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Human intervention on the coast: a case of dike construction at the North Bulgarian Black Sea shore

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In an attempt to control erosion and for coastal stabilisation, placement of hard protection structures (such as concrete seawalls, bulkheads, embankments etc.) has caused coastline armouring. As a result, the high level of shorelines armouring by coastal defence structures has emerged as major environmental problem in the coastal zones at a European and worldwide scale. Since the beginning of the XX century up to now the Bulgarian experience in coastal engineering has also been illustrated by a large number of hard solid structures: huge groins, ruble-mound dikes and concrete seawalls. At present, there are many cases of ad-hoc and ineffective structures along the Bulgarian Black Sea coast, which are partially broken, being in disrepair state or needing reconstructions. In result of the armouring effects the hydrodynamic conditions and shoreline morphology have been irreversibly modified at many sites. In this context, this research presents a case study for modification of 10 km long section between Albena resort and Balchik town, North Bulgarian Black Sea coast due to dike construction. Dikes are onshore structures with the principal functions of protecting low-lying coastal territories against flooding and they are one of the most used defence methods along the Bulgarian coast. A common interpretation in Bulgarian coastal protection practice is a combination of dikes and systems of groins as well as the constructed dikes have functioned as road connections. In that case, however at the study area the existing cliff is overgrown and stable, and there is low wave energy affecting the coast. The construction of dike was started in the middle of 1990s and was entirely completed in 2009.
Data from topographic maps (1:5 000) and field surveys are used to investigate the coastline modification (seaward shift) and sand losses in result of dike building, as data processing and analysis were performed into GIS environment. The main research results clearly show the negative effects of this coastline armouring: degradation of the 10 km natural coast, destroying the existing sandy beach in front of the cliff, irreversible changes of the coastline and destruction of the whole coastal ecosystem.

Keywords: shoreline armouring; sand losses, coastal defence, Bulgarian Black Sea coast.