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TITLE: Estimating Global 'Blue Carbon' Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems

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ABSTRACT:

Recent attention has focused on the high rates of annual carbon sequestration in vegetated coastal ecosystems--marshes, mangroves, and seagrasses--that may be lost with habitat destruction ('conversion'). Relatively unappreciated, however, is that conversion of these coastal ecosystems also impacts very large pools of previously-sequestered carbon. Residing mostly in sediments, this 'blue carbon' can be released to the atmosphere when these ecosystems are converted or degraded. Here we provide the first global estimates of this impact and evaluate its economic implications. Combining the best available data on global area, land-use conversion rates, and near-surface carbon stocks in each of the three ecosystems, using an uncertainty-propagation approach, we estimate that 0.15-1.02 Pg (billion tons) of carbon dioxide are being released annually, several times higher than previous estimates that account only for lost sequestration. These emissions are equivalent to 3-19% of those from deforestation globally, and result in economic damages of \$US 6-42 billion annually. The largest sources of uncertainty in these estimates stems from limited certitude in global area and rates of land-use conversion, but research is also needed on the fates of ecosystem carbon upon conversion. Currently, carbon emissions from the conversion of vegetated coastal ecosystems are not included in emissions accounting or carbon market protocols, but this analysis suggests they may be disproportionally important to both. Although the relevant science supporting these initial estimates will need to be refined in coming years, it is clear that policies encouraging the sustainable management of coastal ecosystems could significantly reduce carbon emissions from the land-use sector, in addition to sustaining the well-recognized ecosystem services of coastal habitats.

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