



Eurosites

**Working internationally
with wetlands to adapt to
and mitigate the effects
of climate change for the
benefit of human wellbeing**

About Eurosite's 'Creating a Climate for Change' workshop

Co-organisers: Aten, Natuurmonumenten, and Wetlands International



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Introduction

Currently, global climate change threatens biodiversity in Europe and the objectives of the 'EU Biodiversity Strategy to 2020'¹. The EU is working to tackle this issue and in April 2013 adopted a strategy on adaptation to climate change² to make Europe more climate resilient and to achieve that aim in the most cost-effective and practical way possible. This strategy includes sharing information and best practice to address knowledge gaps and develop measures to tackle the impact of climate change on Natura 2000 sites. Also in 2013, the European Commission published a set of guidelines, written by Alterra and Eurosite, on 'Climate Change and Natura 2000'³. These guidelines provide a valuable starting point for tackling climate change.

Not only is biodiversity threatened, damage to property and infrastructure and to human health also imposes heavy costs on society and the economy. Between 1980 and 2011 floods affected more than 5.5 million people in Europe and caused direct economic losses of more than €90 billion⁴. Sectors that rely strongly on certain temperatures and precipitation levels such as agriculture, forestry, energy and tourism are particularly affected by climate change.

Wetlands have a prominent role to play in the mitigation of and adaptation to the effects of global climate change. For example, as carbon sequestration and storage areas or as buffer areas for flooding. Therefore, they must be taken into account when implementing Europe's adaptation strategy. This is particularly relevant to achieve objective 3 of the EU strategy on adaptation to climate change: climate-proofing EU action.

However, wetlands are also vulnerable due to their sensitivity to changes in climate, rainfall patterns or rain volume, and the hydric regime. Hence, achieving objective 3 also means adapting wetlands to global climate change. Wetlands, their adaptation to climate change and their role as tools for climate change adaptation are pan-European issues. The effects of climate change are not confined to a particular area and most of Europe's wetlands are in more than one country or the basins that feed them traverse several countries.

For this reason, Eurosite and our workshop host Aten, in collaboration with Natuurmonumenten and Wetlands International, decided to organise a workshop to share knowledge about adaptation to and mitigation of the effects of climate change on wetlands. The workshop was called 'Creating a Climate for Change: Working internationally with wetlands to adapt to and mitigate the effects of climate change for the benefit of human wellbeing'.

The workshop was held in Montpellier, France on 9 and 10 December 2014. 15 people attended from 5 countries (France, Greece, Sweden, Netherlands, and Spain), representing 11 organisations. The workshop provided a platform for site managers and representatives of nature conservation organisations to come together in order to share knowledge, experiences and best practice case studies. The workshop programme included a field trip to local wetlands Petit and Grand Travers and the Natural Park of the Alpilles, a series of presentations⁵ and a discussion session.

The workshop formed the basis of this guidance document and the ideas provided here are based on the discussions that took place during the workshop. These discussions have been compiled into strengths, weaknesses, opportunities and threats that need to be taken into account when designing and implementing strategies to adapt wetlands to climate change. The ecosystem services that wetlands provide are also mentioned, such as the role of wetlands in protecting Europe's citizens from the consequences of climate change. This document provides site managers across Europe with a useful introduction to wetlands and climate change, and will be a starting point for further work on this important issue.

1 <http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm>

2 <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52013DC0216&from=EN>

3 <http://ec.europa.eu/environment/nature/climatechange/pdf/Guidance%20document.pdf>

4 http://ec.europa.eu/clima/change/consequences/index_en.htm

5 To view the presentation slides see: <http://www.eurosite.org/en-UK/creating-climate-for-change>

Adapting wetlands to a changing climate: key factors

Strengths: Intrinsic factors that make wetlands adaptable to climate change

- Resilience and resistance of wetlands:
 - Large wetlands are resilient to changes in climate because of their natural capacity to deal with disturbances, such as pollution or changes in water availability.
 - Wetlands are fire resistant (when they remain wet).
 - Wetlands are extremely dynamic ecosystems with the ability to evolve and adjust to new conditions.
 - Natural processes in wetlands take place over a short time period, so the results of restoration work quickly become evident, especially when pioneer species are involved.
- The fact that wetlands provide ecosystem services, some of which can be easily monetised (such as flood prevention), makes it easier to convince stakeholders to conserve them.

Weaknesses: Intrinsic factors that make wetlands sensitive to climate change

- Wetlands are highly sensitive to water levels. The hydrological changes expected due to climate change will impact rainfall amounts and patterns, which will affect wetlands.
- In deltas, natural subsidence (lowering of the wetland surface due to sediments compacting and organic matter in the soil decomposing) in combination with raised sea levels will lead to increased risk of flooding, whether from flooding by freshwater or by saltwater encroachment. This situation combined with upstream dams in rivers that trap sediments could lead to serious coastal erosion problems, even coastline subsidence.
- The natural evolution of inland wetlands leads to silting up and drying. In certain parts of Europe, climate change will lead to an increased flow of sediments to wetlands and this process will accelerate.
- While the restoration of ecological processes in wetlands is a quick process, recovering their role as carbon reservoirs can be extremely slow. For example, when peatland is drained, the accumulated carbon is lost in a relatively short period of time due to oxidation. Restoring the wetland processes could be as easy as flooding it again, but recovering the lost stored carbon will take hundreds of years.
- Wetlands are difficult to monitor.
- Wetlands are resilient but not resistant to environmental factors like storms or extreme floods.

Opportunities: External factors that will help to adapt wetlands to climate change

- Due to the ecosystem services wetlands provide, governments and private funders are willing to provide financial incentives for the protection or restoration of wetlands and their ecosystem services. Government incentives include positive financial incentives, such as subsidies, as well as negative incentives, such as fines or restrictions.
- Growing interest in nature conservation will help to convince the public and governments to invest in protecting wetlands from climate change.
- Increasing awareness of the effects of climate change will also increase the pressure on governments and international organisations to deal with the factors that create and intensify climate change.
- Adapting to and mitigating climate change provides an opportunity to reconsider the current management of many wetlands and promote efficient strategies for wetland conservation. Examples of strategies for wetland conservation include: landscape management, integrating ecosystem services, and restoring natural processes.

Threats: External threats to wetlands from climate change

- In the face of climate change, in areas where water scarcity is expected, wetlands will be affected by water management that prioritises other water uses, such as industry, irrigation or tourism. For example, in the Mediterranean and other coastal areas, water demand reaches a peak during the dry summer period because of the demand for water from the tourism industry. This demand is being met by diverting rivers that would usually feed wetlands.
- Climate change will reduce crop productivity, which could result in wetlands being converted to agricultural land, as former farming land becomes less productive.
- Expected changes in climate and associated changes in land uses (changes in agriculture, water management, increase or decrease of livestock grazing) and ecosystem dynamics (changes in wildfire regimes or shifts in species composition) could affect upstream processes that are linked to the functioning of wetlands.
- Changes in coastal dynamics related to an increase in the intensity of storms or rising sea levels are a clear threat to coastal wetlands because they are at or below sea level.
- Changes in mean annual temperature will affect stenotherm animals and plants living in wetlands that depend on narrow temperature ranges to complete their vital cycles.
- Changes in temperature will also affect wetlands in cooler ecosystems (Boreal or Alpine wetlands) due to melting of the permafrost and shifts in the distribution of species.

The role of wetlands in protecting society from climate change

Carbon storage and sequestration

Wetlands store and capture carbon, which contributes to the reduction of greenhouse gas emissions and mitigates the effects of climate change. In turn, the conversion of natural peatlands to agricultural land through drainage results in continuous and significant emissions of CO₂ due to peat oxidation.

Water storage and acting as buffers

Climate change will impact the amounts and patterns of rainfall and will lead to an increase in extreme climatic events, such as extreme rain fall episodes and droughts. Wetlands have an important role to play because they can buffer floods or heavy rainfall events, store water for dry periods, and protect underground aquifers against salinization.

Water purification

In areas where water scarcity is foreseen the water purification potential of wetlands could be utilised. Wetlands have an important role as green filters and can be used as a second step in sewage treatment plants. They can also be used to clean nutrient pollutants and sediments from water, for example by cleaning storm water coming from infrastructure or cleaning fertilisers from water coming from farmland.

Cost efficient climate change adaptation solutions

Wetlands have the potential to be used as soft climate adaptation measures (as opposed to building dykes or sea walls or channeling rivers) because:

- Coastal wetlands act as natural barriers against storms and high tides, reducing coastal erosion and damage to infrastructure and housing.
- Wetlands close to rivers or flood plains will contribute to reducing the effects of flooding.

Cost-efficient climate change mitigation solutions

The rehabilitation of drained peatlands immediately eliminates emissions caused by the oxidation of the drained peat. It also initiates a slow accumulation of greenhouse gasses as the peat grows and absorbs CO₂.

Contribution to the study of climate change

Regarding the study of climate change, wetlands offer:

- A laboratory to study the effects of climate change. Some wetlands have been studied scientifically for a long time and so they offer data on the effects of climate change on ecosystems.
- A register of past climatic events trapped in the sediments accumulated over centuries.

Benefits from sustainable use of wetlands

If used sustainably, wetlands can provide:

- Paludiculture: the wet cultivation of wetlands. Paludiculture includes traditional processes of wetland cultivation such as reed mowing and litter usage, as well as new processes, such as using biomass from the marshes for energy, or the production of alternative building materials. For examples, *Typha angustifolia* is a type of reed that grows in some wetlands and can be used as insulation in buildings.
- Food by means of aquaculture, fishing or hunting.

If integrated into urban planning, wetlands provide temperature buffers, green infrastructure, and buffer zones for floods or high rainfall episodes.

The impact of climate change on wetlands: a case study



The coastal lagoons Petit and Grand Travers, and the marshes in the Natural Park of the Alpilles, are both situated in the surroundings of Montpellier.

The link between wetlands and their surroundings is complex, and mitigation and adaptation to climate change goes beyond the borders of the wetland. For example, Petit and Grand Travers depend on the health of the sandbar, which depends on the health of the rivers that provide sand to the coast, and rivers come from mountains that can be affected by forest fires, which change the water and sediment flows in the river. Just before Eurosite's workshop, the area was hit by a large storm. Due to the fact that the sandbar had been restored and was therefore in a healthy state, it was able to protect the lagoon, and the roads and houses in the area, from the storm.

In the Alpilles, the interactions between changes in land uses and changes in the water regime caused by climate change are complex. The integrated management of the surrounding areas is therefore important, particularly in the context of climate change. For example, water management upstream or changes in grazing and types of crops grown will overlap with the impacts of climate change. The Alpilles wetlands also have a role in protecting cities downstream when torrential rain occurs, and agricultural use of the marshes can threaten this ecosystem service. This role as a buffer will be even more important in the context of climate change, because an increase in torrential rain episodes is expected in the Mediterranean region.

Concluding remarks

The effects of global climate change pose a serious threat to Europe's economy, safety and ecosystems. Most cities in coastal areas face problems from coastal erosion, people living on riverbanks face the challenge of increased flooding, and decreases in rainfall amount will produce droughts. Within the framework of the EU strategy on adaptation to climate change, wetlands are a key tool to make Europe more climate resilient and increase the ecosystem services nature provides; all without incurring prohibitive costs.

However, this is not the only reasons to conserve wetlands. Around Europe, wetlands have been used by people for hundreds of years and are part of the traditional way of life and culture of people living near them. Wetlands also contain a high diversity of living forms and ecosystems, and they are key sites for migrating birds and endangered plant species. We have an obligation to bequeath this natural and cultural heritage to our descendants, and for this reason we also have an obligation to protect and conserve Europe's wetlands.

Publications and resources

- [DG Environment: Climate Change](#)
- [Guidelines on Climate Change and Natura 2000](#)
- [Guidelines on Climate Change and Natura 2000 - Supplement](#)
- [2030 framework for climate and energy policies](#)
- [IPCC Fifth Assessment Report](#)
- [Assessment of the potential of ecosystem-based approaches to climate change adaptation and mitigation in Europe](#)
- [Towards a Strategy on Climate Change, Ecosystem Services and Biodiversity](#)
- [The Economics of Ecosystems and Biodiversity for Water and Wetlands](#)
- [Peatland Biodiversity and Climate Change](#)
- [Peatlands - guidance for climate change mitigation through conservation, rehabilitation and sustainable use](#)
- [Adapting to climate change: towards a European framework for action](#)
- [Le Conservatoire du littoral face au changements climatique](#)
- [Water innovations in the Netherlands: A brief overview](#)
- [Espaces Naturels: Changements climatiques](#)
- [Climate buffers in the Netherlands \(video\)](#)
- [Dutch wetlands inspire Indonesian coastal managers \(video\)](#)

Projects and initiatives

International, cross-border cooperation is important when working on wetlands and climate change, the following are examples of international projects and initiatives:

- [Wetlands International](#)
- [European Climate Adaptation Platform](#)
- [Natural Climate Buffers](#)
- [The European Natural Water Retention Measures Platform](#)
- [Project Licco](#)



Eurosité is working to create a Europe where nature is cared for, protected, restored and valued by all

We do this by providing practitioners with opportunities to network and exchange experience on practical nature management. We are a network of site managers, non-governmental and governmental organisations, and individuals and organisations committed to our vision. Our members are based across Europe – from the Atlantic islands to the Black Sea; and from Scandinavia to the Mediterranean.

Nature knows no boundaries: we believe the future protection and conservation of Europe's nature will only be achieved through international cooperation.

Interested in what we do? Take a look at our website to find out more and consider becoming a member.

Together we can make a difference.

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