

Overview of wetlands services for climate change adaptation

Climate change phenomena and some potential impacts

Increased frequency and magnitude of freshwater floods:

- Physical damage / loss of property and life and loss of ecosystems
- Water pollution (overflow of sewage systems)
- Decreased (food) production through damage to production systems and agricultural areas

Increased frequency and magnitude of droughts (rising temperatures, periods with less rainfall):

- Decreased food production due to freshwater shortage
- Waterways unavailable for transport
- Loss of ecosystems and biodiversity
- Contamination of freshwater sources through saltwater intrusion

Increased frequency and intensity of storms affecting coastal zones:

- Physical damage / loss of property and life and loss of ecosystems
- Pollution and damage to ecosystems and health
- Decreased (food) production through damage to production systems and agricultural areas

Melting of glaciers:

- Increased floods after heavy precipitation in mountain regions, leading to floods
- Less fresh water flows from glacier fed rivers during periods with little precipitation. This is leading to fresh water shortage.

Coastal inundation as sea levels rise:

- Loss of coastal fishery productivity
- Loss of coastal agricultural areas, cities and other economically important areas.
- Loss of coastal ecosystems as land is lost
- Loss of agricultural production and increased fresh water shortage through saline intrusion

Role wetlands in climate adaptation

Protect life, property, production systems and ecosystems:

- Lakes and floodplains can reduce peak flood flows by delaying and storing floodwaters
- Lakes and floodplains can detain polluted floodwaters
- Highland peatlands can regulate river flows releasing flood flows slowly over time

Provide resilience against drought by replenishing freshwater aquifers and providing sources of water during drought:

- Marshes, lakes and floodplains can maintain river base flows by releasing wet season flows slowly during drought periods
- Groundwater aquifers can be recharged during water-rich periods ensuring groundwater sources during drought
- Income diversification during drought periods providing alternative sources of food and water for people and biodiversity
- Mangroves and other coastal wetland ecosystems can guard against saltwater intrusion when coastal freshwater areas dry up

Protect life, property, production systems and ecosystems:

- Mangroves other forested coastal and delta ecosystems and reefs can disseminate storm power
- Coastal wetlands like mangroves can assist the recovery of local community livelihoods after storms by providing sources of food and building materials
- Forests and reefs can provide havens for biodiversity during and after storms

Provision of and maintain resilience of freshwater sources:

- Marshes and lakes can store excessive precipitation, just like glaciers used to do.
- Marshes and lakes will release water is a reliable flow just like glaciers used to do.

Protection and maintenance of coastal zones and their ecosystems:

Mangroves, reefs and other coastal wetland ecosystems:

- Build and maintain the resilience of natural coastal defences through alluvial plain accumulation.
- Provide nurseries for coastal fisheries
- Protect freshwater sources from saline intrusion

Mission:

To sustain and restore wetlands, their resources and biodiversity for future generations.

Our future activities on climate adaptation

Research & Evaluation

- Assess the full potential contribution of wetland functioning towards achieving adaptive capacity for climate change
- Evaluate the consequences of changing wetlands conditions for adaptation strategies

Sharing knowledge

- Share practical experiences on community-based wetland conservation and restoration as a practical tool for climate change adaptation
- Mainstream the role of wetlands in local, national and international adaptation policies.

Restoration & conservation

- Contribute to improved wetland conservation, restoration and management focusing on:
 - i) vulnerable coastal areas
 - ii) high altitude wetlands
 - iii) wetlands in Sahelian zone

Wetlands and Climate change adaptation



Sustaining and restoring wetlands: an effective climate change response

Wetlands International urges governments, development organisations and finance institutions to integrate wetlands into climate change and development strategies.

Global conventions UNFCCC, CBD and the Ramsar Convention on Wetlands should assist countries by guiding on the role of wetlands in climate adaptation plans.

Inland and coastal wetlands are being lost and degraded faster than any other ecosystem type in the world. This continuing trend will considerably magnify the problems that climate change will bring to nature and people, This is because the poorest communities are also the most strongly dependent on the natural resources and services that wetlands provide. Hence when wetlands are affected, the ability of these communities to adapt to climate change will be greatly reduced.

Wetlands International explains and demonstrates how conservation, restoration and wise use of wetlands can be a cost-effective strategy for climate adaptation with strong benefits for poverty reduction and biodiversity conservation. Conversely, we believe that strategies for climate adaptation and development that do not address the continuing crisis in wetlands loss and degradation, will have strong limitations.

When wetlands are in a healthy, intact condition, they can greatly contribute to increasing our resilience to the impacts of climate change. For example, mangrove forests and coral reefs are natural buffers against impacts of sea level rise and storms. Floodplains, peatlands and lakes reduce peak flood flows in periods of extreme rainfall or glacier melt. Due to their ability to store and slowly release water, these wetlands can also be a vital lifeline in periods of extreme droughts.



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Examples of wetlands and adaptation

Climate change is expected to contribute to extreme weather like heavy rainfall, prolonged droughts, melting of glaciers, increased temperatures, severe storms and sea level rise. Wetlands International presents 3 cases how wetlands can play a significant role in adaptation to climate change. These lessons are derived from decades of research and ecosystem management in some of the world's areas foreseen to be most affected by these climate change impacts.

Mangrove forests for coastal protection

Tropical coasts become threatened when warmer seawater caused by climate change increases the frequency and strength of storms. Ecosystems along tropical coasts, such as mangrove forests and coral reefs, can reduce the impact of storms and reduce the impacts of sea level rise.

The Asian Tsunami showed that mangroves can considerably reduce the impacts of waves: areas behind intact mangrove forests or coral reefs were less affected than coastal areas without these physical buffers, except in the highest impact areas. This is particularly important as a large percentage of the world's poor live in coastal areas. Many coastal forests and reefs have however been lost or have become very vulnerable due to land conversion, pollution and over harvesting, and have therefore lost their capacities to reduce impacts of climate change.

Intact mangroves are also resistant to sea level rise, they can adapt to 3,8 up to 9 millimetres per year depending on local circumstances. Mangroves can also reduce large scale inundation and salt water intrusion.

The Green Coast project

During the last years, Wetlands International has led the Green Coast project in South-east Asia, working together with partners and local communities to plant 1.2 million mangrove seedlings, re-establishing over 1,000 hectares of coastal forest, as well as managing other key natural habitats such as coral reefs and lagoons. In total this provided 91,000 people with greater security and a basis

for new livelihoods in the hardest hit Tsunami areas of Indonesia, Thailand, Malaysia, India and Sri Lanka. See www.greencoasts.org.

In the Green Coast project, poor communities that participated were rewarded when they restored and managed their areas well. We provided financial capital and technical support for local people's livelihood activities and in return they planted and nurtured mangroves or other coastal forests.

Many thousands of people directly benefited from this approach with increased income. Coastal communities have become more protected and prepared for the impacts of climate change. The restored reefs and mangrove forests also support fish stocks and protect inland fresh water systems.



Upscaling of the approach

Being a well-tested approach in relation to climate change adaptation, the Green Coast model is being promoted by Wetlands International to restore mangroves along the highly vulnerable West African coastline. The Intergovernmental Panel on Climate Change (IPCC) predicts that towards the end of the 21st century projected sea-level rise will affect large populations along Africa's coast line.

Wetlands International is carrying out scientific assessments and provides support to communities and governments in this region to identify priorities for climate change adaptation and to build resources and technical capacity to enable community activities for mangrove restoration and wise use.

Water flow regulation in high altitude areas

In high mountain areas such as the Himalayas, climate change will lead to changes in rainfall pattern and accelerated glacial and permafrost melt due to increasing temperatures. With fewer and fewer glaciers left, the water storage capacity is diminished while this storage is becoming more and more important to reduce the impacts of precipitation extremes. It is expected that changes in precipitation in combination

with melting glaciers will fuel more erratic flows with increased downstream flooding and drought events.

Lakes, floodplains and high altitude peatlands regulate water flow in the Himalayas. These wetlands function as catchment areas for extreme water flows from heavy rainfall and melting ice water. In periods of drought they ensure water availability for the region



Wetlands International leads two major wetland restoration projects in the region with the aim to re-establish their water flow regulation capacity and make their associated communities more resilient to impacts from climate change.

Restoration of Wular Lake

This EU-project (Asia Pro Eco Programme) takes place in the Jhelum Basin, a 33,000 km² sub-basin of the Indus river in India. This basin is fed by glaciers that are amongst some of the fastest receding in the world. The wetlands that regulate the water flow in this area are rapidly being lost due to over-exploitation for agriculture and direct discharge of waste. As a result the area is already suffering from enhanced frequency of floods and droughts within the basin.

The project focuses on improved management of Wular Lake, a major wetland area with a storage capacity of 170 million cubic metres of water. Its water storage capacity has decreased by approximately 20% over the last 30 years, due to conversion of the lake and adjoining marshes for plantation of willow trees and agriculture.

Wetlands International and her partners have developed an Action

Plan for restoration of the lake and its catchment. The implementation includes upstream catchment conservation through afforestation, soil conservation measures and changes to more sustainable land management practices. Within the lake it involves dredging and removal of willow plantations to increase the lake volume to rejuvenate the flow regulation function and rehabilitation of fisheries.

Restoration of the lake ecosystem will lead to increased resilience of local and downstream communities from future floodwaters and enhanced access to water for their livelihoods in times of extreme droughts.

Peatland restoration in Ruoergai

The Ruoergai marshes on the Eastern edge of the Tibetan plateau are one of the world's largest high altitude peatlands, comprising 490,000 hectares. When intact, the peatlands regulate the flow of the Yellow,

by slowly releasing the stored water. This reduces droughts and floods for the 1,5 billion people living downstream in the lowland regions of the Himalayas and in densely populated areas for instance in India, China or Bangladesh.

While these wetlands are more and more important in the light of climate change, they are being lost at a rapid pace.

Yangtze and Lancang rivers which arise here. The peatlands reduce the impacts of extreme rainfall, while in dry periods they supply the associated communities and biodiversity with sufficient water. The marshes are also an important grazing area and have a rich biodiversity.

The peatswamps are heavily degraded due to mining of peat for fuel and overgrazing. Hundreds of kilometers of drainage canals have been created in the seventies to expand the area for grazing. As a result, water levels have decreased, biodiversity is being lost, the carbon storage capacity of the peat marshes is going down, and there is now less land available for grazing due to steady trends of water erosion and desertification. Possibly most important; the capacity of the area to store excessive water diminishes - and this loss magnifies the impacts of climate change.

Wetlands International has advocated and piloted simple peatland restoration techniques in the Ruoergai marshes. In partnership with government agencies and local communities we built small

dams to block ditches and gullies and maintain water level in the peatland near the surface. This reduces drying out and prevents peatland loss. These pilots have been successful.

Peat mining and drainage are now no longer allowed in the area. We showed that at relatively little expense the ecosystems can be restored increasing their resilience to climate

Ensuring fresh water provision in the Sahelian floodplains

Decreasing water availability

Limited water availability and normal climatic variation places enormous stress on life in arid regions. Climate change is expected to worsen this situation in many arid regions like the Sahel.

Climate change will pose an immense challenge to Sahelian peoples and nature. In recent years an unprecedented decline in rainfall has been experienced and it is not expected to recover. As climate change begins to take effect, annual rainfall is expected to stay low and to decline by a further 20% over the next 100 years. Temperature is already rising more rapidly than anywhere else in the world and is expected to increase between 2-7 degrees Celsius in the next 80 years. This points to a reduction in water resources availability.

Wetlands like rivers and lakes are in areas such as the Sahel often the most accessible sources of water and form the centre point for rural life and will increasingly become so considering the expected droughts that climate change will cause.

Wetland management in the Inner Niger Delta

The huge inner Niger Delta in Mali is an example of an extremely important water resource in an Arid region.

In addition to climate change, planned upstream water resource developments in the Niger river like dams for hydropower and irrigation threaten to further reduce flows to the Delta. Predictions show that these developments alone will place the one million inhabitants under extreme stress. The seasonally inundated areas used for agriculture and grazing reduce in size and fish stocks drop.

Poor management of the water resources of the Niger river and the Inner Niger Delta will magnify the impacts of climate change.

In an international partnership including Malian government agencies, Wetlands International has researched the relationship between upstream water management and the life of people and nature in this inland delta.

change and the adaptive capacity of local and downstream communities. This project is a model approach for the whole region which is suffering similar problems.

The partnership developed a method to analyse how to optimise water allocation for the Inner Niger Delta and upstream areas, taking into account environmental and socio-economic factors. This method provides clear information on which irrigation or hydropower schemes provide gross benefits, and which ones do not.

Wetlands International is also working in the delta with local communities to come to a more sustainable use of natural resources. We support people to restore flood forests that are crucial breeding grounds for fish and help to diversify local incomes, to become less dependent on the increasingly unpredictable seasonal floods.

The Inner Niger Delta is a huge area of lakes and seasonally flooded floodplains. 1 million people live in and depend on these areas. Fisheries harvests vary but can total 130,000 tonnes annually and provide employment for 80,000 fishermen. 3 million out of 5 million livestock in Mali live in the regions close to the delta, relying on seasonal flooding for productive grazing lands. Furthermore the livelihoods of 20% of Mali's 12.3 million inhabitants depend fully or partly on this delta.

