Mercury cycling in restored coastal wetlands

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Saltmarsh restoration, through de-embankment, is being implemented across Europe and North America with implications for physicochemical conditions in the wetlands soils created. Yet, there is little understanding of the effects of de-embankment on biogeochemical cycling and this is of particular pertinence for contaminants such as Hg whose behaviour and toxicity is strongly influenced by the physicochemical environment. The aim of this work was to understand the effects of saltmarsh restoration on Hg cycling and MeHg production.

Field observations were used to assess broad-scale Hg dynamics and physico-chemical controls on MeHg production.

Recently de-embanked sites have lower MeHg concentrations, probably due to poor drainage and limited vegetation development. Physical sediment properties are less heterogeneous in restored sites, which is reflecting lower habitat and topographic heterogeneity. Previous land-use has a significant impact on physico-chemical sediment characteristics and these characteristics change over time to reflect saltmarsh development. There was evidence to show that it takes decades for restored sites to attain similar physico-chemical characteristics to their natural counterparts. This could have significant implications for wider biogeochemical cycling in restored saltmarshes, and long-term implications for the delivery of biogeochemical ecosystem services.

Surface sediments in restored coastal wetlands appear to be areas of significant MeHg production. MeHg concentration was found to be well correlated with indicators of sulphate reducing bacteria, however most importantly, evidence was found for biogeochemical relationships with MeHg concentration, particularly the association of MeHg and indicators of iron reduction. Therefore, where MeHg is normally restricted by sulphide production, high levels of MeHg can be formed through other pathways.