetlands for food and shelter. Furthermore, the future survival of approximately 32% of the nationally threatened vertebrate faunal species in Sri Lanka is dependent on wetland ecosystems of the island.

#### ***Cultural heritage***

In Sri Lanka, wetlands such as rivers and floodplains have been the cradle of historic civilizations. The man-made wetlands in Sri Lanka, especially the ancient irrigation tanks and rice fields, clearly highlights the rich cultural heritage associated with wetlands. It is generally believed that Indo-Aryan immigrants started rice cultivation in Sri Lanka more than 2500 years ago. This was a period at which a settled civilization developed in the dry zone and an elaborate irrigation system was established for rice cultivation. The earliest references to the establishment of tanks to conserve water for irrigation of rice in Sri Lanka was about 420 BC. Considering the size of these tanks and the network of neatly built sluices/canals, the technology of our ancestral irrigation engineers is truly astonishing.

### **Threats to Wetlands in Sri Lanka**

A majority of the wetlands in Sri Lanka are facing various threats that are posed by harmful human activities. These could be summarized under four major categories; habitat deterioration/degradation, direct loss/exploitation of species, spread of invasive alien species and natural phenomena.

*Habitat deterioration/degradation*

Several factors have resulted in the deterioration and degradation of the quality of wetlands, which could be highlighted as follows:

<b>Contributory Factors</b>	<b>Impacts</b>	<b>Affected wetlands</b>
Reclamation	Loss of wetlands and their biodiversity	Urban Marshes (eg. Bellanwila-Attidiya, Muthurajawela)
Clearing of vegetation	Loss of habitats and species	Mangroves (eg. Mangroves in the Coastal areas of the Puttalam District)
Water pollution – Organic pollution – Other Chemical effluents – Sewage disposal	Loss of species Loss of species, Harmful impacts on humans Eutrophication	Marshes (eg. Muthurajawela) Rivers (eg. Kelani river) Tanks, Marshes, Estuaries (eg. Parakrama Samudraya, Beira lake)
Garbage disposal	Eutrophication, spread of harmful diseases	Marshes (eg. Muthurajawela, Bellanwila-Attidiya)
Regulation of water flow (Dams)	Gradual disappearance of lowland wetlands	Villu ecosystems in the Mahaweli Floodplain
Mining (Sand/coral)	Loss of habitats and species	Rivers, Coral reefs

*Direct loss/exploitation of species*

Overexploitation of wetland plants and animals has resulted in several species facing the risk of extinction. Factors that contribute to this threat could be highlighted as follows:

<b>Contributory Factors</b>	<b>Impacts</b>	<b>Affected Species</b>
Poaching (for consumption)	Reduction of populations of targeted birds and mammals	Waterfowl (Ducks and Teals), Otter
Ornamental fish trade	Reduction of local fish populations	Black Ruby Barb, Cherry Barb, Mono etc.
Ornamental plant Trade	Reduction of aquatic plant populations and loss of habitats for aquatic animals	<i>Cryptocoryne</i> spp., <i>Aponogeton</i> spp.
Scientific Research	Reduction of aquatic animals	Stream dwelling fish
Water Pollution	Reduction of aquatic animals, Human health impacts	Fish, Amphibians, piscivorous birds, Otter

*Spread of invasive alien species (IAS)*

The introduction of several species of exotic aquatic animals and plants that have eventually escaped into wild habitats are posing a serious threat to native aquatic

biodiversity. Observations made during the past five years have enabled to document 10 species of invasive alien fauna (8 species of fish, one turtle and one aquatic mollusc) and 12 species of invasive alien flora, spreading in different wetland ecosystems throughout Sri Lanka. Among them, 4 species of fauna (Tilapia - *Oreochromis mossambicus*, Walking catfish - *Clarias batrachus*, Rainbow Trout - *Oncorhynchus mykiss* and Mosquito fish - *Gambusia affinis*) and two species of flora (Water hyacinth - *Eichhornia crassipes* and Giant mimosa - *Mimosa pigra*) are included in the list of the world's 100 worst invasive alien species. The ornamental fish trade has been the sole contributory factor to the introduction of invasive alien aquatic species into Sri Lanka. The major impacts of IAS could be summarized as follows:

<b>Impacts of IAS</b>	<b>Example of Invasive species</b>	<b>Affected native wetland species/ecosystems</b>
Direct exploitation or destruction of native species	Predatory species (Trout, Clown-knife fish, Walking catfish, Red-eared slider turtle)	Endemic freshwater fish
Superior competitors for resources	Tilapia, Water hyacinth	Native aquatic fish and plants
Deterioration of the quality of wetlands	Salvinia, Water hyacinth	Tanks, Marshes, Estuaries
Agricultural pests/weeds	Apple Snail, Water hyacinth, Salvinia, Hydrilla	Rice fields, Tanks, Irrigation canals

#### *Natural Phenomena*

Wetlands are threatened by natural phenomena as well. For instance, the recent prolonged drought resulted in the drying off of several tanks, streams, marshes and lagoons, causing death to several species of wetland animals. The rise of sea water temperature (due to climate change) resulted in the bleaching of coral reefs, especially in the south western part of Sri Lanka. For example, the Hikkaduwa Coral Reef, which was once a rich habitat, is now virtually a dead reef.