



## Climate change mitigation & adaptation

Vadret da Roseg Ramsar Site, Switzerland. Photo © Andreas Wipf

The United Nations Intergovernmental Panel on Climate Change (IPCC) – the world’s most authoritative team of climate experts – says that warming of the Earth’s climate system is definitely happening and that most of the increase in average global temperature since the mid-20th century is probably caused by rising levels of greenhouse gases due to human activity.

IPCC reports conclude that:

- Wetlands are among the ecosystems most vulnerable to climate change.
- Some wetlands – including coral reefs, mangroves, and those found in tropical forests, sub-arctic forests, prairies and arctic/alpine zones – are especially at risk.
- Inland freshwater wetlands will be affected mainly through changes to precipitation and more frequent or intense droughts, storms and floods.
- Changes in the timing and amount of rainfall entering river systems will alter the water supply to coastal wetlands such as deltas and estuaries, affecting salinity and supply of sediment and nutrients.
- Mountain snowfields and glaciers that feed many of the world’s major river and wetland systems will shrink due to melting.
- Higher water temperatures, floods and droughts, will reduce water quality and worsen many forms of pollution.
- Many semi-arid areas are particularly exposed to the impacts of climate change and are expected to suffer serious pressure on water resources and wetlands.

The effects of climate change on wetlands will in turn affect the continued provision of the ecosystem services described in this series of Factsheets. This means that the role of climate change must be taken into account when managing wetlands and making decisions that affect them.

There are two broad strategies in responding to climate change: mitigation and adaptation. >>>

### ***In brief...***

- ◆ Many wetlands – and the ecosystem services they provide us with – are threatened by climate change. The seriousness varies with wetland type and location.
- ◆ Wetlands themselves are part of the fight against climate change. They can help reduce both the level of future greenhouse gas emissions and the adverse effects of global warming.
- ◆ Some wetlands, especially peatlands, mangroves and saltmarshes, are big stores of carbon. Protecting them from damage or destruction can prevent the release of even more greenhouse gases into the atmosphere.
- ◆ Coastal and floodplain wetlands help limit the damage from floods, expected to become more frequent with sea-level rise and increased rainfall and storminess.
- ◆ Ensuring the conservation and sustainable use of wetlands in semi-arid regions will help people and wildlife to survive periods of drought.
- ◆ Using and managing wetlands wisely must be part of an overall response to climate change that brings together all those making the big decisions about how we use our land and water.

# Climate change mitigation & adaptation...

Mitigation refers to reducing the overall levels of greenhouse gases (GHGs) entering the atmosphere in the first place. Adaptation means action to minimise the adverse impacts of climate change. Both have relevance to wetlands.

## Mitigation

A significant benefit provided by some wetlands, notably some peatlands, mangroves and saltmarshes, is their role as stores or 'sinks' of carbon. Healthy, intact peatlands lock up significant amounts of carbon whereas drainage, peat extraction and burning release it into the atmosphere in the form of yet more GHGs. One recent study found that damage to peatlands has been responsible for annual emissions of GHGs equivalent to 10% of emissions from worldwide use of fossil fuels.

However, this is a complex issue since different wetlands store and release carbon in different ways and at varying levels. It is the overall balance of 'in' and 'out' that matters and this is the subject of continuing research.

## Adaptation

Given that wetlands are themselves threatened by climate change, it may seem puzzling that well-managed wetlands can also provide one of our best insurance policies against some of the most damaging effects of global warming.

Coastal wetlands such as mangroves, tidal flats and saltmarshes absorb some of the energy from storm and tidal surges, while the roots of wetland plants stabilise shorelines and reduce erosion. A recent study modelling the effects of major US hurricanes found that each hectare of coastal wetland prevented damage valued at US\$33,000 on average.

Under natural conditions, coastal wetlands would gradually move inland in response to rising sea levels. In reality, many coastal lowlands are intensively developed for agriculture, industry and towns and cities. There is literally nowhere for wetland ecosystems to move to and they are being squeezed into an ever narrowing fringe – the open sea on one side, concrete on the other. As these wetlands shrink, so do the services that they provide for free, while the dangers of rising sea levels and increased storminess continue to grow.

Floodplain wetlands such as lakes and freshwater marshes naturally store and slow down floodwater, helping to protect downstream areas from destructive flooding. This role will become more important in areas where the frequency and intensity of extreme rainfall is predicted to increase. Elsewhere, wetlands provide vital resources for people and wildlife alike in times of drought.

Maintaining wetland networks and 'corridors' will also help wetland-dependent plants and animals move to new areas in response to changing climatic conditions.

In short, wetlands can provide us with a climate-change 'safety net' but only if all countries work together to:

- avoid or minimise other (non-climate related) threats to wetlands so that these ecosystems are as extensive and healthy as possible;
- restore wetlands that have been damaged or destroyed; and
- identify opportunities for wetland creation where this would have clear benefits for adapting to climate change.

Conservation and well-planned, thoughtful use of existing wetlands, combined with restoration of destroyed or damaged wetlands, needs to be part of a wider, properly integrated response to climate change. This means bringing together the different land-use and water-use sectors – such as agriculture, water supply and energy – to effect 'climate friendly' policies.



CONVENTION ON WETLANDS

Ramsar Convention Secretariat  
Rue Mauverney 28  
1196 Gland  
Switzerland  
T +41 22 999 0170  
F +41 22 999 0169  
E [ramsar@ramsar.org](mailto:ramsar@ramsar.org)  
W <http://ramsar.org>