# CHAPTER I

# INTRODUCTION

Coastline of Thailand is about 2,600 km long that can be separated into 1,800 km in the Gulf of Thailand side, and the rest 700 km in the Andaman Sea coast and islands. With very long coastal area and the country containing more than 100 islands, the effect of coastal catastrophic events has been frequently occurred. Some events were thought to have related to eustatic phenomena of the global sea-level changes during geological time-span but some are thought to have occurred by human-induced. The studies of the coast in the low-lying areas of Thailand were carried out only in some areas after having been affected by natural disasters, such as coastal erosion, storm surges, flooding and archaeological aspects. The Lower Central Plain, the low-lying area where big cities are currently located, is one of the examples of coastal risk areas. (Choowong *et al.*, 2004)

This study aims to examine the molluscan assemblages recovered from a Holocene sand body in the coastal area of the Sam Roi Yod National Park, Prachuap Khiri Khan Province and to compare them to those occurring on a recent coastline in eastern of the Sam Roi Yod National Park in order to explain the paleoshoreline and paleoenvironment around the study area.

## 1.1 Study area

### 1.1.1 Location

The study area is located in Amphoe Kui Buri Sam Roi Yod National Park, Prachuap Khiri Khan Province. It is about 281 km south of Bangkok (Figure1.1). It is bounded by latitudes 12°04′ to 12°21′ North and longitude 99°51′ to 100°02′ East. The study area is located within the topographic map scale 1:50,000 of the Royal Thai

Survey Department, of sheet 4933 I, series L7017, Amphoe Kui Buri and geologic map scale 1:250,000 Sheet ND47-15 (Amphoe Hua Hin).

### 1.1.2 Accessibility

The study area is located in the south of Bangkok about 281 km. The main road that used as the major transportation from Bangkok to the study area is highway number 4 (Petch Kasem Highway). The head quarter of the National Park is about 15 km from highway number 4 and about 30 km from Pran Buri District or 20 km from Kui Buri District (Figure 1.2). The study area is situated in southern part of the Sam Roi Yod National Park.

### 1.1.3 Physiography and Climate

The study area is physiographically located in the west of the Gulf of Thailand, in the territory of Sam Roi Yot Sub-District, Kuiburi District, Prachuap Khiri Khan Province. The Khao Sam Roi Yod National Park has been established as Thailand's first coastal National Park since 1996, covering the area of approximately 98.8 $km^2$. The landscape is dominantly composed of high steep limestone mountains, the beautiful coast, matching with plain area, which are marshy beach and shallow sea pond. The flat area with stagnant water through the year on the west of the park is Thung Sam Roi Yod, which is the large freshwater marsh, covering around 36.8 $km^2$.

The climate in the south of Thailand is tropical monsoon. It is heavy annual rainfall with a short dry season. This area is probably the transition zone between tropical monsoon and tropical savanna. In summer (March-May), the temperature is approximate 23-32 °c. In rainy season (June-September), the approximate temperature is 20-30 °c. And in winter (October-February), the approximate temperature is 23-32 °c.

## 1.2 Purposes of the study

1. To study molluscan fossils from the Khao Sam Roi Yod National Park, Prachuap Khiri Khan Province.

2. To determine age of molluscan fossils.

3. To describe paleoenvironment of study area.

## 1.3 Methodology

Generally, the methodology under the investigation can be categorized into three main aspects: office work, field work and laboratory work. The summarized flow chart showing methods of the study is illustrated in Figure 1.3.

### 1.3.1 Office work

The office work is to review of previous works on molluscan in Thailand, to study topographic map and geologic map of study area.

### 1.3.2 Field work

The field investigations are divided into 3 parts: collecting molluscan samples, study sediments and taking photographs of study area. The samples view be collected from 5 localities: Wat Ban Khao Daeng, Khao Rap, Wat Thung Noi School, Ban Don Makham, and Ban Nong Tao Pun Lang.

### 1.3.3 Laboratory work

In laboratory, cleaning the molluscan, classify the molluscan samples, taking the photographs and identified of molluscan samples will be done.

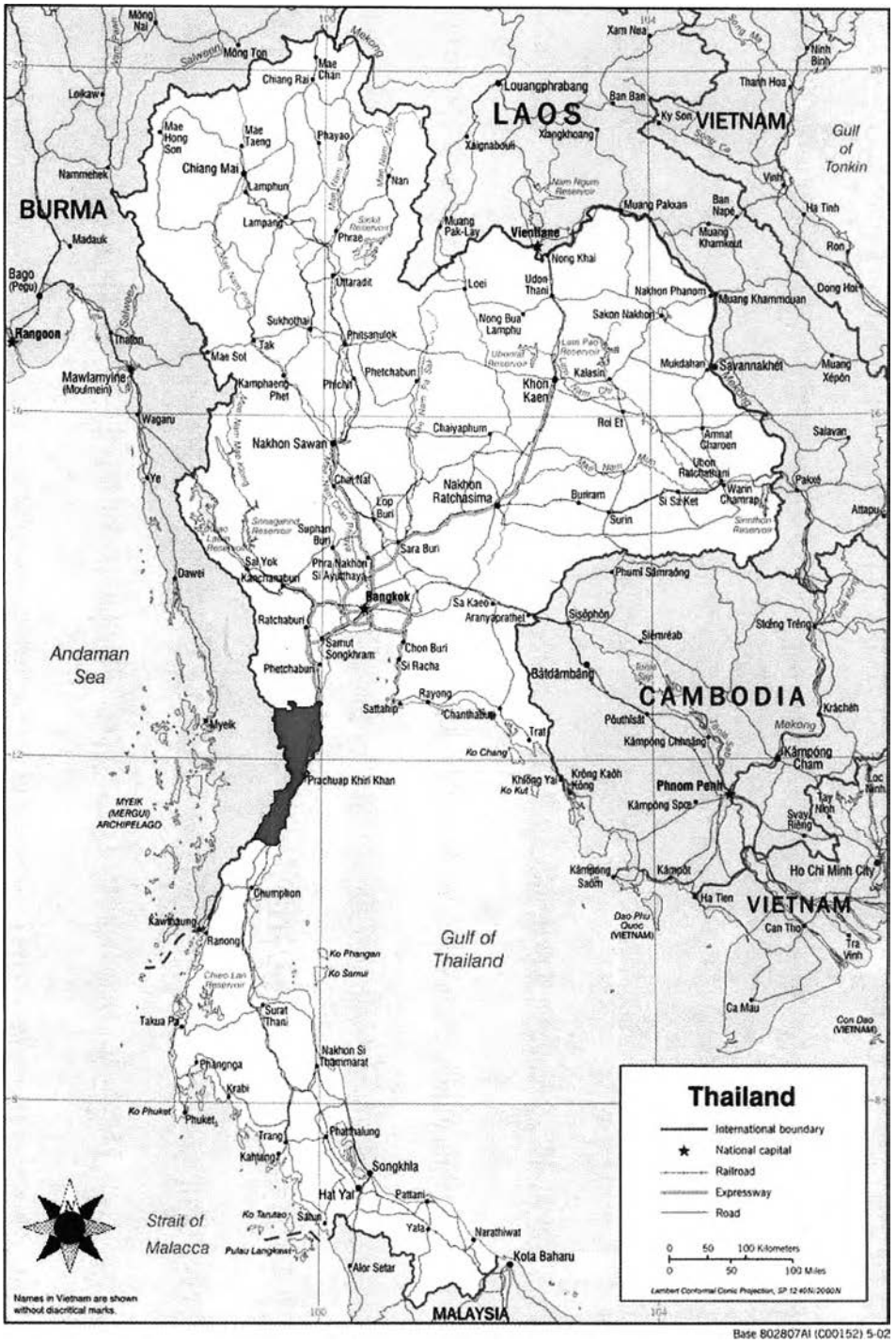


**Figure 1.1** Index map of Thailand shows study area in Prachuap Khiri Khan Province (Napiere, 2004).

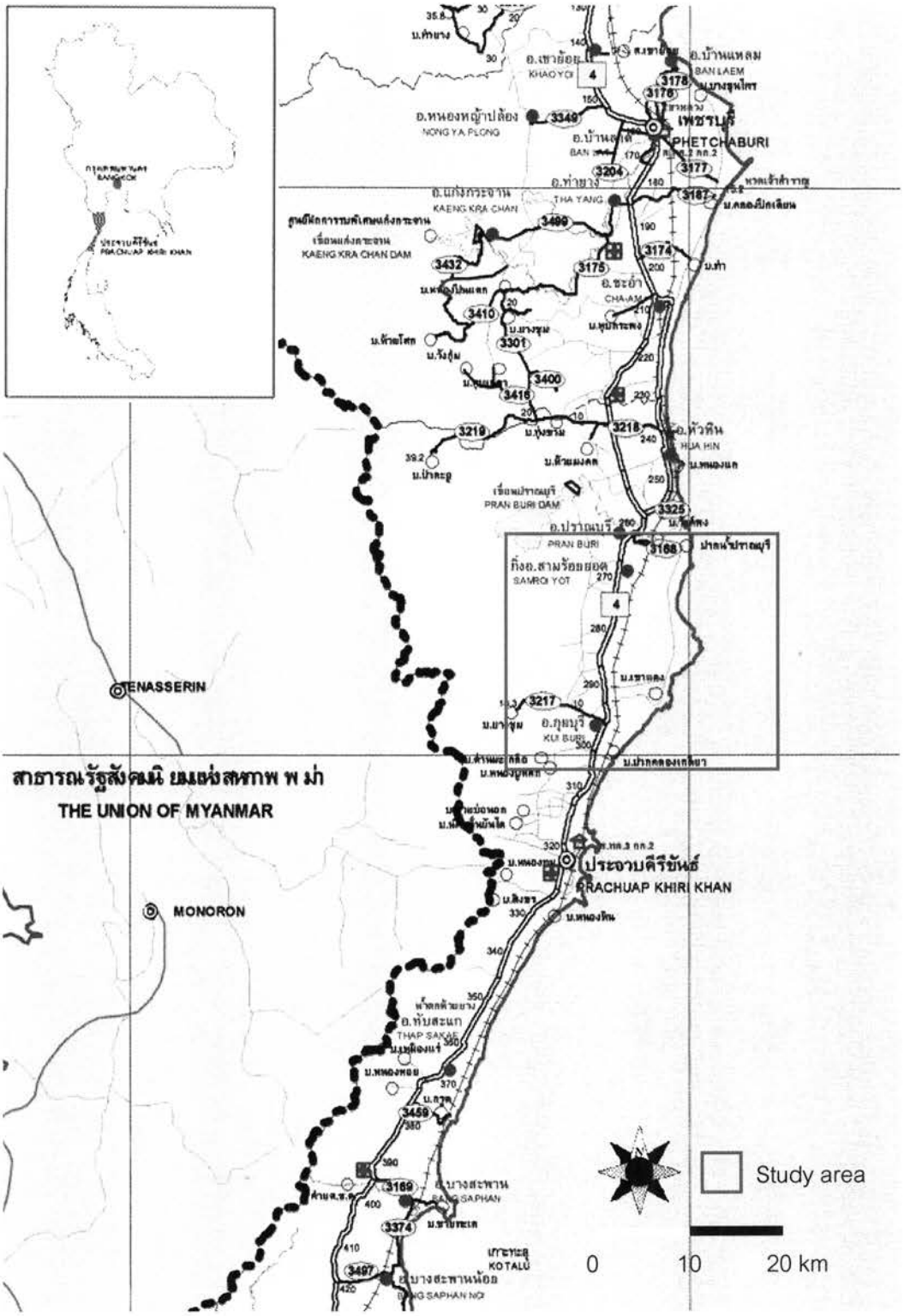


Figure 1.2 A route map showing the accessibility to study area (Department of Highways, 2004).

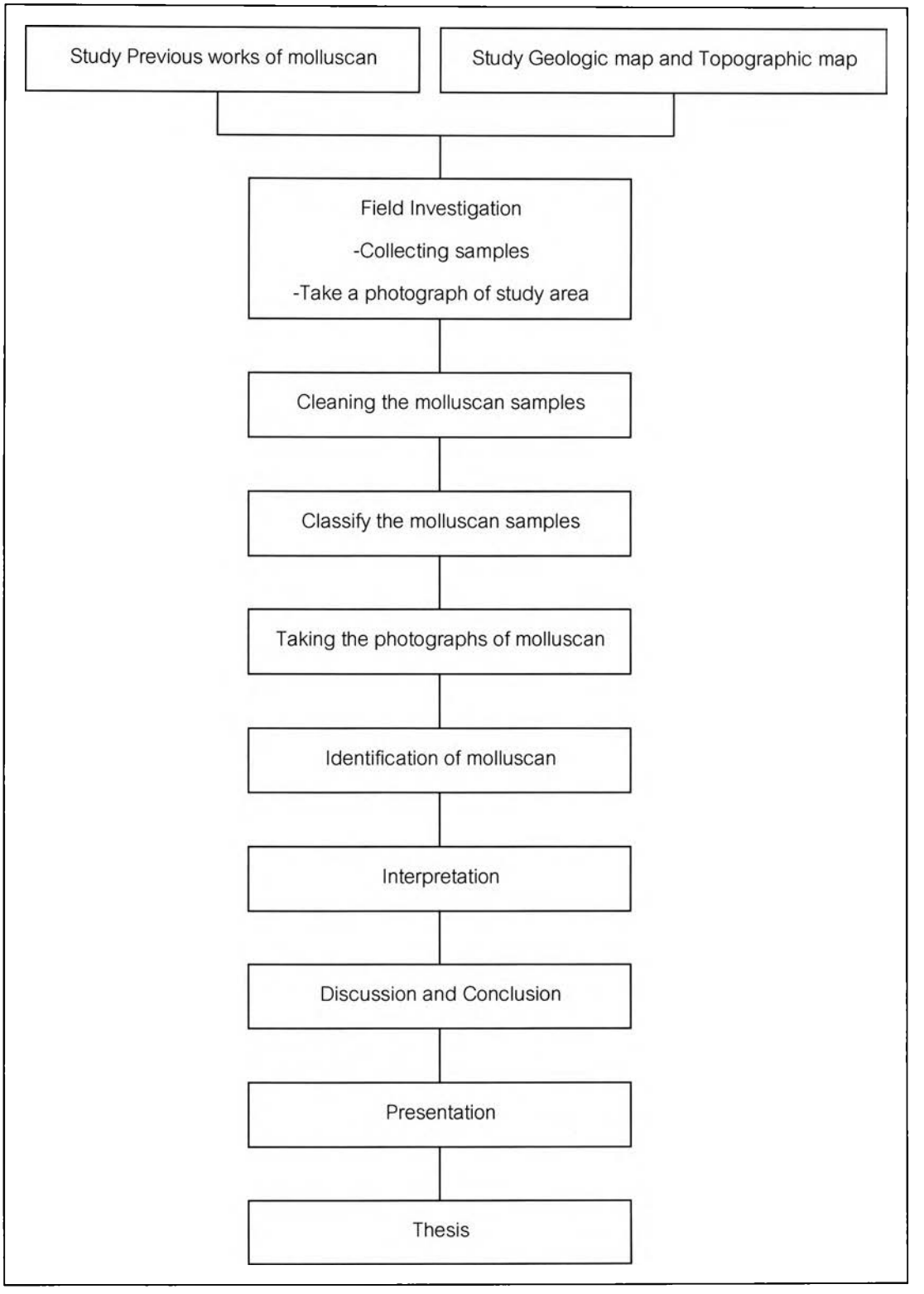


Figure 1.3 Flowchart showing the methods of the study.

## 1.4 Previous Investigation

Abbott *et al.* (1990) studied about molluscan around the world. Sinsakul (1985, 1992) deemed that sea-level changes in study area were attributed only to glacio-eustatic cycle during the Post Glacial Marine Transgression (PGMT) without isostatic adjustments. Thiramongkol (1986) argued that isostasy has played an additional role in controlling sea-level changes in study area. Swennen *et al.* (2001) studied introducing molluscs and their environments in southern part of the Gulf of Thailand.

Choowong (2002) discussed an assessment of evidence of sea-level changes in explaining the evolution of the coastal plain from the Gulf of Thailand. The discussion is preceded by a review of the published literatures relevant to the study of the geomorphology and sea-level changes in the Gulf of Thailand. The literatures concluded that the evolution of the coastal plain of the Gulf of Thailand responded to a relative change in sea level in particular during a rapid rising of the sea in the early Holocene. In this paper, the discussion is aimed to evaluate evidence of sea-level changes preserved on the coast of the Gulf of Thailand including geological and biological features. Geological indicators are sea notches, sea caves and arches, platforms and beaches with weathered feature such as honeycomb structure, former tidal flats and salt marshes, and relict barriers. Biological indicators include palynology, fossil crabs, shell fragments and peats. A result of evaluation shows that evidence of sea-level changes provides precise scientific key and helps in explaining coastal evolution in this area. The morphology of coastal landforms, depositional stratigraphy of the coast and AMS dating, all contribute to explain the history of coastal evolution in this paper. These-contributions provide the better understanding in evolutionary history of sea-level changes in Thailand.

Robba *et al.* (2002, 2003) studied gastropods and bivalves recovered from the Holocene Bangkok Clay in the Lower Central Plain of Bangkok along with those obtained

from modern shallow bottoms in Phetchaburi coastal area. The bivalve assemblages of the Holocene Bangkok Clay appear to parallel the recent ones recovered at sea, from intertidal and shallow infralittoral, predominantly muddy, substrates. The species treated are complemented with taxonomic remarks and with information on respective ecological requirements.

Choowong *et al.* (2004) studied biological clues, particularly marine fossils in Holocene coastal deposits from study area. Detailed systematic biological description and coastal stratigraphy presenting in this paper were contributed to unveil the characteristics of sedimentary sequences in association with the history of marine transgression and regression. Sedimentary sequences and fossils reveal marine episodes that were deposited mostly under intertidal and estuarine conditions. Marine faunas indicate regression periods of the sea. The age of some marine faunas were determined using AMS method and given the range of their deposition about 4,000 to 2,000 years BP. Results of dating confirm precise period of rapid marine gradual regression after the mid Holocene.

Di Geronimo (2005) studied the benthic molluscan thaoatocoenoses as a record of living associations that have existed prior to the modern ones in the Northern Gulf of Thailand. The investigated area encompasses the tidal flats and upper infralittoral bottoms facing the coastline of Phetchaburi province, approximately 150 km southwest of Bangkok. The 14C dates from that area have shown that molluscs in thanatocoenoses appear to be affected by bomb radiocarbon and did live after the 1960s. The statistical treatment of faunal lists pertaining to 55 stations delineates 7 thanatofacies. The first one is widespread throughout the upper infralittoral zone and is largely dominated by *Nuculana* (*Jupiteria*) *puellata*, *Timoclea* (*Chioneryx*) *scabra* and *Decorifer* sp.; it contains a total of 298 species and the average species richness per station is 60. Thanatofacies 2, recovered at a single station in the inner tidal flat, is dominated by *Scapharco indica*, *Cerithidea cingulata* and *Cycladicama oblonga;* the total number of species is 64.

Thanatofacies 3, also within the tidal flat at more sandy locations, is dominated by *Corbula* (*Caryocorbula*) *lineata*, *Decorifer* sp. and *Mactra* (*Mactra*) *luzonica;* the total number of species is 32. The fourth is another typical intertidal thanatofacies, dominated by *Pitar* (*Costellipitar*) *manillae*. *Anadara granosa* and *Arcopagia yemenensis;* it comprises a total of 18 species. Thanatofacies 5 and 6 appear to be intertidal ecotones, representing different transitional aspects, between the infralittoral thanatofacies 1 and the strictly intertidal thanatofacies 4 and 5. The upper infralittoral thanatofacies 7 denotes sedimentary instability. The living associations obtained at the same locations appear to be markedly depleted in both species richness and total number of specimens, if compared to the co-occurring thanatofacies. It is apparent that the whole sea-bed area investigated in this study underwent a dramatic negative change in benthic molluscan biodiversity during the last decades. This change seems to be related primarily to the intensive trawling in shallow water, practiced by local coastal villagers. Other causative agents are likely the shrimp farming effluent and sewage from coastal human settlements that affect the water quality.

Robba (2005) examined 4 faunal samples: 2 samples from the Recent Ban Laem Phak Bia sand spit, and another 2 samples from the Holocene sand body of Ban Bang Ket. Fossil and modem assemblages are compared on the basis of overall composition, taxa abundances, and of autoecological investigation on life habit, substrate preference, feeding type, depth range and ecological meaning of the identified species. The Holocene assemblage of Ban Bang Ket, compared to the recent one of Ban Laem Phak Bia, 1) exhibits generally similar overall composition and ecological structure, 2) contains much of the dominant species characterizing the modem assemblage, and 3) includes all taxa that are members of the living molluscan community. On this basis, the molluscan assemblage of Ban Bang Ket results to be the Holocene counterpart of the modem one of Ban Laem Phak Bia, and reflects the same environmental conditions recorded for the latter. Thus, the sand body near Ban Bang Ket is interpreted as a Holocene equivalent of the sand spit of Ban Laem Phak Bia.