

Is wetland an ecosystem type? A synthesis assessment on global carbon sequestration in wetlands

Outline

According to Ramsar Convention on Wetlands, the definition of wetlands is deliberately broad, encompassing "*areas of marshes, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is flowing or static, fresh, brackish or salty, including areas of marine water the depth of which at low tide does not exceed six meters*". It may also include riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands. On the other hand, the wetland concept was consciously or unconsciously perceived as an ecosystem type and their carbon storage potential was evaluated or estimated by well-studied wetland types. For example, peatland was recognized worldwide as highly important for carbon storage since it accounts for circa 50% of terrestrial carbon storage with only 3% cover of world's land area. Comparatively, we know little about carbon storage and flux in other wetland types. Globally, the importance of wetland may be overestimated if we evaluate the wetland ecosystem services on carbon sequestration using few well-studied references. Even concerning the peatland, the carbon storage was largely estimated based on the researches in North America. As most peatlands occur in lower altitudes, the peatland based assessment on wetland lacks of global basis.

In this study, we propose to collect the data from global wetland sites, especially from tropical and temperate zones which have not been well-researched by far. Because the carbon storage in different wetland is variable and carbon flux of wetland is sensitive to waterlogging condition, it is important to separate the wetland into different subsets. For example, though salt marsh and mangrove swamps shared similar carbon sequestration rates, the average soil carbon density was significantly higher in mangrove swamps. When compared to peatland, however, salt marshes and mangroves showed a higher magnitude of carbon sequestration rate. Consequently, it requires reassessment of wetland ecosystems as a whole to evaluate their role in global carbon cycle. Also, we are interested in the effect of disturbances on carbon storage and flux of wetland, such as climate change and land use change since a lot of wetlands were drained for agricultural use. As the importance of wetland was widely accepted, the restoration of wetland is launched in many places, and it is important to evaluate carbon sequestration potential of the restored or newly created wetlands. This may offer a guideline for evaluating the wetland restoration practices.

Involved sites

Data from wetland sites with at least one year continuous data. Carbon sequestration of wetlands measured by other methods like harvest method and isotopes is also used. We especially welcome data from tropical and temperate zones.

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