# Topic 2: Green coastal protection – towards quantifying the benefits of vegetated foreshores and other nature-based solutions

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Coastal areas are particularly vulnerable to the effects of climate change. Sea-level rise and storm surge extremes can result in erosion and flooding of these sensitive areas. Over the last decades, traditional “hard” coastal defenses such as concrete embankments have been used but these are usually expensive to maintain, they have contributed to the loss of valuable habitats, and they are also held responsible for coastal erosion in some cases. The EU Green Infrastructure Strategy promotes the use of nature-based solutions to provide environmental, economic and social benefits through natural solutions. One of the key attractions of Green Infrastructure is its multifunctionality, i.e. its ability to perform several functions on the same spatial area. Nature-based solutions can also increase the protective character of coastal defenses, as e.g. vegetated foreshores that reduce the wave load on coasts.

Vegetated foreshores (VF) have been an integral part of many modern coastal protection strategies, offering adaptive, eco-friendly, and cost-effective solutions. However, quantifying the benefits of VF for coastal protection is still a challenge as – amongst others – i) they show seasonally varying characteristics, ii) they depend on location factors, iii) they are affected/degraded by individual extreme events, all of which can have an impact on the resistance of the defense. In order to objectively quantify the effectiveness of VF for coastal protection and to gain acceptability, frameworks are needed that allow to objectively quantify wave damping effects from VF.

A recent initiative (the Eco-Dike project) aimed at to collect and merge existing field and lab data focusing on wave-damping as response to VF. A simplified method to statistically model this highly complex interaction was developed (Soltau et al., 2021), allowing first order estimates of wave damping from unimpaired VF which are represented by the observed samples that ran into the statistical model. The credibility, however, decreases when it comes to extrapolations and/or degraded or seasonally affected vegetation.

The aim here is to bring together colleagues working in coastal sciences in order to discuss the opportunities, challenges and limitations of VF in coastal engineering applications. As a deliverable, we aim at a) to collect and merge all available data from field and lab campaign usable to be incorporated in a common and (if possible) freely available data base, b) to identify knowledge gaps in the existing records, thus indicating the event/species range that needs to be investigated in future campaigns, and c) to update/develop a regression based approach in order to estimate the wave damping effect of VF and on coastal protection. At the end of the workshop, the aim is to summarize/present a) to c) in a common paper considering all active participants as potential co-authors of the paper/database.