

Wetland for adaptating to climate change

Increased freshwater floods due to rainfall extremes

This is leading to loss of property and life, water pollution due to overflow of sewage systems, and damage to production systems and agricultural areas.

Wetlands like (mountain) lakes or swamps and floodplains can:

- reduce peak flood flows by delaying and storing waters
- detain polluted floodwaters and improve their quality.



Coastal inundation as sea levels rise

Due to sea level rise, many of the world's most economically important areas are at risk of inundation and salt water intrusion.

Mangroves, reefs and other coastal wetland ecosystems can:

- increase the resilience of coastal areas through alluvial plain accumulation
- create a freshwater buffer, preventing saline intrusion.



Melting of glaciers

Quite similar to wetlands, also glaciers store large quantities of fresh water. As glaciers shrink, this storage of fresh water is strongly reduced. Stable flows of meltwater disappear while run off after precipitation becomes more extreme.

Wetlands like mountain lakes or high altitude peat swamps can:

- store a part of the excessive precipitation thus attenuating the loss of glaciers
- release this water after the rainfall in a steady flow.



Rising temperatures, less rainfall

Especially in arid areas, climate change will make droughts and water shortage more extreme. Rainfall may decrease. Also, evaporation increases considerably with higher temperatures. As a result, food production may drop, waterways become unavailable for transport and salinisation will occur.

Marshes, lakes and floodplains can attenuate these impacts by:

- releasing wet season flows slowly during drought periods
- recharging groundwater aquifers during water-rich periods
- providing diversification during drought periods
- In addition, mangroves and other coastal wetland ecosystems can guard against saltwater intrusion when coastal freshwater areas dry up.



Increased frequency and intensity of storms affecting coastal zones

Warm seawater is in fact the fuel behind storms like cyclones and hurricanes. Increased seawater temperatures will lead to increased frequency and intensity of storms.

Coastal wetlands like mangrove forests and reefs can attenuate these disasters by:

- absorbing storm power
- providing alternative sources of food and building materials
- providing havens for species during and after storms.

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

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 [wetlandsint](https://www.youtube.com/user/wetlandsint)
www.youtube.com/user/wetlandsint



Wetlands and climate change adaptation



Sustaining and restoring wetlands: an effective climate change response

In a healthy, intact condition, wetlands can greatly contribute to attenuate the water related impacts of climate change. Wetlands International urges governments, development organisations and finance institutions to integrate wetlands into climate change adaptation strategies.

Mangrove forests and coral reefs are natural buffers against impacts of sea level rise and storms. Marshes, 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 are a vital lifeline in periods of extreme droughts.

All over the world, wetlands are being lost faster than any other ecosystem. This continuing trend considerably magnifies the problems that climate change brings to nature and people. Especially the poorest people that are also the most strongly dependent on the natural resources will suffer. Sustaining and restoring wetlands form a cost-effective strategy for climate adaptation with strong benefits for poverty reduction and biodiversity conservation.



Some examples

Mangroves protect tropical coasts

Global warming will lead to sea level rise and increased storm intensity. Maintaining and restoring healthy ecosystems along coastlines, such as mangroves, salt marshes and coral reefs reduce the impact of these climate related disasters.

Values for adaptation

Salt marshes in the USA have an annual storm protection value of US\$ 250 to US\$ 51.000 per hectare¹. Many coastal wetlands can adapt to sea level rise; some mangrove forests can accommodate rises of up to 9 millimetres per year through sediment trapping and accumulation of organic matter. Mangroves also serve as buffers against saltwater intrusion.

Restoring coastal wetlands in tropical regions

For more than a decade, Wetlands International is implementing coastal restoration projects to create resilient coasts in Africa and South-East Asia. Together with partners



and local communities more than 6 million seedlings have been planted, re-establishing over 2000 hectares of mangrove forest, protecting and managing 100 hectares of coral reef and sea grass and 4 kilometres of sand dunes and coastal lagoons. Our work has improved the livelihoods and resilience of more than 260,000 people in the most vulnerable areas.

At the same time, many mangrove forests are lost at an alarming rate for firewood, shrimp farms or urban developments. The costs of this loss only become clear at the event of an extreme storm.

For more information:
www.greencoasts.org

¹. Constanza, R., Perez-Maqueo, O., Luiza Martinez, M., Sutton, P., Anderson, S.J. & Mulder, K., 2008. The value of coastal wetlands for her can protection. *Ambio* 37 (4): pp. 241-247.



Replanting mangrove forests in Indonesia.
By Wetlands International

Mountain wetlands regulate floods and droughts

Climate change in many high mountain areas - such as the Himalayas - leads to altered and more extreme rainfall patterns, accelerating glacial melt and reduced storage in the form of ice and snow. As a consequence, hazardous floods and droughts occur downstream. Lakes, floodplains and high altitude peatlands can store a big share of excessive water. This reduces the severity of floods but also of droughts, benefitting 1.5 billion people living downstream in the lowland regions of the Himalayas and in densely populated areas in India, China and Bangladesh.

For restoration of the lakes in the Himalaya Wetlands International and its partners have developed a plan for the large Wular Lake in the Jhelum basin (Kashmir, India). The water storage capacity of this glacier fed lake was rapidly being lost due to siltation and conversion of the lake and adjoining marshes into willow plantations and agricultural land. A 20% decrease of the storage capacity in the last 30 years has already led to an increased frequency of floods and droughts.

The management plan includes upstream

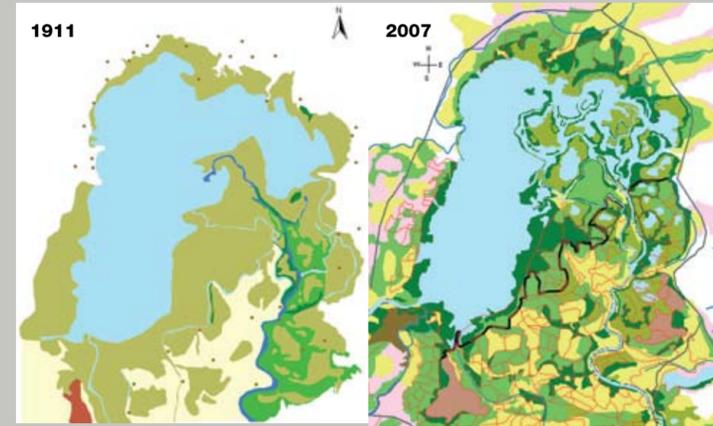


Figure 1: The water storage capacity of Wular Lake has decreased considerably.

reforestation, soil conservation measures and improvement of land management practices within the lake removed willow plantations to increase the lake volume. These quite simple measures reduce the risks of floods and water shortage of several millions of people downstream in the Kashmir valley.

Restoring mountain peatlands, China

Likewise, Wetlands International has worked with pastoralists on the

Tibetan Plateau to restore the Ruorgai peatlands. By blocking erosion gullies and reducing grazing pressure, tens of thousands of hectares of peatland are restored. This has contributed significantly to regulating the flow of the Yellow and Yangtze rivers which originate in this area, thereby contributing to reduced flooding and drought risks for millions of people downstream.



Ruorgai peatlands in China.
By Marcel Silvius

Sahelian floodplains ensure water security

Climate change significantly exacerbates water stress in the arid regions of the Sahel. While experiencing extensive droughts already, annual rainfall in this area is expected to decline by a further 20% in the next 100 years. Temperatures are rising more rapidly than anywhere else in the world and will increase between 2-7°C in the next 80 years.

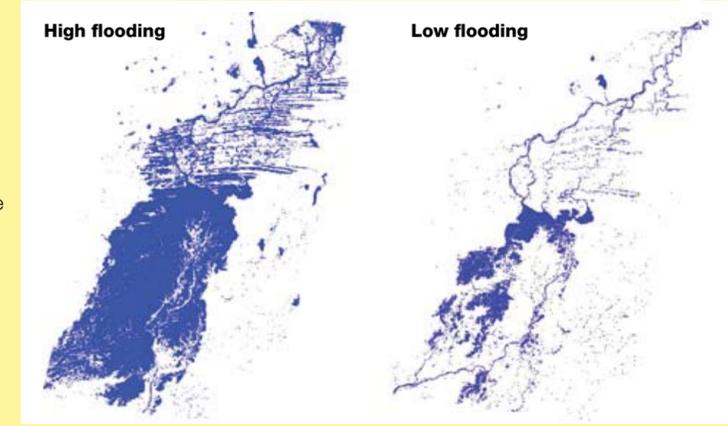
Wetland Management in the Inner Niger Delta

The Inner Niger Delta in Mali is an extremely valuable wetland in the Sahelian zone. This inland delta provides water, fisheries, livestock grazing and agriculture for one million people. Upstream dam development for hydropower and irrigation has this wetland under great stress.

In an international partnership together with Malian and Dutch organisations, Wetlands International has implemented various adaptation measures.

Flood prediction tool

A tool for flood prediction - OPIDIN - has been developed based on extensive research. This tool predicts flooding levels throughout the delta several months in advance; it informs local communities how they can best align their farming and



Flood patterns in the Inner Niger Delta, Mali. From: *The Niger, A Lifeline*. Effective water management in the Upper Niger Basin. Wetlands International, 2005.

fishing practices to the water availability expected for a certain year.

Impact of dams

An assessments on the socio-economic and environmental implications of planned and existing upstream dam and irrigation activities was conducted. It was shown for example that some dams positively contribute to the Malian economy, whereas others will have severe net negative economic implications. This has helped local officials to make well-informed

decisions on economic developments in the Niger basin.

Taking care of the precious wetlands

Through community-based restoration projects critical nursery grounds for fisheries and grazing fields for cattle have been recreated. Areas have also been reforested. This has significantly improved the resilience of local communities in the delta.

For more information:
www.wetlands.org/lifeline



The Inner Niger Delta in Mali.
By Leo Swarts.