Climate Change Mitigation

In Brief

- ✔ **Wetlands may store as much as 40% of global terrestrial carbon; peatlands and forested wetlands are particularly important carbon sinks.**
- ✔ **Conversion to agricultural use and destruction of wetlands will release large quantities of carbon dioxide, the gas that accounts for at least 60% of the global warming effect.**
- ♦ **As the full effects of global warming are felt over the next 100 years, the ability of coastal wetlands in some parts of the world to mitigate the effects of storm surges and other extreme weather effects will be put to the test; maintaining wetlands in a healthy state, avoiding further wetland losses and restoring and rehabilitating wetlands in the frontline of defences would be sensible tactics.**

WETLANDS PLAY AT LEAST TWO CRITICAL BUT CONTRASTING ROLES in mitigating the effects of climate change: one in the management of greenhouse gases (especially carbon dioxide) and the other in physically buffering climate change impacts.

Wetlands act as significant carbon sinks and so the destruction of wetlands will release carbon dioxide, a greenhouse gas, while wetland restoration and creation will increase the sequestering of carbon.

Wetlands will play a further role as the frontline defenders of coastal and inland areas as countries deal with the full effects of climate change: increasing frequency of storms, changing rainfall patterns, rising sea-levels and sea surface temperatures.

Wetlands have been identified as significant storehouses (sinks) of carbon. Using Ramsar's broad definition of wetlands this may amount to as much as 40% of global terrestrial carbon. Peatlands and forested wetlands are particularly important as carbon sinks. Although covering only 3% of the world's land area, peatlands are estimated to store over 25% of the soil carbon pool.

Although wetlands are known to play an important role in the global carbon cycle their full role is not yet completely understood. What is clear is that drainage, conversion to agricultural use and degradation of wetlands will release large quantities of carbon dioxide (which accounts for at least 60% of the warming effect) as well as other greenhouse gases contributing to global warming.

It is alarming to realise that the Earth is likely to become warmer during this century than at any other time in the history of the human species.

The many environmental changes associated with climate change have serious implications for wetlands – key impacts on wetlands include the effects of sea level rise, rising temperatures, and changes in precipitation patterns, ocean currents and winds. Compounding this in certain areas will be the likely increase in tropical storms as well as heavier and more abundant rainfall bringing increased freshwater and sediment to coastal areas. Changes in the hydrological cycle will affect inland wetlands too and test their abilities to contend with increased rainfall in some areas and decreased rainfall in others as well as changes in groundwater recharge and discharge.

Beaches, dunes, estuaries, mangroves and other coastal wetlands are naturally equipped to adapt to changes in prevailing winds and seas and to sea-level rises. The predicted changes as a result of climate change will, however, be increasingly rapid compared to the natural rate of change to which the systems are adapted. Coastal managers will have to assist wetlands to adapt to these

changes – dune restoration and rehabilitation and re-creation of coastal wetlands will be essential in some countries.

The ability of coastlines and coastal wetlands to "migrate" inland with sea-level rise is increasingly restricted through the infrastructure associated with human habitation in coastal areas – more than half the world's population already lives in coastal zones and this proportion is increasing. Dense human habitation of coastal zones and intense economic activity will limit the capacity of some coastal wetlands to adapt quickly to sea level rise and more frequent storm surges.

The same goes for river floodplains, where increasing human habitation, drainage of wetlands and river canalisation have severely restricted their capacity to buffer floods in many places – and increased people's vulnerability to flooding. Not only does this cost human lives but damage can run into billions of dollars (see section on Flood Control).

In anticipation of these climate change effects it makes sense (a) to prevent further wetland destruction and conversion that would increase carbon dioxide emissions and (b) to consider wetland restoration and rehabilitation as a means to increasing carbon storage and improving the resiliency of wetlands. The opportunities are many: restoring floodplains, for example, would assist countries that may be faced with more abundant and unpredictable rainfall.

The Ramsar Convention, through its Scientific and Technical Review Panel (STRP) is looking more closely at climate change and wetlands with the provision of more guidance for Contracting Parties at the 8th Conference of the Contracting Parties in Spain in 2002. The Ramsar Bureau will also be forging closer, more effective links with the United Nations Framework Convention on Climate Change to assist countries prepare for the effects of climate change on their wetlands.

The effects will vary geographically but here are some examples of the predicted effects of climate change on selected wetlands:

- Some inland wetlands will be under pressure from increased precipitation. In the Pantanal the wettest years will be 2-3 times more frequent than they are now, leading to more frequent flooding. Spanning Bolivia, Brazil and Paraguay, the Pantanal is one of the largest remaining freshwater wetlands in the world; part of it is a Ramsar site.
- Coral atolls will be particularly threatened through sea-level rise and rising sea surface temperatures. Rising temperatures in recent years have already caused serious coral bleaching in many areas – reefs in Australia, Costa Rica, Panama, Colombia, the Galapagos Islands and the Caribbean have already suffered and further temperature rises will have more widespread effects. Sea level rise is an immense threat to small island nations based entirely on coral atolls such as the Maldives in the Indian Ocean and Kiribati and Tuvalu in the Pacific.
- Warmer sea temperatures will produce more frequent algal blooms in some areas. The coastal wetlands of the Florida Keys and the Everglades in the USA will suffer such damaging effects.
- Some inland areas will experience decreased precipitation. Wildlife in Zimbabwe's Kariba National Park will be threatened by reduced precipitation in the Lake Kariba basin. Although the Iberian peninsula will have increased annual precipitation, summers will become drier, threatening the wetland habitats in the Coto Doñana National Park, an important breeding and wintering site for migratory waterbirds. ◆

Wetland Values and Functions

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