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Howe, John; Austin, William

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Carbon budgets and potential blue carbon stores in Scotland's coastal and marine environment

John Howe and william austin

Scottish Association for Marine Science, Biogeochemistry and Earth Science, Oban, United Kingdom
(john.howe@sams.ac.uk)

The role of marine ecosystems in storing blue carbon has increasingly become a topic of interest to both scientists and politicians. This is the first multidisciplinary study to assess Scotland's marine blue carbon stores, using GIS to collate habitat information based on existing data. Relevant scientific information on primary habitats for carbon uptake and storage has been reviewed, and quantitative rates of production and storage were obtained. Habitats reviewed include kelp, phytoplankton, saltmarshes, biogenic reefs (including maerl), marine sediments (coastal and shelf), and postglacial geological sediments. Each habitat has been individually assessed for any specific threats to its carbon sequestration ability. Here we present an ecosystem-scale inventory of the key rates and ultimate sequestration capacity of each habitat. Coastal and offshore sediments are the main repositories for carbon in Scotland's marine environment. Habitat-forming species on the coast (seagrasses, saltmarsh, bivalve beds, coralline algae), are highly productive but their contribution to the overall carbon budget is very small because of the limited extent of each habitat. This study highlights the importance of marine carbon stores in global carbon cycles, and the implications of climate change on the ability of marine ecosystems to sequester carbon.