ID: W2169803857

TITLE: Coastal Mangrove Squeeze in the Mekong Delta

AUTHOR: ['Linh K. Phan', 'J.S.M. van Thiel de Vries', 'Marcel Stive']

ABSTRACT:

Phan, L.K.; van Thiel de Vries, J.S.M., and Stive, M.J.F., 2015. Coastal mangrove squeeze in the Mekong Delta.The role of mangrove forests in providing coastal zone stability and protection against flooding is increasingly recognized. The specific root, stem, and canopy system of mangroves is highly efficient in attenuating waves and currents. The sheltered environment created by a healthy mangrove forest offers great sedimentation potential in case a sediment source is available. However, the once-abundant mangrove forests in the Mekong coastal delta are becoming rapidly depleted. Especially along the Mekong eastern and southeastern coast, mangrove degradation and rapid coastline erosion are observed at many locations. At these locations, the mangrove forests usually consist of a narrow strip only, sometimes as narrow as 100 m. This mangrove squeeze is mainly due to the construction of sea dikes in a quest for the creation of space for cultivation and the prevention of salinity intrusion. The basic assumption behind our work is that there is a critical minimum width of a coastal mangrove forest strip to keep its ability to stay stable or, once surpassing the minimum width, to promote sedimentation. The larger the width the more efficient the attenuation of waves and currents will be, offering both a successful seedling and sedimentary environment. Our analysis of available data both from literature and from satellite observations supports our basic assumption: an average critical width of 140 m is found for the southeastern and eastern Mekong Delta coast as a minimum width to sustain a healthy mangrove forest. To further our insights into the efficiency of mangrove to attenuate wave energy as a function of their width we have applied a state-of-the-art wave propagation model that includes both short and long waves. Our results confirm earlier results from the literature that short waves are indeed attenuated very rapidly over distances shorter than the critical width, but as we show for the first time infragravity waves penetrate over much larger distances. We therefore hypothesize that the decay of long waves plays a crucial role in the health of the mangrove.

SOURCE: Journal of coastal research

PDF URL: None

CITED BY COUNT: 104

PUBLICATION YEAR: 2015

TYPE: article

CONCEPTS: ['Mangrove', 'Rhizophora mangle', 'Dike', 'Coastal erosion', 'Delta', 'Geology', 'Salt marsh', 'Oceanography', 'Flooding (psychology)', 'Environmental science', 'Sediment', 'Hydrology (agriculture)', 'Shore', 'Ecology', 'Geomorphology', 'Psychology', 'Aerospace engineering', 'Engineering', 'Biology', 'Psychotherapist', 'Geotechnical engineering', 'Geochemistry']