What are the boundary conditions to implement nature-inspired coastal defence solutions? A Coastbusters blueprint comparison between Europe and Bay of Bengal

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Ecological engineering uses biobuilders, natural processes and materials to resolve environmental challenges by restoring ecosystems and creating opportunities for nature. Incorporating nature in engineering design results in resilience and adaptability. New ecosystem services are created benefiting coastal defence, shoreline stabilization, biodiversity and provision of breeding and nursery habitats, but also potential food supply or recreational activities. The ongoing industrial research Coastbusters project aims to unravel the required boundary conditions necessary to facilitate reef building to bio-stabilize natural accretion of sand and reinforce the foreshore against coastal erosion.

The specific hydrodynamic, biological and chemical features of such biogenic reef system and the surrounding area should be identified correctly. Hence, adequate site of interest can be selected to deploy structures inducing biogenic reefs. For this study, two broad coastal regions are selected as potential application field: temperate Europe and tropical Bay of Bengal. A comparative study between them will generate a set of boundary parameters and basic design conditions necessary to evaluate potentials of the concept at any coastline worldwide. Several case-study sites will be selected on the basis of their typifying conditions and need for erosion protection. The results will take into account the site-specific boundary conditions, but also the reef biobuilder species-specific habitat constraints.

The outcomes of the project work will provide the scientific communities with a set of measurable tools to predict locations where artificial biogenic reef could be of use as alternative nature based coastal protection scheme. Moreover, a blueprint will be rolled out to reach out to policy makers to choose a more sustainable source of marine ecosystem services as part of local coastal zone management in developed and developing countries.

Keywords: Coastbusters; Ecological engineering; Nature Inspired Design; Coastal erosion; Blueprint; Biogenic reef; Europe; Bay of Bengal