Functions of mud in estuarine and coastal ecosystems

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Abstract
It is generally and qualitatively well known that environmental conditions like turbidity and sediment composition play a role in the biodiversity development of ecosystems. It is not yet known 'how' these environmental conditions determine the general direction in which the ecosystem's diversity and species abundance develop. The question whether 'mud' and 'turbidity' itself can be considered as environmentally 'good' or 'not good' is of utmost importance since more and more directives and regulations are focussing on ecosystem 'trade off' and 'quality'. Mud is one of the ingredients contributing to 'habitat'. The EU-Water Framework Directive (and forthcoming Marine Strategy Directive) requires optimal physico-chemical conditions and optimizing the 'habitat providing conditions' as a mean to improve the general environmental conditions. As such 'mud' plays a vital role in itself (sediment composition), as light inhibitor (water turbidity) and as carrier for detritus, micro-organisms, pollutants and nutrients).
Mud related pollution may lead to malfunctioning of organisms. The nutrients related to mud may increase the primary production while the presence of mud may lead to a decrease in light conditions and thus decrease the primary production.
It is emergent that, apart from internal disturbances (within species assemblages and caused by inter species competition for resources) also external disturbances (caused by environmental factors) contribute to the development of biodiversity. There are a few indications that the direction of the diversity development may be determined by the frequency and the intensity of environmental changes and disturbances. When focussing on mud this is turbidity (channel maintenance dredging and disposal of harbour sludge), mud associated nutrients and associated pollutants.
It is evident that at the basis of forthcoming monitoring some basic ecological theories (as Intermittent Disturbance Hypothesis and Resource Competition Theory) should be acknowledged by confronting them with starting points and goals of the EU Water Framework Directive and the Marine Strategy Directive. Suggestions are done to extend ecosystem monitoring by covering all trophic groups instead of a selection. It is also suggested to start flux analyses (e.g. Ecological Network Analysis) to integrate 'structuring' (the species) and 'functioning'(the processes) and to judge in a more general way the systems status by ENA related indices and to further develop this approach. Merging the ecological theories then with the practical application of ENA (or a comparable approach) then guarantees the conversion of conceptual knowledge to a practical application so that ecological theories can play the pivotal role they should play in both science and integrated environmental management.