POLICY BRIEF

How can coastal wetlands help achieve EU climate goals?

An issue brief on the importance of European coastal wetlands for reducing Greenhouse Gas emissions

KEY MESSAGES

→ **Coastal wetlands are important natural carbon stores,** given their capacity to sequester carbon efficiently while emitting relatively less methane - a Greenhouse Gas (GHG) with much higher warming potential than CO_2 at medium term.

→ **When well-preserved or restored, coastal wetlands deliver key ecosystem services** and have positive impacts on the environment and society. The conservation and restoration of coastal wetlands in Europe is therefore a cost-effective climate mitigation strategy in line with the European Climate Law and can contribute to reach climate neutrality by 2050.

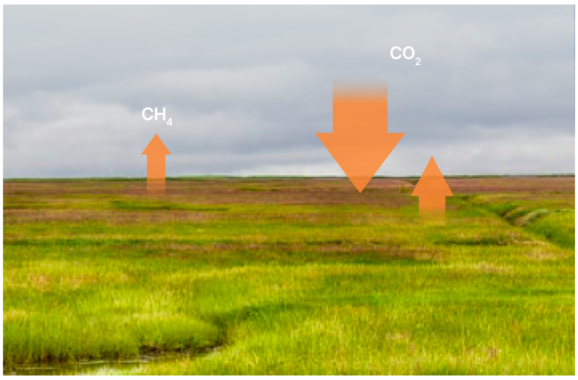
→ **Robust carbon certification schemes can offer additional tools** to finance projects for protecting and restoring European coastal wetlands.
Coastal wetland protection and restoration activities that contribute to reduce GHG emissions, sequester carbon and provide long-term storage should qualify and be recognised under the **EU Certification Framework for Carbon Removals**. These measures provide an opportunity for unlocking new financial sources for wetland conservation and restoration while ensuring ecological and social benefits with the necessary safeguards in place.

→ **Actions to protect and restore carbon sinks** – including the sustainable management and restoration of wetlands – are qualified by the EU Taxonomy Regulation as 'environmentally sustainable' economic activities.
These actions can create incentives for companies that aim to become more climate-friendly and attract new investments for restoration by labelling certain activities as 'environmentally friendly' or reducing their financial transaction costs.

INTEGRATING COASTAL WETLAND PROTECTION INTO LULUCF FOR ACHIEVING EU AND GLOBAL CLIMATE GOALS

GHG reductions and carbon removals under the Land Use, Land Use Change and Forestry (LULUCF) sector are a key lever to reach the EU's climate goals, as well as to the long-term climate goals of the Paris Agreement. Mainstreaming climate mitigation commitments which support coastal wetland protection and restoration (e.g. avoiding loss or degradation of wetlands and/or the restoration or creation of coastal wetland habitats) in LULUCF activities will contribute to reach national, EU and global climate goals.

Healthy, well-preserved coastal wetlands provide efficient carbon sequestration and long-term storage with minimal methane emissions.



Wetlands in the European coastal landscape

"Coastal wetlands" are broadly defined as areas of saltwater and freshwater located within coastal zones. They encompass areas with water that can be static or flowing, fresh, brackish or salty, but also areas of marine water with a maximum depth of six metres at low tide (Ramsar Convention*). These areas can be permanently or seasonally inundated and host a range of plant and animal species that are uniquely adapted to the degree of inundation, water characteristics and soil conditions.

Among the different wetland types found in European coastal watersheds, we can distinguish between vegetated environments - such as seagrass, tidal marshes and freshwater marshes - and unvegetated flats (tidal and non tidal) and creeks. In areas where tidal flooding is intermittent, other natural wetland habitats such as saltpans can also form under high salinity conditions.

Coastal wetlands are widespread along all European coastlines. They develop at coastal lagoons, estuaries and other transitional waters, fjords and sea lochs as well as embayments. These ecosystems alone cover 84,487 km^2 and make up 1% of the total wetland area in EU27+ the UK[2].

They are also among the best examples of ecosystems with a whole range of ecosystem services, offering increased resilience to extreme events for local communities. Moreover, they buffer wave energy and currents, enhance particle sedimentation from the water column and prevent erosion, protecting coastal shores. Acting as natural sponges, they also regulate the water cycle and mitigate both floods and droughts. This makes coastal wetlands in Europe extremely valuable in terms of improving water quality and biodiversity, providing habitats and food chain support for many species including commercial exploitable species[3].

Among all the ecosystem services provided by coastal wetlands, the service that has risen to prominence in recent years is linked to their potential to capture and fix carbon in the soil over hundreds to thousands of years. This capacity makes the protection and restoration of these ecosystems an **important contribution to climate change mitigation targets.**

Ebro Delta. © Gerold Grotelueschen

LEGAL RECOGNITION AND STANDARDISATION OF COASTAL WETLANDS FOR CLIMATE REGULATION AND RESTORATION

Granting legal recognition to coastal wetlands and acknowledging their climate regulation benefits at both national and EU levels will help ensure their protection and prioritise their restoration in national programmes across various regions. A unified definition of wetland ecosystems should also be incorporated into EU climate mitigation and adaptation policies. This standardisation, aligned with the Ramsar definition of wetlands, will provide a consistent approach to defining various wetland ecosystems, including coastal wetlands, and enable their classification as "managed" or "unmanaged" in a standardised manner according to the IPCC Guidelines and the LULUCF Regulation in the period 2021-2025.

* Res. VI.5 and VII.11. Ramsar Classification System for Wetland Type. ramsar.org

The climate benefits

To what extent can healthy and functional coastal wetlands contribute to mitigate climate change?

The ability of coastal wetlands to mitigate climate change linked to enhanced greenhouse gas (GHG) emissions is the sum of two services: (i) the accumulation of organic carbon (sequestration, gain of stock), and (ii) the capacity of reducing GHG emissions, particularly of forms with higher radiative potential, such as methane (net GHG removal)[4]. Certain coastal wetland types like salt marshes can sequester carbon from their vegetation and via sedimentation besides storing large amounts of organic carbon in their soil due to their rapid growth and slow decomposition rates because of the saline and anoxic waterlogged conditions of the environment[15]. Moreover, the saline conditions of healthy coastal wetland soils have the advantage of potentially emitting only negligible amounts of other greenhouse gases[5] such as methane (CH_4), which is a substantially more potent greenhouse gas than CO_2. Their position in the coastal zone and flooding regimes alter the soil water regime, drainage, and oxygen availability driving the accumulation of carbon in the wetland. They also favour the trapping of organic particles carried by the flooding water from adjacent ecosystems that increases the soil organic carbon with the formation of organic-rich reservoirs, commonly recognized as **blue carbon sinks[3]**.

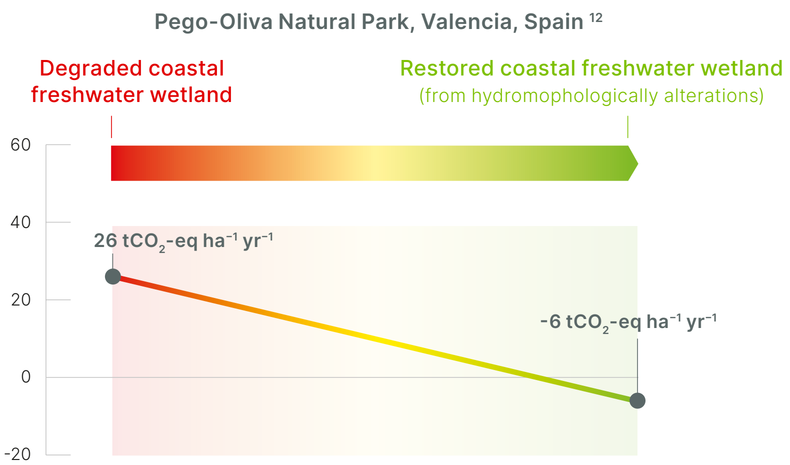
Within coastal wetland habitats, salt marshes in Europe are estimated to have soil carbon densities between 200-400 tons per hectare for just the top meter of soil, with an average annual rate of carbon sequestration potential of 166-282g C m^{-2} when in healthy condition[7]. Well-functioning salt marshes store and sequester quantities of carbon per unit area comparable to terrestrial forests and other wetland types[8]. Compared to altered coastal wetlands, coastal wetlands that have been restored can recover their capacity to reduce GHG emissions. This demonstrates the important role of coastal wetlands as natural sinks for greenhouse gases, where carbon is captured, stored in the soil and prevented from entering the atmosphere**.

The capacity of these ecosystems to store carbon and offer GHG abatement is however highly variable and dependent on the habitat and its condition. Different studies have shown that **undisturbed coastal wetlands store nearly twice as much carbon as wetlands disturbed by human activities**. The combination of wetland degradation and loss due to climate change and human activities diminish their sequestration capacity and can lead to the release of the stored carbon.

Overall, the ecosystem services provided by healthy and restored coastal wetlands can help fulfil both European and global commitments for climate change mitigation and adaptation and reduce biodiversity loss. Given their importance, nowadays the restoration and protection of wetlands is included among the new binding targets and objectives to restore natural habitats contained in the EU Nature Restoration Law, the EU Biodiversity Strategy and EU Soil Strategy for 2030 as well as the new rules under the EU Common Agriculture Policy for the funding period 2023–2027. Significant areas of carbon-rich ecosystems, such as wetlands and seagrass meadows, should also be strictly protected, taking into account the future projected shifts in vegetation zones due to climate change.

Moreover, both the European Climate Law for achieving climate neutrality as well as the European Methane Strategy stress the need for countries to prioritise emission reductions and, at the same time, enhance removals also by maintaining the capacity of natural sinks in the long term, avoiding their degradation while protecting and restoring biodiversity.

The GHG abatement capacity of coastal wetlands depends on their condition and can be improved through restoration. This diagramme shows how restored coastal wetlands can mitigate more emissions than degraded ones.

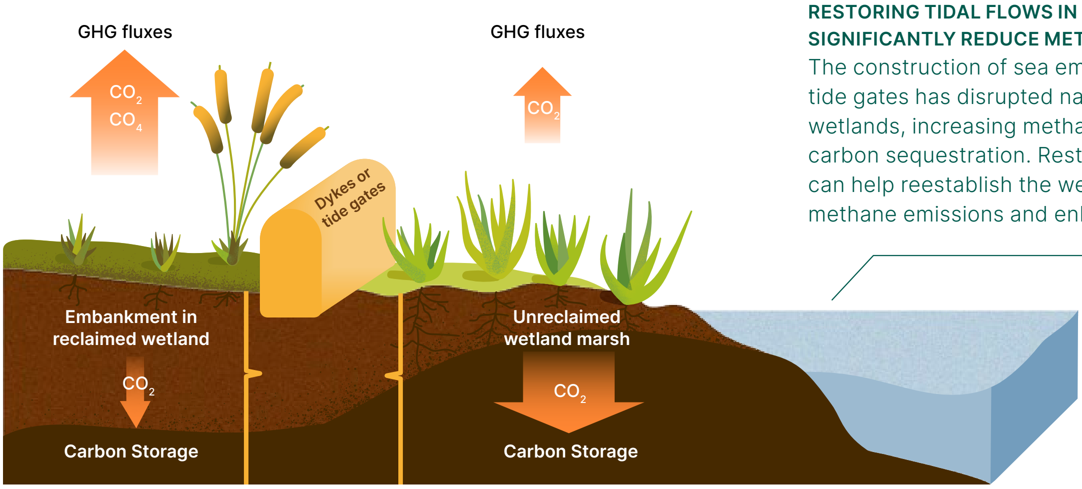


** 'Land with high-carbon stock' means wetlands, including peatland, and continuously forested areas within the meaning of Article 29(4)(a), (b) and (c) of Directive (EU) 2018/2001.

Coastal wetlands and LULUCF

Large areas of European coastal wetlands have been lost or are in poor condition since the beginning of the 20th century due to anthropogenic impacts including land reclamation and pollution[2]. Changes in land use often result in degradation and conversion of natural wetlands and affect the dynamics of greenhouse gases. At European scale, the observed rapid decrease of coastal wetland area in recent decades due to anthropogenic activities (e.g., land reclamation and embankment) has led to the loss of significant soil carbon sinks and potentially to higher CO_2, methane (CH_4), and nitrous oxide (N_2O) emissions[7].

The reduction in sediment supply due to river damming can compromise the resilience of coastal wetlands. Historical wetland reclamation projects in Europe have blocked or restricted river or tidal flows, through installation of dykes or tide gates, as a common method to protect coastal infrastructure. Other coastal wetlands have been drained to expand available agricultural and urban areas or have had their water table raised or managed to reduce salinity for aquaculture, roads or crop production, for example.



RESTORING TIDAL FLOWS IN COASTAL WETLANDS CAN SIGNIFICANTLY REDUCE METHANE AND CO_2 EMISSIONS. The construction of sea embankments, dykes, or tide gates has disrupted natural tidal flows in coastal wetlands, increasing methane emissions and reducing carbon sequestration. Restoring these tidal flows can help reestablish the wetlands' ability to reduce methane emissions and enhance CO_2 sequestration.

The enclosure and drainage induced by these land-use changes has reduced or interrupted the frequency of flooding and saltwater flow, stimulating the decomposition of soil organic carbon and consequently affecting the production and emissions of CO_2 and CH_4. Changes in the hydrodynamics of the wetlands also have an effect increasing the release of CO_2 from drained organic soils[10].

The conversion of natural coastal wetlands into aquaculture ponds and agriculture crops and their management practices (e.g., fish food, tillage, fertilisation, and irrigation) can also profoundly alter the hydrological and nutrient conditions in these areas and potentially lead to a significant increase in CH_4 and N_2O emissions, altering CO_2 fluxes as well as transforming the ecosystem from a net carbon sink into a substantial carbon source[6].

The inclusion of wetlands in national GHG inventories enables the quantification of how mitigation initiatives (e.g., avoiding loss or degradation of wetlands and/or the restoration or creation of wetland habitat) may contribute to a country meeting its international GHG commitments.

Thereby, **keeping an account of wetland emissions and removals under the European Land Use, Land-Use Change and Forestry (LULUCF) Regulation from 2026 onwards provides the opportunity for countries to enhance climate ambitions with emission reductions and removals through actions that favour mitigation measures for these ecosystems**. At the same time, it is important to prevent possible double claiming and double counting where emission reductions or removals accounted by a Member State to achieve its obligation under the revised LULUCF Regulation could be simultaneously issued as a carbon credit under the forthcoming Carbon Removal Certification Framework.

Research has shown that tidal restoration in salt marshes through the removal and modification of tidal barriers or through changes in land management practices will have greater potential for emission reductions per unit area as a climate change intervention than the creation of new salt marshes[11]. Additionally, the restoration of salinity conditions is important to maintain low methane emissions[12,13] while also helping to stabilize the shorelines, revegetate degraded salt marshes and support biodiversity.

Coastal wetlands and the EU carbon removal certification framework

Coastal wetlands are characteristic features of many European coastal landscapes but they are vulnerable. Although they can emit GHG, on a balance, healthy wetlands generally provide a net carbon removal / emission reduction benefit delivering an essential nature-based solution in line with the goal of the European Climate Law to reach climate neutrality by 2050. This justifies the added value of restoring degraded coastal wetlands in spite of the related challenges and costs.

Voluntary carbon markets can underpin the goal of conserving and restoring coastal wetlands through increased investment opportunities that could be qualified as environmentally sustainable economic activities **by the EU Taxonomy Regulation**. As a result, over the last years different standards and methodologies for carbon removals (amount of carbon) and GHG reductions (CO_2-equivalents) related to coastal wetlands have been developed[14]. Existing quantification approaches to account for project-based baselines for emission reductions and carbon removals can also be applied in combination with modelling, data collection from greenhouse gas fluxes, soil sampling, remote sensing or the use of default equations derived from IPCC Wetland Guidelines.

Given coastal wetland's ability to support GHG reduction and carbon removals, the possibility to include these wetlands within the **EU Certification Framework for Carbon Removals** (trilogue decision early 2024) presents an additional opportunity to enhance conservation and restoration efforts as well as harmonising current certification methodologies and schemes. This supports the objectives under the EU Sustainable Carbon Cycles Communication which names coastal wetlands (seagrasses, salt marshes and mangroves) in the context of blue carbon ecosystems to promote increased carbon removals, while providing strong benefits on biodiversity.

A Carbon Removal Certification Framework that recognises the benefits of wetlands and specifically includes coastal wetlands should be clearly defined and aligned with other EU policy targets and commitments such as EU climate and biodiversity objectives, the EU Nature Restoration Law, the EU Biodiversity Strategy, the EU Soil Strategy for 2030 and the EU Sustainable Carbon Cycles Communication.

In addition, the Framework could offer an important boost to large-scale restoration efforts supporting essential social and environmental benefits beyond carbon and GHG removals. Ecological and social safeguards need to be in place to ensure the development of scientifically robust and **high-quality carbon removal credits** from coastal wetlands, while trusted and scientifically consolidated methodologies need to be developed under this policy.

Carbon sampling and GHG study in a coastal wetland.
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EU CARBON REMOVAL CERTIFICATION FRAMEWORK: INTEGRATING COASTAL WETLANDS AND ALIGNING WITH POLICY TARGETS

The EU Carbon Removal Certification Framework (CRCF) aims to introduce the first EU-wide voluntary certification scheme for carbon removals and emission reductions. The Regulation, which includes wetland restoration activities, envisions that carbon farming can encompass practices in marine and coastal ecosystems, potentially certifying coastal wetland restoration projects. This framework should recognise the benefits of wetlands, specifically include coastal wetlands and be aligned with other EU policy targets and commitments.

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