Biodiversity of Cambodia's Wetlands

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Introduction

Wetlands cover more than 30 per cent of Cambodia. In addition to streams, ponds, freshwater swamps and marshes, Cambodia has four internationally significant wetland areas: the Mekong River and its floodplain, the Great Lake (Tonle Sap) and its floodplain, the Stung Sen River and the coastal estuaries of Stung Koh Pao and Stung Kep. The Mekong River is the longest river in Southeast Asia, and about 468 km of its length is in Cambodia. The Mekong River provides a wide range of benefits at both national and community levels. It serves as a migratory channel for fish between rivers, tributaries and lakes. The seasonal relationship between the Tonle Sap and the Mekong River is an interesting aspect of the Mekong River system. The Mekong River swells during the wet season (May to October) and its waters flow into the Tonle Sap River, forcing it to reverse its course and flow back into the Tonle Sap Lake. The lake expands from 2 500 km^2 in the dry season to 13 000 km^2 in the wet season (Ministry of Environment 1999).

The Tonle Sap Lake is a seasonally inundated lake surrounded by a broad belt of freshwater swamp forest about 25 km wide except in Battambang Province where it extends up to 65 km. The Tonle Sap supports important agriculture, fisheries, and aquaculture industry. Cambodia is estimated to have a fish catch of more than 400 000 t per annum (van Zalinge et al. 2000) and average per capita fish consumption of 71 kg per annum (Ahmed et al. 1998).

In the coastal zone, mudflats and estuaries are important wetland environments. The major estuaries and mudflats are found in Koh Kong and Kampot provinces. The Stung Koh Pao and Stung Kep estuaries are recognized as internationally important wetlands. Both rivers originate in the Cardamon range and discharge into Koh Kong Bay. Mudflats are very productive systems and are rich feeding grounds for vertebrates (Ministry of Environment 1999).

Many of the riparian wetland ecosystems in Cambodia are of global significance. Their exploitation, management and conservation are important areas for study.

Freshwater wetlands

Freshwater wetlands in Cambodia represent one of the most diverse ecosystems in the Mekong River Basin. Nearly 500 of the 1 200 fish species found in the Mekong River are in Cambodia. The degree of endemism in the Cambodian section of the Mekong River is high, especially in the upland areas of the northeast and in the mountains bordering Thailand and the Gulf of Thailand (Rainboth 1996). Endangered species include the Giant Catfish (*Pangasianodon gigas*) and Try Trasak (*Probarbus jullieni*) (Ministry of Environment 1999).

Of the 435 bird species in Cambodia, 106 are water birds and the wetlands of the Lower Mekong Basin support 15 globally threatened species including the critically endangered Giant Ibis (*Pseudibis gigantean*), rediscovered in 1993 along the Xe Kong and Mekong Rivers in Lao PDR. Other endangered species include the Sarus Crane (*Grus Antigone*), Greater Adjutant (*Leptoptilos dubius*), White Shouldered Ibis (*Pseudibis davisoni*), White Winged Duck (*Cairina scutulata*), Bengal Florican (*Eupodotis bengalensis*) and Nordmann's Greenshank (*Tringer guttifer*). Vulnerable species include the Spot Billed Pelican (*Pelecanus philippensis*), Lesser Adjutant (*Leptoptilos javanicus*), Milky Stork (*Mycteria cinerea*), Greater Spotted Eagle (*Aquila clangula*), Green Peafowl (*Pavo muticus*), Masked Finfoot (*Heliopais personata*), Blackbellied Tern (*Sterna acuticauda*), and Indian Skimmer (*Rynchops albicollis*).

The Tonle Sap Lake is the largest breeding ground for large water birds in Asia. The Sarus Crane and Grus Antigone are found in Northeast Cambodia and Trapeang Thmar, and Banteay Meanchey provinces (Wetlands International-Asia Pacific 1996).

Other endangered species include the Irrawaddy Dolphin (*Orcaella brevirostris*), of which fewer than 100 individuals are believed to survive in the Mekong today, mostly between Phnom Penh and the Khone Falls in southern Lao PDR. The Siamese Crocodile (*Crocodilius siamensis*) is also critically endangered. It used to be found throughout the Lower Mekong Basin but numbers have declined through excessive hunting and

habitat degradation. Over 20 species of turtles live in the Lower Mekong Basin, 10 of which are listed in the Red Data Book, including the critically endangered Chinese Three Striped Box Turtle (*Cuora trifasciata*).

Limited surveys of mollusks have identified a rich biodiversity with a high degree of endemism. Of the 160 mollusks identified in the Mekong and its Mun tributary, 116 species (73 per cent) are endemic. In a recent survey of the Stung Treng Ramsar site conducted by the Department of Nature Conservation and Protection, 33 species of plants were found in flooded forests. In the Tonle Sap alone, 200 species were identified in 1996 (McDonald et al. 1997).

Threats to freshwater wetlands

Loss of ecosystem integrity

The productivity of the wetland system of the Lower Mekong Basin stems from the differences in the wet and dry season flows. There are a number of proposed developments that may alter the hydrological regime, reducing the peak wet season flow and increasing the dry season flow. The cumulative effects on the biodiversity of the Basin's wetlands are unknown. Such alterations are likely to reduce productivity because some seasonal wetlands do not fill up and others dry out. The rapid industrialization of the Lower Mekong Basin and agricultural runoff are increasing the pollution load and, in the absence of effective measures to control pollution, it will continue to increase. Intensive logging in the Basin is reportedly causing increased sedimentation of rivers resulting in the loss of ecosystem function.

Reduction of species abundance and diversity

Exploitation of wildlife in the region is high, particularly migratory birds, and over-harvesting of plant life is widespread. For example, during the 1995-96 breeding season, collectors and harvesters gathered over 26 000 eggs and 2 559 chicks from colonies in Prek Toal at the western end of the Tonle Sap Lake. The species collected included the endangered Spot Billed Pelican (*Pelicanus philippensis*), Greater Adjutant Stork (*Leptoptilos dubius*), and the White Winged Duck (*Cairina scutulata*). About 3 100 Spot Billed Pelican eggs were harvested during the 1995-96 breeding season. This is from a species whose global population is estimated at 11 500.

Harvesting non-target fish species using destructive methods, tree felling (to remove arboreal wildlife or allow easy gathering of fruit) and illegal shipments of biomaterial for traditional medicine and food are also threatening the ecosystem. Loss of ecosystem integrity is further brought about by the introduction and spread of alien species such as the Giant Mimosa (*Mimosa pigra*) and Golden Apple Snail (*Pomacea canaliculata*).

Coastal wetlands

Biodiversity

The 435 km Cambodian coastline is comprised of beaches and 60 000 ha of some 30 species of mangroves. The most pristine mangrove forests are found in Koh Kong Province. In addition to mangroves, seagrass beds extend throughout the coastal areas, especially in Kampot Province, the Prek Kompong Bay Delta and Kep municipal waters. Extensive seagrass meadows exist along the mainland and patches of seagrass intermingled with coral reefs may be seen around islands. Eight species of seagrass have been identified to date: *Enhalus acoroides*, *Cymodocea serrulata*, *Halodule pinifolia*, *Halodule uninervis*, *Halophila decipiens*, *Halophila ovalis*, *Syringodium isoetifolium*, and *Thalassia hemprichii*.

A total of 70 species of hard corals belonging to 33 genera and 11 families have been identified in Cambodia's coastal waters. *Acropora* and *Montipora* are two of the most common ones. Among reptiles, four species of marine turtles are reported to be present in Cambodia's waters: Hawksbill turtles (*Eretmochelys imbricata*), Green turtles (*Chelonia mydas*), Olive Ridley (*Lepidochelys olivacea*) and Leatherback (*Dermochelys coriacea*). Crocodile sightings, (probably the Saltwater Crocodile *Crocodylus porosus*), have been reported by fishermen in the Koh Kong estuary mangroves and Prek Toek Sap.

The coastal waters host about 435 fish species from 97 families. Marine mammals (*Dugon dugon*) and marine dolphins are found, including the endangered Irrawaddy Dolphin (*Orcaella brevirostris*). Other species of cetaceans known to occur in Cambodia's coastal waters are the Indo-Pacific Humpback Dolphin (*Sousa chinensis*), Common Dolphin (*Delphinus delphis*), Bottle-nosed Dolphin (*Tursiops truncatus*), Shinner Dolphin (*Stenella longirostris*), and Finless Porpoise (*Neophocaena phocaenoides*).

Threats to biodiversity

While there are laws protecting mangrove forests, (cutting mangroves has been made illegal since 1994) threats remain. Mangrove loss occurs as a result of charcoal production and shrimp farming. A large portion of the Peam Krasop Wildlife Sanctuary was cleared at the end of 1998 even though the Department of Environment routinely destroyed the charcoal kilns to prevent further production. In Koh Kong and Kampot provinces, 1 272 ha of mangroves was cleared for shrimp farming but the shrimp ponds were later abandoned as unprofitable. Trawling and motorized push nets in shallow waters destroy seagrass leading to a reduction in fish catch and threaten the species which are dependent on them. Coral reefs in near shore areas are reported to be in poor condition due to sedimentation and the use of destructive fishing practices. The *Dugon dugon* is endangered by floating and fixed gill nets, especially in Kampong Som Bay.

Conservation approach

In 1993, the King designated 23 areas as protected. Four categories were created: national park, wildlife sanctuary, protected landscape, and multiple use areas. The Tonle Sap, Dong Peng (multiple use areas) and Peam Krasop (wildlife sanctuary) were designated as protected wetland areas. Three wetlands (Boeng Chmar in the Tonle Sap-Great Lake, Stoeng Treng and Koh Kapi in Koh Kong Province) were identified as sites of international importance. Stoeng Treng was designated by the Ministry of Environment as a demonstration site for the 'Mekong River Wetlands Biodiversity Conservation and Sustainable Use Project' that will run from 2003 to 2007. The Boeng Tonle Chmar Ramsar site has been designated as the core zone of the Biosphere Reserve. A number of sites in the Tonle Sap area are designated as fish reserves or fish sanctuaries. Most of the open waters bordering the flooded forests are allocated for fishing by the Department of Fisheries.

The Participatory Mangrove Management Resource Project is being implemented in the Peam Krasop Wildlife Sanctuary. This sanctuary is an important migration route for birds in the region.

Recommendations

Local communities and other stakeholders need to be involved in managing the wetlands. An economic valuation of wetlands should be undertaken to confirm the benefits of biodiversity. The approval of the Wetland Action Plan and the establishment of the National Wetlands Committee are necessary for integrated wetlands planning. A wetlands biological assessment should be conducted to provide a basis for wetland policy, planning and management. There need to be human and technical resources development and a review of alternative uses of wetland natural resources.