Effect of Coastal Prevention by Beach and Serious Problems in Some Coasts of the Gulf of Thailand

Nunthawath Charsurothianadech, Yoshimichi Yamamoto, and Uba Sirikaew

ABSTRACT

Beach erosion in most of Thailand became significant in some many years ago. The causes of this change are considered to be the combination of human induced development and big waves. Though people tried to respond to it mainly by building seawall, there are many inappropriate elements in design and materials. In this research, the authors assessed the mangrove presence and beach change in coastal areas and analyzed the effective prevention to coastal disaster by beach using a lot of beach information gotten by the authors’ field surveys, aerial photographs, wave and tidal data gotten from government organization. The authors introduce two serious problems on coastal disaster in the Gulf of Thailand, and propose countermeasures for those.

KEY WORDS: Aerial photograph; Coastal disaster; Coastal facilities; Coastal protection; Gulf of Thailand; Mangrove forest; Wave data.

INTRODUCTION

The Gulf of Thailand, an inlet of the South China Sea, has a coastline along the east and west region stretching for approximately 544 and 930 km respectively. It has been pointed out that many beaches in the Gulf of Thailand suffer from beach erosion. In addition, if sea level rises as predicted in the research, Houghton et al., (1990); Watson et al., (1995), then many coastlines of the Gulf of Thailand are going to be subjected to increased erosion, inundation and other problems as a result. If sea level rises as predicted and coastal problems worsen then the communities will need to protect their shorelines in order to defend their livelihood. Present practices of coastal protection are not effective and most such communities are unable to afford to build artificial structure of optimal design. The geomorphology of the gulf coast is characterized by a long and wide mainland beach of sand and dunes, with lagoons bays and splits in east coast and muddy shoreline with mild slope beach in the upper part of the gulf. Tidal range on the east coast varies between 0.2 and 4.0 m, with two types of tide, mixed but predominantly diurnal in the upper part and mixed but predominantly semidiurnal in the lower part. Along the western coast, the tide is mixed semidiurnal with a relatively high tidal range between 1.1 and 3.6 m, Siripong, (1985). Deltaic coasts are affected by changes both on the land and in the sea. Anthropogenic activities in upland catchments such as deforestation, cultivation, dam construction as well as coastal activities such as construction of ports, sand barriers, breakwaters and jetties, all may have adverse impacts on the sediment delivery and thus on the availability of mangrove habitats. Hogarth, (2001); Saito, (2001). Thampanya et al., (2006) provide a regional overview of coastal progradation and erosion along the coast of southern Thailand and specifically focus on long-term development in a number of areas with comparatively large mangrove stands using remote sensing in combination with in situ studies and compare the results with overall patterns synthesized from coastal surveys.

Isobe, (1998) introduced a basic theoretical framework for an integrated coastal zone management (ICZM) scheme in Japan. Such scheme will seek to integrate the ecological, disaster prevention, and human utilization functions of coastal zones. The paper arrives at the conclusion that an ICZM scheme is absolutely essential to solve Japan’s development-related coastal zone problems. Mimura & Nunn, (1998) analyzed the present status of beach erosion and evaluate the efficiency of both traditional and existing measures of coastal protection and concluded that the causes of beach change are considered to be a combination of human-induced development and global sea-level rise. Jarungrattanapong & Manasboonphempol, (2008) reported that the households at the coast of Bang Khun Thian district of Bangkok had applied autonomous adaptation for prevention coastal erosion/flooding by three types of category; protection strategies, which consist of stone breakwaters, bamboo revetments, and the heightening of dikes; retreat, for which farmers need to rebuild a new water-gate; and accommodation, by rebuilding/renovating their houses in order to avoid the impacts of coastal erosion or flooding. They noted that all the households have applied more than one adaptation strategy.

The purposes of this study are (1) to analyze the present status of coastal erosion in mangrove area changed and beach change and (2) to evaluate the efficiency of both traditional and existing measures of coastal protection and determine appropriate method to solve the problems on coastal disaster.

EFFECT OF COASTAL PREVENTION BY BEACH

The authors had collected the information on coastal disaster, the coastal profile data and the external force data of 24 coasts in Japan and 9 coasts in Thailand as shown in Table 1 and Fig. 1.

Then, the authors had analyzed those data in order to acquire some limits on coastal disaster and could obtained two graphs as shown in Figs. 2 & 3. In Fig. 2, the beach section area means the half of ‘the beach height times the beach width’. In general, the likelihood of a coastal disaster becomes low as the scale of a beach profile becomes large, because the beach is a natural wave absorber. Figs. 2 & 3 show that the area of black circles is the high risk range of coastal disaster.

Moreover, although the beach height is 0 m or the beach section area is 0 m², in the case that the equivalent offshore wave height is less than 1.5 m or the wave height x wavelength is less than 50 m², the possibility of not damaging is high.