



Can sand nourishments counteract the consequences of climate change while preserving ecosystems: A case study

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In order to adapt to sea level rise, sand nourishments are one of the measures to protect the coast from erosion and stabilize shorelines. Marine sands are being dredged from the ocean floor and nourished onto the beach or in the shallow water. To understand the ecological effects of these measurements, the following case study was performed. Both short and long-term effects on aquatic and terrestrial coastal ecosystems were monitored during a 24 months survey which started in June 2021 in Ahrenshoop at the Baltic Sea (Germany). Sediment structure and vegetation along the nourished beach as well as the turbidity plume caused by the nourishment were monitored.

It was shown that it takes around 6 months until the sediment and water conditions prior to the nourishment are met again. This is due to the mechanism of the nourishment itself and depending on the nourished sediment. The algae vegetation was only influenced by seasons and not affected by the nourishment. In contrast, there were major changes in vegetation of the dune since part of the dune was burrowed under the nourished sand. The vegetation coverage decreased as well as the biodiversity in the primary and secondary dune which both were buried under a new layer of sediment that was significantly different and only *Ammophila arenaria* was restored there. The tertiary dune was not directly affected by the nourishment. Nevertheless, comparisons of the dune with unnourished dunes showed overall lower biodiversity including the tertiary dune.

Sand nourishments can change the ecology of a coastal ecosystem. Even after reinstating similar sediment parameters, the results of the case study suggest that long-term effects occur regarding vegetation of the dune.