Synergy between macrophyte abundance and DIC concentrations that reduce methane emissions from experimental ponds

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A recent analysis shows aquatic productivity is an important driver of CH_4 emissions from lentic waters, with shallow lakes being particular hot spots. In this study, we document the diurnal and seasonal variations measured in DIC, Chla, CH_4, and other related hydrochemical parameters in five artificial pond ecosystems under scenarios of nutrient loading with differing land uses at the Shawan Karst Test Site, SW China. The macrophyte abundance of the five ponds was extremely similar, with an increase in nutrient concentrations but completely opposite Chla abundance over period. The ponds were dominated by one, or a combination of, *Charophyta*, *Ceratophyllum demersum* and *Myriophyllum*, whereas *Spirogyra* was more abundant in the low-nutrient pond. The CH_4 emissions from macrophyte abundant ponds were reduced by 20 %- 60 % compared with those from phytoplankton predominant ponds. The highest DIC concentration resulted in minimum CH_4 emissions in ponds. These results indicate that CH_4 efflux in the ponds with elevated nutrients was limited by DIC fertilization, compared with macrophyte abundance in karst aquatic ecosystem.

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