**Supplementary Materials**

Catherine E. Lovelock and Carlos M. Duarte. Dimensions of Blue Carbon and emerging perspectives

Illustrative references (Table S2) and criteria on which the ecosystems are assessed (either YES, NO, or inconclusive?) (Table S2).

Table S1. References supporting Table 1 and Table S2.

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Table S2 Criteria used for assessing whether ecosystems are considered Blue Carbon ecosystems.

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| Criteria | Key considerations |
| Scale of GHG gas removals or emissions are significant | Multiple sources of scientific evidence is available and supported by theory, that the ecosystem have either 1) high levels of carbon (C) stocks either globally or locally (on an area basis); 2) high rates of carbon sequestration globally or locally. E.g. we conclude “YES” for mangroves which have a limited global cover but high levels of soil C stocks on an aerial basis, and also for phytoplankton which have extensive global cover but low C stocks on an area basis.  |
| Long term storage of fixed CO2 | Multiple sources of scientific evidence that fixed organic carbon is stored for longer than 100 years.  |
| Undesirable anthropogenic impacts on the ecosystem | Multiple sources of evidence that ecosystems have been removed, converted or degraded by human activities. E.g. we conclude “YES” for seagrass which have reduced cover caused by declining coastal water quality; but “?” for phytoplankton, because cover has not been reduced, but there is evidence that phytoplankton communities have changed in coastal oceans due to nutrient enrichment, yet we are uncertain of the spatial extent or functional consequences of this change. |
| Management is practical/ possible to maintain/enhance C stocks and reduce GHG emissions | Multiple sources of evidence that ecosystems can be managed to either maintain or enhance carbon stocks or to decrease net greenhouse gas emissions. E.g. we conclude “YES” for tidal marshes that can be restored, thereby protecting remaining soil C stocks, enhancing soil C sequestration and, if there were significant methane emissions from freshwater ecosystems prior to restoration, also potentially through a net reduction in methane emissions; but “?” for phytoplankton where there is conflicting evidence on the levels of C sequestration can be achieved through fertilizer additions; and “NO” for ecosystems where high levels of calcification, which result in CO2 emissions, and where we assume management is focussed on enhancing growth of habitat forming calcifying organisms. |
| Interventions have no social or environmental harm | Blue Carbon projects should follow the recommendations of Crooks et al. (2014)[38] thereby avoiding the negative social consequences that have been associated with programs such as REDD+[39]. However, risks of social harm and/or environmental harm with their restoration and/or conservation cannot be completely eliminated. Therefore, to reflect these uncertainties, and based on the restoration literature, as well as literature on marine protected areas, we assign a “?” to for mangroves, tidal marshes, coral reefs and marine fauna. We assign “YES” to seagrass, oyster reefs and mud flats as we are not aware of reports of adverse social or environmental harm associated with their conservation or restoration.  |
| Alignment with other policies: mitigation and adaptation | Blue Carbon project outcomes align with international conventions, national or sub-national policies and guidelines. E.g. Sustainable Development Goals, Convention on Biodiversity, RAMSAR Convention, climate adaptation policies, local biodiversity conservation, fishery habitat protection and others. |