

**CASE STUDIES IN WETLAND
VALUATION #1: May 2003**

**MUTHURAJAWELA
MARSH, SRI LANKA:
Safeguarding wetland
protected areas in cities**

**Maintaining wetlands in Sri Lanka's
coastal cities**

The south west coastline of Sri Lanka represents one of the most densely populated, intensely urbanised and heavily industrialised parts of the country. There is extreme pressure on the natural environment, and wetland ecosystems in particular are under severe threat. Land use planning processes have paid little heed to the need to maintain green spaces for Sri Lanka's city-dwelling populations, and have often resulted in development decisions which have taken place at the cost of the few remaining urban and peri-urban conservation zones.

This case study describes an attempt to assess the economic value of Muthurajawela Wetland Sanctuary, situated just to the north of the capital city, Colombo. Both wetland ecosystems and urban parks are poorly represented in Sri Lanka's national protected area network, and Muthurajawela fulfils an almost unique role because it combines both these attributes. Although during the mid-1990s a land use masterplan was developed for the area, and a wetland management plan was established for Muthurajawela, there is serious concern about the future of this protected area. Within the context of a renewed effort to conserve the area more effectively, including a proposed extension to the Wetland Sanctuary, the valuation exercise aimed to develop and apply integrated biodiversity-economic assessment methods that could be used to identify critical threats, major benefits, and key actions required to support the management of Muthurajawela as a conservation zone.



Integrating Wetland Economic Values into River Basin Management

Muthurajawela Wetland Sanctuary

Muthurajawela Marsh is the largest saline coastal peat bog in Sri Lanka, and covers an area of some 3,068 hectares (Figure 1). It runs alongside the Indian Ocean and is located between 10-30 km north of Colombo, in Gampaha District. Together with the contiguous Negombo Lagoon (3,164 hectares), Muthurajawela forms an integrated coastal wetland system of high biodiversity and ecological significance. It is listed as one of 12 priority wetlands in Sri Lanka, and in 1996 1,777 hectares of the northern section of Muthurajawela was declared a Wetland Sanctuary. The Sanctuary contains a high diversity of both flora and fauna, including several endemic and nationally threatened species, and also provides an important area for migratory birds. Because of the presence of these natural habitats and species, Muthurajawela is a popular recreational destination, primarily attracting educational or school trips and day visitors from nearby Colombo.

Muthurajawela Sanctuary represents a “conservation island” in the midst of intense urban and industrial development. It remains one of the few wetlands in the Colombo area that has not been reclaimed for agriculture or filled in for development. More than 300,000 people live in the Muthurajawela-Negombo area and just under 5,000 people occupy the marsh itself, half of whom are squatters and about three quarters who live on unauthorised landholdings. About 80% of industries in the country are concentrated in Colombo and Gampaha Districts (UNEP 2001). Areas to the north, south and east of the marsh contain a large number of industries and commercial enterprises. It is known that in 1991 there were almost 150 industrial units in and around Muthurajawela marsh and Negombo Lagoon, including vehicle and electrical goods repair and garment makers (GCEC 1991). Today this number has undoubtedly increased, as much of the southern part of Muthurajawela has been now turned into an industrial area.

As well as harbouring important biodiversity the Wetland Sanctuary provides a range of

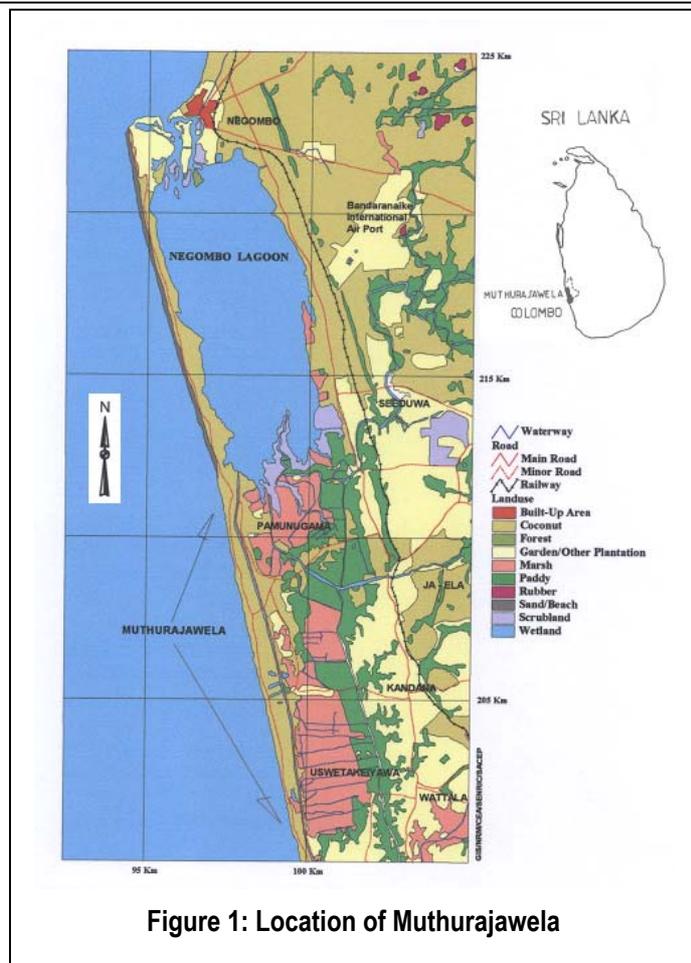


Figure 1: Location of Muthurajawela

ecological and hydrological services. Muthurajawela receives and retains high loads of domestic and industrial wastes, and sediment and silt loads, from both surrounding and upstream areas. Wetland plants facilitate sediment deposition, before water enters Negombo Lagoon. They also act as a filter for through-flowing waters, and assist in the removal of nutrients and toxic substances. During the rainy season large volumes of water enter the wetland system, from rainfall, through run-off from surrounding higher grounds and via floodwaters from the Dandugam Oya, Kalu Oya and Kalani Ganga which feed the marsh. Muthurajawela buffers these floodwaters and discharges them slowly into the Negombo Lagoon. The maximum water storage capacity of the marsh has been estimated at 11 million cubic metres, with a maximum discharge of 12.5 cubic metres per second and a retention period of more than 10 days (Mahanama 2000). By maintaining surface, near-surface and possibly groundwater levels, the marsh also plays a major important role in local freshwater supplies. These functions are particularly important for local households,

many of whom lack a piped water supply and rely on shallow-dug wells.

Water quality and fisheries production in downstream Negombo Lagoon are heavily dependent on these wetland services. Muthurajawela acts as a source of freshwater to the tidal delta, and is critical in moderating salinity and pollution levels. Its sheltered waters, flooded vegetation and mangrove areas all constitute important breeding grounds and nurseries for freshwater and marine species of fish and crustaceans. Downstream of the marsh, Negombo Lagoon has a high productivity for fisheries of an estimated 150 kg/hectare/year (GCEC 1991), involving more than 3,000 families from 26 villages (CEA 1994, GCEC 1991, Hettiarachchi & Samarawickrama 2000).

The impacts of land use zoning around the wetland

The location of Muthurajawela Wetland Sanctuary in a rapidly developing urban area makes it an extremely vulnerable ecosystem. Large parts of the freshwater marsh system have been altered, and a variety of canals, drains, bunds, sluices and culverts present evidence of various attempts to manage waterflow, combat flooding and prevent saltwater intrusion. There is a long history to these human modifications. As early as the 15th century a canal was constructed (now referred to as the Dutch canal, running along the eastern side of the marsh from the Kalani Ganga into Negombo Lagoon), and extended along with other works under Dutch occupation in the 18th century. In the 19th century the British constructed the Hamilton canal, running along the western side of the marsh, parallel to the sea. Since then, a network of dikes and waterways have been built which link and extend the Dutch and Hamilton canals.

After Independence, in 1947, successive national governments have made plans to further develop Muthurajawela for agriculture and settlement. In 1965, a scheme was identified to completely fill and polderise the marsh in order to provide land for the relocation of slum residents from Colombo. Although this plan was never implemented, it resulted in encroachment into the marsh. Since

the 1970s housing development has increased still further, and a number of permanent settlements have been established around the fringes of the Wetland Sanctuary. Most of today's population originally migrated into the area after the mid-1970s, attracted by the relatively low price of land and the lack of enforcement against moving into state-owned areas.

Today, the marsh is subject to intense pressure from surrounding industries and settlements. Low-cost housing borders, and in some case encroaches upon, the wetland. The large Ekala-Ja Ela Industrial zone lies to its east and a new industrial area has been developed at the southern end of the wetland. Bandaranaike International Airport and Negombo town (with an estimated population of 150,000 people) are both located to the north of Muthurajawela. The Colombo-Katunayake Expressway, linking Colombo with the industrial areas and airport, is in the process of being built and cuts across the borders of the Wetland Sanctuary.

There have been considerable changes to the biodiversity, ecology and hydrology of the marsh area as a result of these activities. Large amounts of wastes now enter the marsh from adjacent households, fishing boats, tourist facilities, agriculture and industries (CEA & Arcadis 2000). Currently at least two thirds of the households living around the marsh have no proper latrine facilities, and discharge untreated sewage into the wetland (Mahanama 1998). Of the 150 or so industries in Ja-Ela and Ekala, 64 generate effluent, 17 have high domestic loading of over 10 m³/day by water consumption, and only 13 have any kind of treatment facility (Ministry of Policy, Planning and Implementation 1993). In total, it is estimated that the marsh and lagoon area receive raw or partially-treated sewage from a population equivalent to 200,000 people (CEA undated). Land filling and reclamation in the marsh area for industry, infrastructure and settlement has also increased local erosion and siltation (van Agthoven and Gijsbers 1992). By 1999, annual sediment loads entering the marsh were estimated at 147,000 tonnes a year from the Dandugam Oya and Ja-Ela, and 62,000 tonnes a year from the Hamilton Canal (Kragtwijk and van Nood 1999).

As Muthurajawela has been degraded and reclaimed, hydrological linkages to appropriate discharge points have been cut off, meaning that excess water and peak flows cannot move easily into Negombo Lagoon. Over recent years the intensity and frequency of flooding has increased dramatically in low-lying fringes of the marsh (CEA 1994). In severe rain, the Hamilton Canal and other watercourses overflow, and inundate surrounding areas. Today, floods occur in adjacent settlements at least two times a year during the wet seasons (van Aghoven and Gijssbers 1992), and during every rainfall period more than 1,000 households in the marsh area are affected by flooding (GCEC 1991). Important breeding habitat for freshwater, brackish water and marine fish species has been reduced and water quality has fallen, with especially high levels of BOD and COD around industrial and residential areas indicating organic loading and pollution (IUCN 2001).

As a result of growing concern about these sources of ecosystem degradation and biodiversity loss, the government decided in 1989 to freeze all public and private sector development proposals until an environmentally sound Masterplan was developed for the Muthurajawela Marsh. The Greater Colombo Economic Commission (now the Board of Investment) was instructed to prepare this plan. The publication of the Masterplan for Muthurajawela Marsh and Negombo Lagoon in 1991 (GCEC 1991) led to a land use strategy being proposed for the future, based on dividing the Muthurajawela-Negombo area into various development and conservation zones (Mahanama 2000):

The Master Plan was accepted by the government in 1992, and implementation commenced, including the development of a special management plan for the conservation zone (CEA 1994). The Department of Wildlife Conservation was charged with managing the conservation zone, the Department of Fisheries was made responsible for the fishery in Negombo Lagoon, and the Forest Department was mandated with the management of mangrove areas. A detailed plan for the conservation zone was prepared, and in 1996 an area of 1,777 hectares in the northern part of the marsh was declared a

Wetland Sanctuary under the Fauna and Flora Protection Ordinance.

Valuing the benefits of Muthurajawela Marsh

Despite the existence of a management plan for Muthurajawela conservation zone, there remains serious concern about the future of the Wetland Sanctuary. Encroachment and degradation continues, and infrastructural developments and industrial expansion are still occurring close to – and sometimes within – the marsh area. A clear need has been identified to strengthen existing conservation activities in the Wetland Sanctuary.

A first step in these renewed efforts was to provide the basic biophysical and socio-economic information required to update wetland management activities. The first detailed biodiversity assessment ever made of Muthurajawela Wetland was carried out between November 1999 and April 2000 (IUCN 2001). It resulted in the identification of critical species, habitats, threats and proposed management actions.

The valuation exercise aimed yield a set of complementary data which could provide backup to, and additional justification for, the recommendations arising from the biodiversity assessment. Just as the biodiversity assessment had used Muthurajawela Wetland Sanctuary as a demonstration site to develop and apply a set of general criteria for the identification of critical habitats in wetland ecosystems, so the economic study aimed to develop, apply and document methods for the integration of economic concerns into biodiversity assessment procedures which would then be more generally replicable within the context of wetland conservation in Sri Lanka. Economic assessment procedures were designed so that each stage corresponded to an equivalent step in the biodiversity assessment process applied in Muthurajawela, and analysis and conclusions pointed to economic measures that could provide direct support to the management recommendations provided in the biodiversity assessment.

Using economic tools in the Wetland Sanctuary's management plan

The principal recommendation yielded by the earlier biodiversity assessment was that Muthurajawela Wetland Sanctuary should be accorded Ramsar site status, and that the northern part of the marsh should be added to the existing protected area in order to assure adequate protection of critical species and habitats. The economic study provided a credible economic rationale for these actions, showing that continued conservation of the Wetland Sanctuary would yield considerable benefits.

Direct use values that depend on the Muthurajawela Marsh, including sustainable local resource use and recreation, are worth more than half a million dollars a year (Figure 2). The provision of localised ecosystem services such as flood attenuation, industrial and domestic wastewater purification and year-round surface and sub-surface water supplies have an annual value in excess of \$7 million a year. The wetland's support to downstream fish productivity in Negombo Lagoon contributes a value of almost \$225,000. Together these translate into economic benefits of just over \$2,600/hectare/year for the whole of Muthurajawela Marsh, or non consumptive use benefits of \$4.4 million for the Wetland Sanctuary. More than 30,000 people, most of them poor slum dwellers and fishing households, gain from these economic goods and services.

Figure 2: Economic value of Muthurajawela

	Value (\$/year)	Value (\$/ha/year)
Flood attenuation	5,394,556	1,758
Industrial wastewater treatment	1,803,444	588
Agricultural production	336,556	110
Support to downstream fisheries	222,222	72
Firewood	88,444	29
Fishing	69,556	23
Leisure, recreation and recreation	58,667	19
Domestic sewage treatment	48,000	16
Freshwater supplies	42,000	14
TOTAL	8,072,111	2,631

The biodiversity assessment specified five management actions that were required as a matter of urgency to address the current threats to the wetland. Dissemination of the findings of the valuation study met the first two aims: raising awareness on wetland values, and documenting the socio-economic status of Muthurajawela. The valuation study also specified a series of economic tools and measures that could lend support to the three other management actions specified – promoting sustainable revenue and income-generating activities, encouraging ecosystem restoration activities and initiating prompt and punitive action against wetland-degrading practices.

The valuation study's findings underlined the high economic benefits that could accrue from wetland restoration, but also indicated that any reduction in extractive wetland activities would constitute real economic losses to local households. A package of economic incentive measures, including value-added and income generating activities, was identified as essential to providing the necessary support to local landholders undertaking wetland restoration. Ways of capturing and retaining wetland benefits as revenues for the Department of Wildlife Conservation, the agency mandated to manage the Wetland Sanctuary, were also highlighted by the valuation study as central to the management of the extended conservation area. Information on the high economic benefits yielded by Muthurajawela Marsh additionally provided a reference point for ensuring that penalties for wetland degradation are realistic, and reflect the real costs of damage caused. The study recommended that penalties for wetland damage through infrastructural and industrial expansion should be set at levels that are considerably higher than is currently the case, and are closer to the real costs incurred, either to act as an additional disincentive against wetland degradation or else to make available sufficient funds to remedy or mitigate their effects.

This case study is adapted from Emerton, L., and Kekenlandala, B. (2002). Assessment of the Economic Value of Muthurajawela Wetland. IUCN — The World Conservation Union, Sri Lanka Country Office and Regional Environmental Economics Programme Asia, Colombo

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This project aims to develop, apply and demonstrate environmental economics techniques and measures for wetland, water resources and river basin management which will contribute to a more equitable, efficient and sustainable distribution of their economic benefits at the global level and in Africa, Asia and Latin America, especially for poorer and more vulnerable groups.

The views and opinions in this document are those of the authors alone, and do not necessarily reflect those of IUCN, DFID or other institutions participating in the project.

For more information, please contact:

Lucy Emerton. LAE@iucnsl.org Tel: ++94 1 694 094

For information about project activities in Africa, Asia and Latin America please contact:

Eastern Africa: Francis Karanja.

FKK@iucnearo.org Tel: ++254 2 890 605-12

Latin America: Rocío Córdoba.

Rocio-cordoba@iucn.org Tel: ++506 241 0101

Lower Mekong: Sarah Porter.

sp.mekongwetland@online.com.kh Tel: ++855 23 222

311/2

South Asia: Shamen Vidanage.

SPV@iucnsl.org Tel: ++94 1 694 094

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