

ASSESSMENT OF IMPACTS OF SEA LEVEL RISE ON THE SONGKHLA LAKE IN SOUTH THAILAND

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ABSTRACT

The author shows the procedure and some results of the assessment of the impacts of sea level rise on a coastal lagoon in a case study of the Songkhla Lake in south Thailand. At first the data on physical and human conditions are collected, and the characteristics of both natural and socioeconomic systems are delineated. Then the study area is divided into some homogeneous zones; *Beach ridge plain, Sand spit of Songkhla City, Deltaic lowlands and Melaleuca or Mangrove forest*. After identifying development factors in each zone, some serious impacts of sea level rise, such as coastal erosion, inundation or severe flooding, intrusion of salt water, should be estimated.

1. Purpose of This Study

The purpose of this study is to assess the impacts of sea level rise on coastal lagoons in some Asian countries. To assess the impacts appropriately, it is most important to clarify the natural and socioeconomic systems of each lagoon area. Because the impacts will have various aspects depending on the vulnerability or the resilience in each community to the occurrence of hazardous events. So the author tried to assess the impacts of sea level rise according to the following procedure, and shows some results in a case study of a part of the Songkhla Lake; Thale Sap Songkhla, in south Thailand (Fig.1).

2. Methodology

At first the author collected the data on physical and human conditions. And the characteristics of both natural and socioeconomic systems are delineated. The data on natural system is arranged from geomorphological and hydrological viewpoints. In the same way, the data on socioeconomic system is analyzed in relation to the land use pattern and water use conditions. Then the study area is divided into some homogeneous zones through integration of the data on natural and socioeconomic systems. After that, development factors in each zone are identified and the impacts of sea level rise will be estimated.

3. Classification of Lacustrine Lowlands in the Songkhla Lake Basin

Lacustrine lowlands of Thale Sap Songkhla can be divided into beach ridge plain, sand spit of Songkhla City area, and the deltaic lowland by the differences of mainly geomorphological conditions (Fig. 2, Fig.3). And the deltaic lowland of Thale Sap Songkhla is further divided into five distinctive zones by the characteristics of the land use patterns as shown in the Table 1.

3.1 Beach ridge plain

Eighteen ridges are found in the most southern part of the plain (Fig.2,A-A'). The height of the top of the ridges is 1.3 to 3.5m above sea level. A large part of the lowlands between the ridges, being 1 to 2 m lower, has turned into wasteland without cultivations for the last 5 to 6 years, and are changed into shrimp ponds quite recently. In such shrimp farming area many palm trees are dying because of the

increase in salinity of groundwater and severe coastal erosion is taking place.

3.2 Sand spit of Songkhla City

The urban area of the Songkhla City is almost 2 to 3 m high above the sea level, and both sides of shoreline are protected by the seawall or wide and strong road (Fig.2,B-B'). But the long and beautiful Samila Beach is now suffering from a severe coastal erosion, too.

3.3 Deltaic lowland of Thale Sap Songkhla

Present and former deltas of the U-tapao river and the Phu Mi river are developed at the southern and western coast of Thale Sap Songkhla. Natural levee are developed along the diverged river courses. The height of this deltaic lowland is so low, about 0.5 to 1m above the mean lake level, that the littoral lowland is often inundated by flooding in every rainy season (Fig.2,C-C'). Rapid development of shrimp ponds on a large scale as well as urbanization in the suburbs of Hat Yai and Songkhla City are in progress with deforestation of mangrove and melaleuca forests.

4. Assessment of Impacts of Sea Level Rise

According to the characteristics of both natural and socioeconomic systems and the development factors in each zones (Table 1), some serious impacts will be estimated as follows when the sea level rises about 1m in future (Fig.3);

- (1) In the beach ridge plain, coastal erosion will become more severely, especially where large-scale shrimp farming developed along the present coast will be affected critically by the retreat of the shoreline.
- (2) The area of Songkhla City should be protected by higher or stronger seawall because the coastal erosion will become more severe.
- (3) The channel linked the lake and the Gulf of Thailand will become bigger than present one because of the erosion of the north end of the spit. Then the groundwater in the littoral lowlands will be affected by the increase in salinity of the lake water.
- (4) In the deltaic lowland of Thale Sap Songkhla, wide littoral area will be inundated. So the lacustrine lowlands newly covered with urban facilities, should be protected from severe floods or long-term inundation.

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