



Action for Blue Carbon: Protecting the marine environment to support action on climate change

Summary

“Blue carbon “ is the term that is used to collectively refer to carbon stored in and/or sequestered by the sea and marine environments. Scotland's blue carbon environments store 9,636 MtCO₂-eq and sequester 28.4 MtCO₂-eq per year. This store is roughly equivalent to the total carbon stored in Scotland's land-based ecosystems and the sequestration rate is three times greater than the annual carbon sequestration of Scottish forestry. Adding emissions related to activities at sea, the wider 'marine carbon' balance is, therefore, vital to efforts to address climate change.

Scotland's seas are, environmentally, in a poor condition – and we are failing to meet our obligations for their restoration. Action to address marine carbon issues can also address the poor environmental condition of our seas – and vice versa. It is a potential win-win.

At present, neither blue carbon nor some aspects of the wider marine emissions are included in the UN's greenhouse inventories. This means that they are not measured or reported in Scotland's annual emissions' report or addressed in the Climate Change Plan.

Nevertheless, blue carbon (and its release, store and sequestration) will affect the climate whether it is 'counted' in the inventory or not. Not addressing blue carbon is delaying action that will, one day, be 'counted' and makes meeting the Paris target all the harder. The approach to act now to protect blue carbon was supported by the (then) Environment, Climate Change and Land Reform (ECCLR) Committee in the last Parliament.

The new Climate Change Plan should not only refer to blue carbon and ongoing research, but also include clear and specific actions to protect such carbon stores, and environmental improvements that will increase sequestration rates.

In addition to a substantial marine section in the new CCP, we also recommend that the Scottish Government ensures more investment in appropriate research and monitoring. It should also implement a range of 'no regret' actions to protect and enhance blue carbon, including fishing policy reform, improved management of MPAs/HPMAs and coastal management and seaweed protection/cultivation.

What is Blue Carbon?

“Blue carbon “ is the term that is used to collectively refer to carbon stored in and/or sequestered by the sea and marine environments. It includes CO₂ and other GHGs dissolved in the oceans, carbon 'locked up' in organic and inorganic sediments, and carbon within living plants and animals (which, on dying, go on to add to the organic and inorganic sediments).

Speaking at the Blue Carbon Conference, in Edinburgh in November 2021, Cabinet Secretary for Rural Affairs, Mairi Gougeon MSP, said:
“There is increasing recognition across the international community of the role of the carbon stored in our seas and ocean for enhancing action on climate change mitigation, adaptation and resilience.”¹

¹ <https://www.gov.scot/news/blue-carbon-international-policy-challenge/>



To this 'natural' blue carbon, which itself is significantly affected by human activities (and, in turn, influenced by policy decisions), must be added the direct emissions from activities at sea (fishing, shipping, etc).

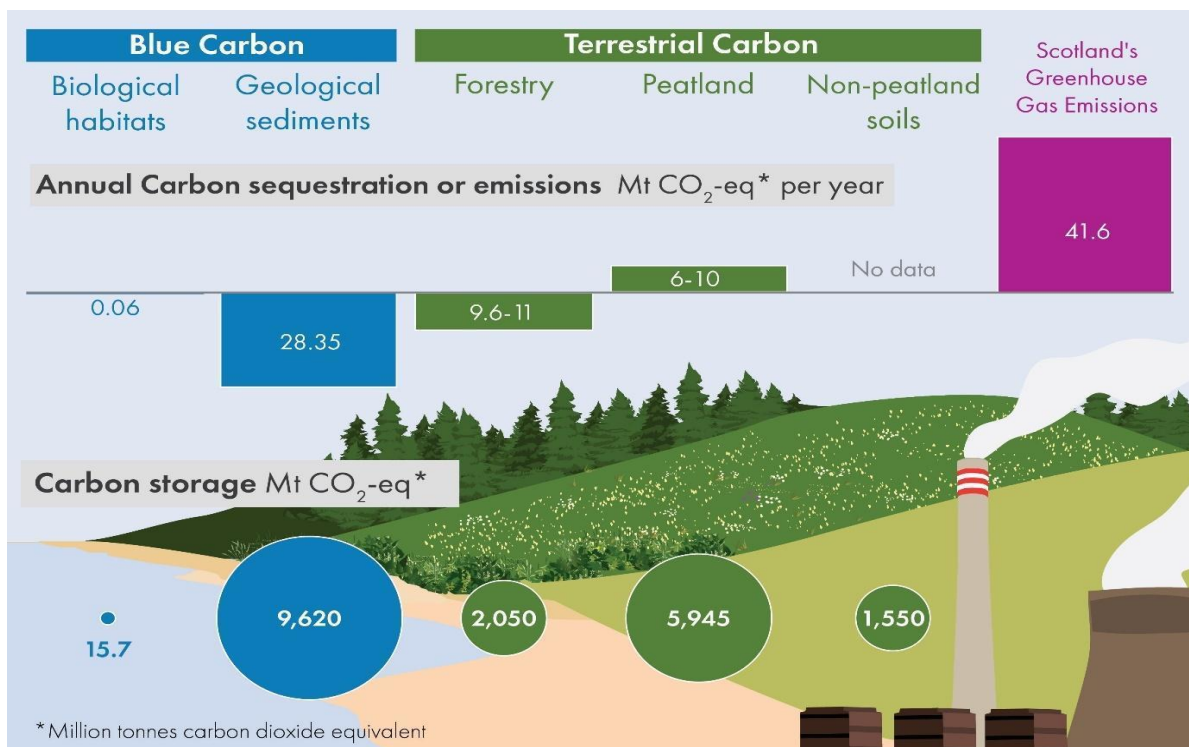
Scotland's blue carbon resource – a key feature of our marine environment

A SPICE briefing² on blue carbon summarised the current data available on the total extent of this resource in Scotland as:

- “Collectively, Scotland's blue carbon environments store 9,636 MtCO₂-eq (Megatonnes of CO₂-equivalent). This is roughly equivalent to the total of carbon stored in Scotland's land-based ecosystems (9, 546 MtCO₂-eq) such as peatlands, forestry and soils.
- Annually, Scotland's blue carbon stores sequester 28.4 MtCO₂-eq, which is approximately three times greater than the annual carbon sequestration of Scottish Forestry (9.6-11 MtCO₂-eq per year).”

These headline figures, which reflect the data in the Scottish Government's “Compendium of Marine Related Carbon Stores, Sequestrations and Emissions³) are based on detailed reports commissioned by Scottish Natural Heritage (SNH, now known as NatureScot) as well as papers by a research team at Heriot-Watt University⁴.

Comparison of blue carbon storage and sequestration with terrestrial carbon, and Scotland's greenhouse gas emissions⁵.



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<https://digitalpublications.parliament.scot/ResearchBriefings/Report/2021/3/23/e8e93b3e-08b5-4209-8160-0b146bafec9d#Executive-Summary>

³ <https://data.marine.gov.scot/sites/default/files/SMFS%201101.pdf>

⁴ The SNH reports are Burrows et al. (2014) and Burrows et al. (2017); the Heriot-Watt University papers are Smeaton et al. (2016 and 2017) – see references section for full citation and links.

⁵ Illustration from

<https://digitalpublications.parliament.scot/ResearchBriefings/Report/2021/3/23/e8e93b3e-08b5-4209-8160-0b146bafec9d#8b1bb7dd-2090-4586-ac72-b02fbb5a068a.dita>



Data on the extent of blue carbon stores, as well as sequestration and emission rates, are rapidly improving. For instance, SAMS has recently been commissioned by RSPB/WWF/WTs to undertake a comprehensive Blue Carbon mapping project across the UK⁶. This will mean that the UK will become the first nation to produce a complete map of its blue carbon stores. The final report will be produced by the summer of 2023, with initial findings expected later this year.

Notwithstanding the rapidly improving scientific knowledge, Laffoley (2020) concluded that **“the importance of maintaining the integrity of carbon storage in marine soils, sediments and vegetation (preventing carbon dioxide release) is not in doubt”** – while also highlighting the many knowledge gaps, especially in relation to quantification of carbon flows. This need to protect marine carbon was recognised by SNH, in its 2019 climate change commitments, which included:

*“We will further develop policy and practice on maintaining and enhancing the carbon storage capacity of marine habitats, using Marine Protected Areas as pilots and exemplars”.*⁷

The importance of Scotland’s blue carbon resource to both Scotland and the wider UK’s effort to address climate is underlined by both its extent and its current state. Scotland’s marine area accounts for over 60% of the UK’s seas; they extend to over six times our terrestrial land mass.

Our marine environment is undoubtedly impressive but, looking closely, shows that not all is what it seems. The pressures facing marine life are not all fully understood but we do know that these ecosystems are fragile and under increasing stress from human activities.

The EU’s Marine Strategy Framework Directive (MSFD)⁸, adopted in 2008 and incorporated into UK law in 2010⁹, aims to improve the state of Europe’s marine environment. It includes an ambition to achieve “Good Environmental Status” of the seas – and member states and the EU Commission have developed a set of indicators to measure the achievement (or not) of that status. Yet, despite the UK and Scottish Governments claiming a “mixed picture”; it is clear that 11 out of the 15 targets were missed in the last (2019) assessment¹⁰. A similar picture of failure to achieve environmental ambition is set out in the 2020 Scottish Marine Assessment¹¹. This poor environmental condition is also reflected in the state of the north-east Atlantic generally¹².

Action to address marine carbon issues can also address this poor environmental condition of our seas – and vice versa. It is a potential win-win.

The UN inventory and blue carbon

At present, neither blue carbon nor many of the wider marine emissions are included in the UN’s greenhouse inventories¹³ used for reporting and for determining national contributions. This means that they are not measured or reported in Scotland’s annual emissions’ report or addressed in the Climate Change Plan that delivers policies to deliver emission reduction targets.

⁶ <https://www.sams.ac.uk/news/sams-news-blue-carbon.html>

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<https://www.nature.scot/sites/default/files/2019-10/Publication%202019%20-%20SNH%27s%20Climate%20Change%20Commitments%202019.pdf>

⁸ https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

⁹ <https://www.legislation.gov.uk/ukxi/2010/1627/made>

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/921262/marine-strategy-part1-october19.pdf

¹¹ <https://marine.gov.scot/sma/>

¹² <https://www.sciencedirect.com/science/article/pii/S1470160X22006203>

¹³

<https://unfccc.int/process-and-meetings/transparency-and-reporting/greenhouse-gas-data/ghg-data-unfccc/ghg-data-from-unfccc>



This is a recognised shortcoming, and work is underway to address it. The UN has agreed a definition of “all biologically-driven carbon fluxes and storage in marine systems that are amenable to management” and in 2019 a special report on the oceans was published¹⁴. Despite their importance, however, these blue carbon concepts are not yet uniformly incorporated into climate strategies on local, national and global scales. Yet, as research continues and understanding grows, that is clearly the direction of travel¹⁵.

In the short-term, it is likely that carbon stores/flows associated with saltmarshes/seagrasses (albeit a small subset of the overall blue carbon) will be added to the inventory in the next 2-3 years. While this is certainly a small proportion of overall blue carbon, it is important that this action, and other wetland restoration is undertaken – to drive forward further inclusion of blue carbon sources and action on those. Longer-term, it is vital that as much of the blue carbon stores and flows will be added as soon as possible. **SCCS strongly supports the inclusion of blue carbon, and emissions from marine industries, in the inventory and the Climate Change Plan. In the short-term, emissions from, and action to protect and enhance saltmarshes/seagrasses, should be added immediately.**

Scotland’s blue carbon – acting irrespective of inventory status

During Parliamentary scrutiny of the Climate Change Plan update (CCPu) in 2021, the then Cabinet Secretary confirmed the above position, stating that:

“Blue carbon is not currently included in the UK greenhouse gas inventory. That means that policies and proposals in that space could not contribute to progress to meeting Scotland’s statutory emissions targets, which in turn means that, of necessity, they fall outside the formal scope of the climate change plan update”¹⁶.

She added that Scottish Government officials are also working with UK counterparts on developing the evidence base to support including two blue carbon habitats (saltmarsh and seagrass) within the UK emissions inventory as soon as it is appropriate to do so, while highlighting that those decisions on technical changes to the UK inventory are, however, made solely by the UK Government.

Nevertheless, blue carbon (and its release, store or sequestration) will affect the climate whether it is ‘counted’ in the inventory or not. While ‘meeting our targets’ is linked to emissions reductions from sectors included in the inventory, achieving a stabilisation of the temperature rise (to below 1.5°C if the “Paris aspiration” is to be met) is, in fact, linked to emissions whether ‘counted’ against inventory or not. Thus, not addressing blue carbon is delaying action that will, one day, be ‘counted’ and makes meeting the Paris target all the harder.

Acting now on blue carbon would allow Scotland to get ahead of the game and become a genuine ‘world leader’, able to help advise and influence global thinking on this issue. Such action would also contribute to nature restoration at sea (helping us meet wider environmental aspirations), as well as help support the Just Transition of marine industries.

Notwithstanding the then Cabinet Secretary’s perspective, the then Environment, Climate Change and Land Reform Committee (ECCLR) drew attention to the lack of policies and proposals relating to the protection of blue carbon in the CCPu. The ECCLR committee heard evidence from a range of stakeholders as well as on the latest research. This scrutiny process led to the ECCLR Committee concluding that:

*“The Committee continues to be of the view that **CCPs, including the CCPu, should contain policies and proposals on blue carbon.** Whilst emissions reductions from blue carbon are not currently included in the GHG inventory, it is clear that **practical action to protect carbon stores in the marine environment is important to ensure the continued contribution of marine ecosystems in reaching net-zero.** It would appear to the Committee that acting on the basis of the precautionary principle, **taking a proactive***

¹⁴ <https://www.ipcc.ch/srocc/>

¹⁵ <https://www.frontiersin.org/articles/10.3389/fclim.2021.710546/full>

¹⁶ <https://archive2021.parliament.scot/parliamentarybusiness/report.aspx?r=13124>



approach to blue carbon and including it as part of the final CCPu would ensure that Scotland makes early advances and secures multiple benefits in terms of carbon storage, securing biodiversity and supporting adaptation and resilience, in many areas though relatively simple, low cost actions. The Committee is of the view that this would avoid mitigation by numbers and ensure a coordinated approach – as is proposed in the draft CCPu” (emphases added)¹⁷.

This approach is one that SCCS supports – and it is disappointing that the Scottish Government did not act on this recommendation. The CCPu was finalised, in part because of the then pending dissolution of Parliament and election, with none of the recommended amendments being made.

Now, the Scottish Government is in the early stages of developing the successor Climate Change Plan and decisions are imminent in relation to the scope of that plan. SCCS has made submissions to the Scottish Government that the scope should be broad and include a range of non-statutory issues, including blue carbon¹⁸. Given the importance of blue carbon, described above, and the recommendations of the former ECCLR Committee, SCCS strongly recommends that **the new Climate Change Plan should not only refer to blue carbon and ongoing research, but also include clear and specific actions to protect such carbon stores, and for environmental improvements that will increase sequestration rates.**

Recommendations for action

SCCS’ marine group has previously (January 2020) submitted proposals for action. These both reflect and have been built on by subsequent proposals set out by Laffoley (2020), the ECCLR Committee in the last Parliament (March 2021) and a Scottish Government review of fisheries policies in relation to climate change policies¹⁹ (July 2022). These ideas are set out in full in annex 1, and based on these ideas, SCCS calls for: -

1. More/better/faster research and monitoring

As described above there is considerable research ongoing, but it is important to ensure that it is also co-ordinated and the results shared and used as soon as possible. For instance, early results from the SIFT-funded research at St Andrews (to be published in September 2022) appear to show that the vulnerability of marine carbon in the Scottish inshore appears to increase with proximity to shore. This underlines the need to protect such inshore stores from disturbance likely to release carbon – notably dredging activities. Further research on the disturbance to, and vulnerability of, carbon storing habitats and sequestering ecosystems is urgently required.

To aid further policy development, it is important that the Scottish Government urgently commission, if necessary, and publish high resolution mapping of blue carbon stores. This would, in particular, inform the selection and management objectives of protected areas as well as of fisheries management (see below). The need for such an understanding (and then appropriate management action) is illustrated by recent research that concludes that blue carbon “hotspots are potentially at risk of disturbance from bottom trawling activity and should be prioritised for the consideration of future safeguarding (management) measures to ensure emissions are minimised and to provide greater protection of this natural carbon capital resource”²⁰.

¹⁷ https://archive2021.parliament.scot/S5_Environment/Reports/ECCLR_2021.03.04_OUT_CS_CCPu_Report.pdf (page 36-37)

¹⁸

<https://www.stopclimatechaos.scot/wp-content/uploads/2022/08/CCP-scope-one-sider-from-SCCS-1-Mar-2022-FINAL.docx-2.pdf>

¹⁹

<https://www.gov.scot/publications/review-fishing-practices-adapted-commercial-fisheries-around-world-order-help-mitigate-sectors-contribution-climate-change/pages/1/>

²⁰ <https://www.frontiersin.org/articles/10.3389/fmars.2022.892892/full>



2. The implementation of 'no regret' actions to protect and enhance blue carbon

Some such measures might be taken immediately while others could be included for action over the coming years in the new CPP. These should include:

a) Fishing policy reform

The relationship between marine carbon and fisheries is crucial – and is not restricted to the emissions from fishing vessels (albeit that is one area that needs attention and should include the removal of fuel subsidies). Issues that need attention include fisheries management (to reduce steaming distance to fishing grounds and restore fish stocks and the wider marine environment) as well as changes to vessel/gear types and fishing methods to limit damage to carbon stores and accelerate sequestration of blue carbon.

The finalisation of the Scottish Government's Future Catching Policy would be an ideal vehicle to deliver such a clear change of direction in relation to fishing policy – as set out by SCCS in our response to that consultation²¹. Further detailed policy measures should be set out in both fisheries policy and the new CCP.

b) Clearer/firmer management measures for MPAs/HPMAs

Protected areas provide an ideal vehicle to implement and monitor management measures for blue carbon – and deliver for the wider marine environment. It is very welcome that the Bute House agreement includes the protection of blue carbon as both a selection criterion and an objective for the new Highly Protected Marine Areas.

Nevertheless, it is vital that both these HPMAs, and the existing MPAs, are better managed to deliver blue carbon benefits. Such benefits must be clearly built into management objectives and management measures introduced to ensure their delivery.

While actions for protected areas are a good start, they should be seen as a first step (trial?) for measures to protect wider blue carbon, especially saltmarshes and seagrasses) wherever they occur.

c) Coastal, seaweed and other policies

Given the growing evidence of the important role of terrestrial management on inshore deposits of carbon (via runoff of soil /peat), there is a need to develop and implement better integrated coastal management, spanning the land-sea boundaries – and for this to be reflected in terrestrial land use policies.

The Government should also develop a coherent seaweed policy covering both protection of wild stocks and sustainable cultivation. The recent evidence raises question about the ability of cultivated seaweed to sequester carbon in significant quantities and implies that policy may have to rely more on natural growth²². However, it is recognised that farmed kelp will enable a new generation of climate mitigating products (e.g., methane reduction feedstuff additives).

3. A substantial marine section in the CCP

As described above, the new Climate Change Plan should not only refer to blue carbon and ongoing research, but also include clear and specific actions to protect such carbon stores, and for environmental improvements that will increase sequestration rates.

Stop Climate Chaos Scotland
August 2022

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<https://www.stopclimatechaos.scot/wp-content/uploads/2022/06/SCCS-response-to-consultation-on-Future-Catching-Policy-1-1.pdf>

²² <https://cdn.cyfoethnaturiol.cymru/media/695110/nrw-evidence-report-606-seaweed-farming-and-blue-carbon.pdf>



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ANNEX 1

Various proposals for action to protect and enhance blue carbon

Policy asks from SCCS marine group, submitted to Scottish Government in January 2020:

- Halt impacts on existing marine carbon stores by establishing appropriate spatial management
- All marine activities having an impact on marine carbon stores to be monitored and high resolution maps of the footprint made available publicly and annually
- Cease damage to all biogenic reefs, seagrass, kelp and other habitats which sequesterate carbon, and establish regeneration targets for each
- Cease damage to saltmarsh habitats and establish regeneration targets
- Establish low emission and sustainable fisheries objectives in fishery legislation and report on annual fisheries emissions
- Recover fish stocks to the point at which they can provide maximum sustainable yield to provide low emission protein source
- Improve terrestrial coastal land management
- Establish financial instruments to promote emissions reduction
- Promote research into carbon sequestration in aquaculture

Laffoley (2020) recommendations for action:

- Recognise the full extent of blue carbon ecosystems present in MPAs as the basis for initiating climate/biodiversity joined up and effective management action.
- Take additional management measures straight away to secure the carbon values of well-documented blue carbon ecosystems.
- Take additional management measures to secure the carbon values of less well-documented blue carbon ecosystems, which may need to include mapping their extent and quality within current MPAs before enacting relevant management measures.
- Designate new MPAs based primarily on the carbon values for blue carbon ecosystems that lie outside existing MPAs, rather than just focusing on traditional biodiversity values alone. This step can be enacted alongside any other step and as early as resources allow as a key element of delivering the CBD's existing (Aichi) and future biodiversity targets.
- Take measures to complement the MPAs using tools such as marine spatial planning and fisheries management measures to recognise, protect and enhance and restore blue carbon across seascapes.

The ECCLR Committee (March 2021) went on to recommend that the Scottish Government:

1. Brings forward policies on how to protect blue carbon stores through the forthcoming update of the National Marine Plan and the development of the Blue Economy Action Plan and reflects this intention in the final CCPu.
2. Provides clear guidance on the role of spatial management in protecting blue carbon hotspots from pressures such as mobile bottom-contacting fishing gear.
3. Ensures that blue carbon storage and sequestration capacity is taken into account in proposals for management measures in Marine Protected Areas.
4. Provides further information on how it will ensure that the Blue Economy Action Plan reconciles the need to ensure protection of natural capital such as blue carbon and marine biodiversity hotspots with socioeconomic priorities of coastal communities.
5. Works with the UK Department for Business, Energy and Industrial Strategy to incorporate blue carbon in saltmarsh and seagrass ecosystems into the UK's National Atmospheric Emissions Inventory and therefore Scotland's greenhouse gas inventories.
6. Takes a leadership role in promoting the opportunities of blue carbon and presses for the inclusion of blue carbon in the GHG inventory, including with the UK Government and in the COP26 negotiations.



A Scottish Government review of fisheries policies²³ in relation to climate change policies, published in July 2022, identified a number of options for policy interventions grouped into in eight areas:

1. **Fossil fuel consumption**; efforts to reduce consumption and associated greenhouse gas (GHG) emission from fishing vessels.
2. **Alternative energy**; Cleaner energy supply for fish and shellfish processing.
3. **Selectivity**; the use of more selective and efficient methods of fishing.
4. **Local Markets**; better use of local markets, reducing food miles and associated GHG emissions.
5. **Reducing waste**; efforts to reduce waste/gear loss, thereby reducing marine litter and GHG emissions.
6. **Refrigerants**; measures taken to reduce the contribution of refrigerants to GHG emissions.
7. **Stock resilience**; measures to improve stock resilience to climate change.
8. **Consumer behaviour**; efforts to change consumer behaviour.

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<https://www.gov.scot/publications/review-fishing-practices-adapted-commercial-fisheries-around-world-order-help-mitigate-sectors-contribution-climate-change/pages/1/>