CLMTV EXCURSION GUIDE BOOK

EASTERN ECONOMIC CORRIDOR DEVELOPMENT PLAN

CLMTV
Cross-border Collaboration on Geology and Mineral Resources Project
WG MEETING
CHONBURI, 2018

EEC
ระเบียงเศรษฐกิจพิเศษภาคตะวันออก
เชื่อมโลก ให้ไทยแล่น

3rd August 2018

Chonburi Province

Department of Mineral Resources

THAILAND

Prepared by International Cooperation Subdivision,
Geological Resources Conservation and Management Division

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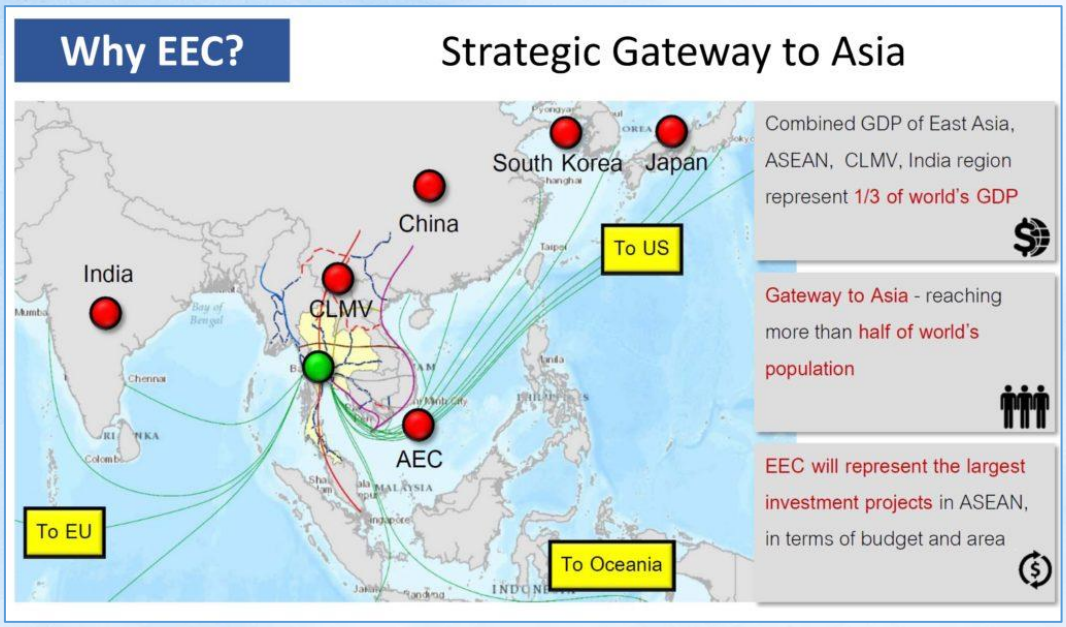
CLMTV EXCURSION PROGRAMME

07.30-08.30	Breakfast at Sila Restaurant & Bar, 1st Floor, Bangsaen Heritage Hotel
08.30-08.40	Depart for Stop 1
08.40-09.00	Stop 1. Coastal Change Status of Bang Saen Beach compare to Rayong Deep Sea Harbor
09.00-10.00	Depart for Stop 2
10.00-10.40	Stop 2. Laem Chabang Deep Sea Port Development
10.40-11.20	Depart for Stop 3
11.20-12.00	Stop 3. Pattaya sea view
12.00-13.00	Lunch at Pu Pen restaurant, Pattaya beach
13.00-13.40	Depart for Stop 4
13.40-15.00	Stop 4. Khao Chi Chan Stone carving
15.00-16.00	Depart for Bangsaen Heritage Hotel
18.00-20.00	Dinner at Pakarang Restaurant
20.00-21.00	Visit Bangsaen Walking Street
21.00-21.15	Depart for Bangsaen Heritage Hotel

INTRODUCTION

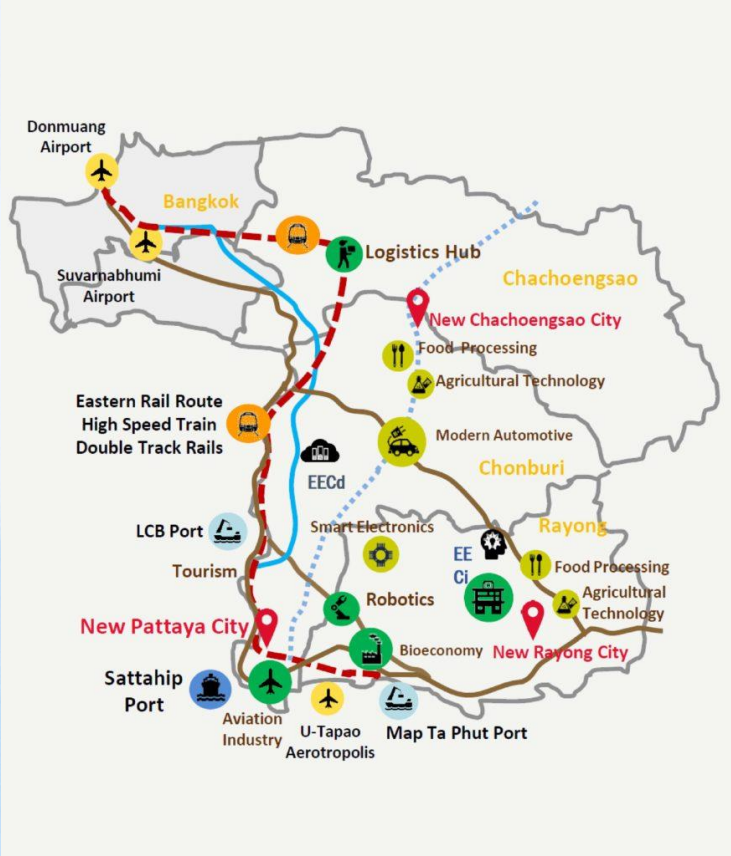
EEC Background

The Eastern Economic Corridor (EEC) Development Plan under scheme of Thailand 4.0 aiming to revitalise and enhancing of the well-known Eastern Seaboard Development Program that had supported Thailand as a powerhouse for industrial production in Thailand for over 30 years. Under this initiative, the Eastern Economic Corridor Office of Thailand (the EECO) has been assigned to drive the country's investment in up-lifting innovation and advanced technology for the future generation. The EEC Development Plan will lead a significant development and transformation of Thailand's investment in physical and social infrastructure in the area. The EEC project will, initially, be focused in 3 eastern provinces namely Chachoengsao, Chonburi and Rayong. Regarding this, the EEC Policy committee is the primary Royal Thai Government collective force chaired by Prime Minister of Thailand.



Development Goals

Given that the economy is one of the most important bases for the development of any nation, growth facilitated by strong developmental structure can be viewed as the cost or fertilizer required to allow such developments to flourish. Over the past decades, Thailand has seen little investment in large-scale projects, a situation which has been the case since the "Eastern Seaboard" era, which changed the course of Thailand's economic strongholds from agriculture to more industry-oriented focuses.



Be this as it may, global trends of industry have begun to shift directions and this, importantly, is the spark which prompted Thailand's necessity to re-envision and enhance the nation. These changes will allow Thailand to better survive and lay the foundation for a new era of prosperity. Today, the **Eastern Economic Corridor Development Project (EEC)** has risen as a new large-scale investment, which sets its sights on new and unprecedented levels of development under the **"Thailand 4.0"** initiative.

In attempts to best achieve these goals, it was deemed necessary to launch a pilot project in three provinces of Thailand, namely, **Chachoengsao, Chonburi,** and **Rayong**. These designations of land for the project are coupled with strong recognition of targeted industries, which were selected and promoted due to their ability to increase investment potentials, facilitate development of economically significant activities, and to provide better facilities in the designated promotional zones. These industries will also place special focus on human resource development and acquisition and development of new technologies, thus providing a more sustainable vision of Thailand.

In addition, The Policy Committee of the Eastern Economic Corridor has adopted resolutions as of the 1/2560 meeting on April 5th, 2017, which lays out 8 implementation programmes for EEC regional development. Each of the programmes link together and provide for well-implemented regional development of the EEC in a manner which is just and sustainable in every dimension.

The 8 implementation programmes for EEC development are as follows:

1. The EEC Infrastructure Development Implementation Programme
2. The EEC Targeted Industries Development Implementation Programme
3. The EEC Human Resource, Education, Research, and Technology Development Implementation Programme
4. The EEC Tourism Development and Promotion Implementation Programme
5. The EEC New City and Community Development Programme
6. The EEC Business Hub and Finance Hub Development Implementation Programme
7. The EEC PR and Mass Engagement Implementation Programme
8. The EEC Agriculture, Irrigation, and Environment Implementation Programme

Infrastructure Overview

The EEC is an organization which focuses on the implementation of infrastructural development projects and seamless operation of transportation in providing vital linkages for air, land, rail and sea routes. In doing so it bolsters competitive abilities in offering reduced transportation times and considerably cheaper costs.

CORE DEVELOPMENT AREAS

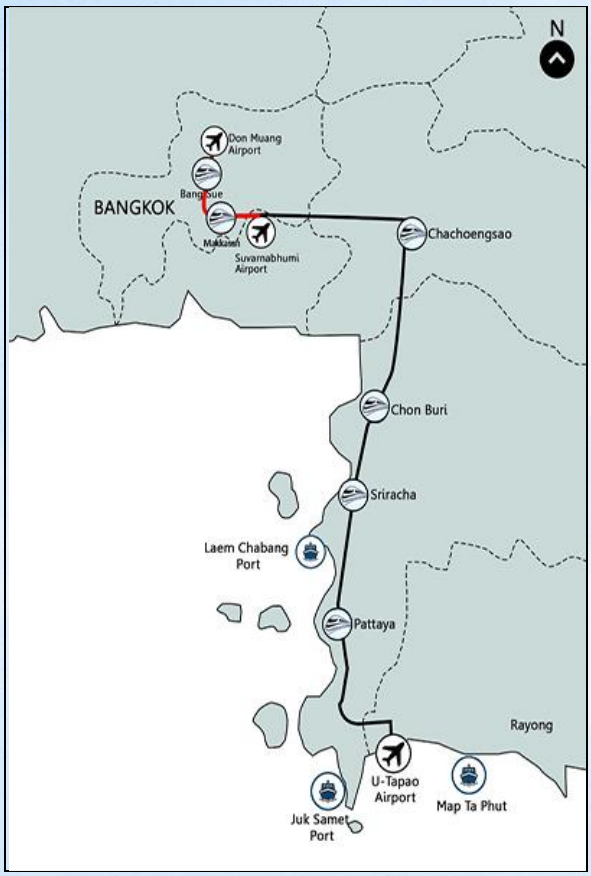
U-Tapao Airport

This project has received approval for public private partnerships in developing the U-Tapao International Airport as a part of the U-Tapao and Eastern Airport City project. PPP investment was deemed necessary so as to facilitate continuous development of the airport and many various activities including: construction readiness and serviced maintenance of the Terminal 3 building, as well as the Commercial Gateway, Phase II Air Cargo, Phase II Maintenance, Repair and Overhaul services, Phase II Aviation Training Center, and the Free Trade Zone.

The High Speed Train

The High-Speed Rail Linked 3 Airport Project
Project Description

The High-Speed Rail Linked 3 Airport Project makes use of existing structures and routes as seen in the form of an airport rail link system. Expansions will see the implementation of standard gauge 1.435-meter tracks with 2 new connecting routes from the Phaya Thai – Don Muang route as well as the Lad Krabang – U-Tapao (Rayong) route offering ease of access to and from the airports. These expansions will largely make use of existing routes from the State Railway of Thailand and in total comprise 220 km. of seamless railway routes. Urban line within Bangkok will see slower speeds of 160 km/hr. (Don Muang Station to Suvarnabhumi Station) while intercity line will reach a maximum speed of 250 km/hr. (Suvarnabhumi Station to U-Tapao Station). This system comprises 9 high-speed stations, namely, Don Muang, Bang Sue, Makkasan, Suvarnabhumi, Chachoengsao, Chonburi, Sriracha, Pattaya, and U-Tapao.



Laem Chabang Deep Sea Port

Laem Chabang Port Phase III will place it in a better position to accept the future demands of international sea freight and transportation industries. This expansion will see the creation of a deep seaport and many other facilities including the implementation of a single rail transfer operator (SRTO), the construction of a larger Port A, and the renovation of many facilities so as to alleviate internal traffic problems ranging from networking to transportation systems. The renovations and expansions of the Laem Chabang port will better prepare it for linkage with habour-external transportation systems and an increased volume of various shipping vessels.

Map Ta Phut Port

Map Ta Phut Industrial Port Phase III will see enhancements to existing infrastructure to better facilitate shipment of natural gas and raw fluid material for the petrochemical industry.

Sattahip Commercial Port

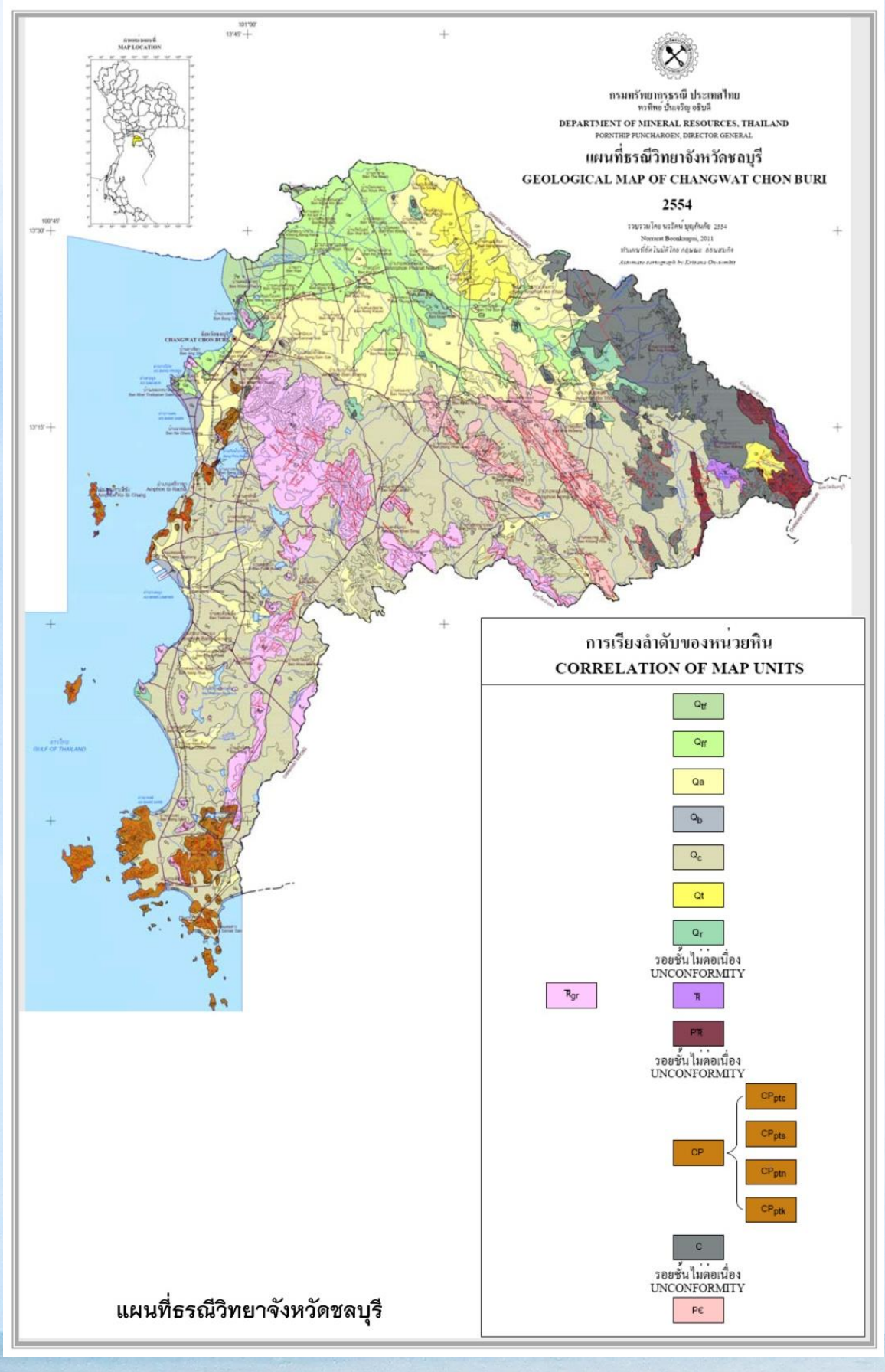
Recent transformations means this port can facilitate world-class modern cruise ships. It also supports a successful shipbuilding and oil rig assembly industry.

The double-track rail lines

The double-track rail lines will connect industrial zones nationwide. It also connects to Laem Chabang, Map Ta Phut, and our new Sattahip deep sea port.

Geology of Chonburi Province, Thailand

General Geology of Chonburi Province compose of 3 main hard rocks which are metamorphic, igneous and sedimentary rocks with an age range from Pre Cambrian to Quaternary sediments.



Stratigraphy

The geological stratigraphy in Chonburi province from the oldest to the youngest rocks can be classified as follow;

Pre Cambrian formation **(PE)** were distributed at the eastern part of the province, Panas Nikom, Bo Thong and Nong Yai districts. The rocks compose of high grade metamorphic rocks such as biotite-diopside gneiss, hornblend-diopside gneiss, biotite gneiss, biotite-hornblend gneiss, biotite-feldspar-quartz gneiss, marble, calsilicate and amphibolite.

Carboniferous formation (C) distribute on the eastern part of Bo Thong and Ko Chan district. They are mainly Quartz-schist, marble, feldspartic philite, quartzite, siltstone and sandstone. Parts of the sequence show at least 2 metamorphism. Bryozoa and forraminiferras fossils were reported in this formation.

Carboniferous-Permain formation (CP) of Chonburi Group is the sedimentary sequence distributed all over the eastern part of Thailand. The Group can be subdivided into 3 formations namely Sri Racha formation, Pluta Luang formation and Dhammarat formation. Within Chon Buri, 1 formation were discovered and mapped. Pluta Luang formation composes of chert, sandstone, mudstone and carbonaceous mudstone. Limestone lens may occur between the bedding. The sequence were deformed a clearly show folding. The metamorphism was identified as contact metamorphose with Triasic granite batholit.

Permo-Triasic formation (PTR) distributes along the east part of Bo Thong district. The rocks compose of shale, sandstone siltstone slate and metamorphose tuff. Oolitic limestone bed may alternated within the sequence.

Triasic formation (TR) compose of mudstone alternated with siltstone and arkosic sandstone in light brond and dark gray colors.

Granite (TR Gr) is hornblend-biotite granite.uniform grain and 2 types grain with age ranging 245-210 my.

Quaternary sediments can be subdivided into 7 units as intertidal clay unit, floodplain sand, silt and clay unit, fluvial sand and clay unit, recent beach sand unit, colluvial gravel, sand and laterite unit, high terrace gravel and clay unit and residual sand, silt and clay with rock fragment unit.

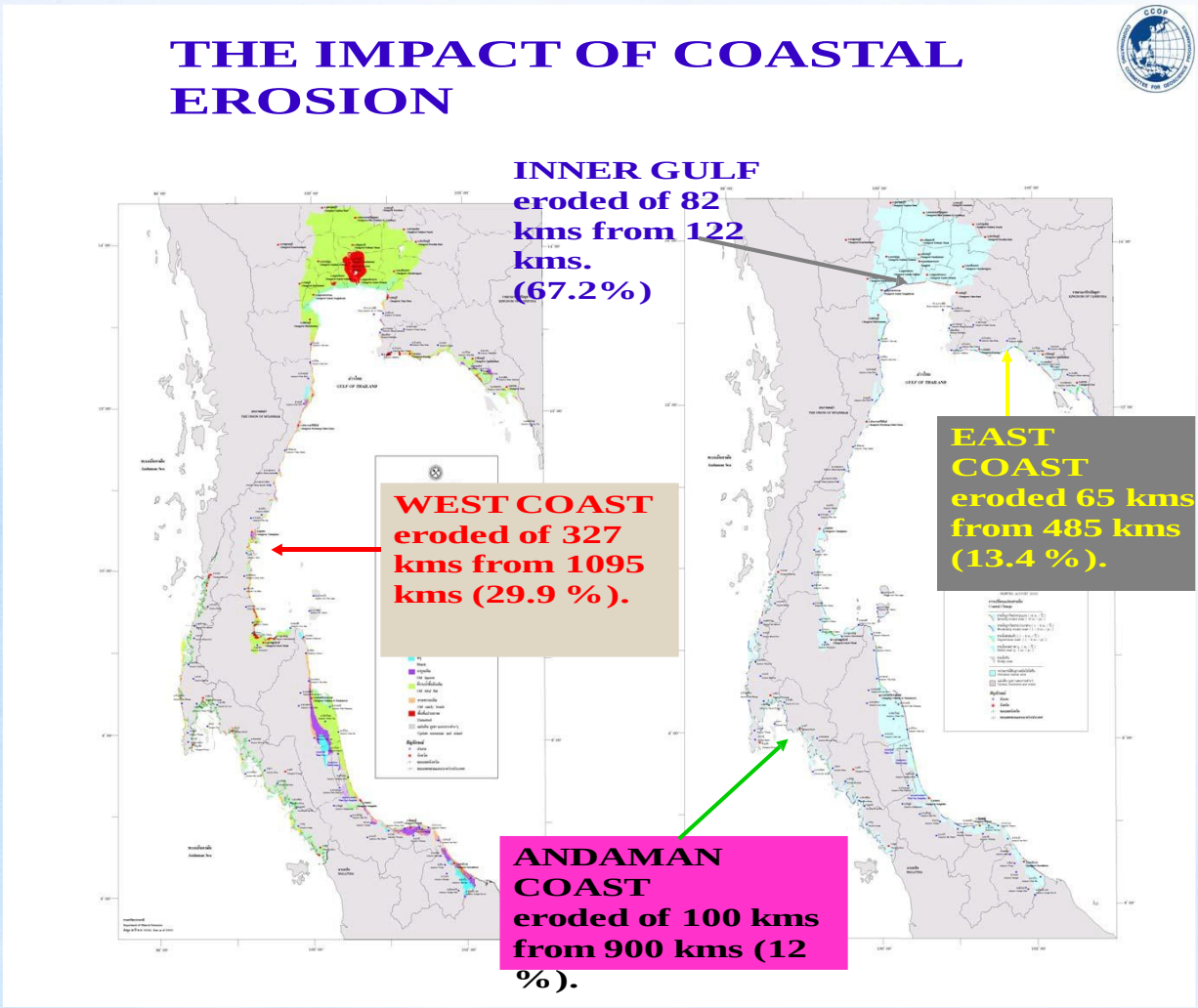
Coastal change along the Gulf of Thailand coast

The Gulf of Thailand is a continental shelf sea of the South China Sea. It comprises the territorial waters of 3 bordering countries. The coastline is stretched like a horseshoe, extending from the Thai-Malaysian border northward to the Upper Gulf and turning toward the east to reach the Thai-Cambodia border. The total length of the coast is approximately 1,700 kilometers, with 17 provincial coastal areas. Many large rivers which discharge into the Gulf of Thailand have made its coasts in many ways important from the past to present.

Sea-level changes during 6,000-800 B.P. resulted in the deposition of marine sediments in inland areas. These deposits are characterized by coastal geomorphology of beach sands, sand dunes, lagoons, marsh and tidal flats vegetated with mangrove forest. The coastal areas represent a rather dynamic environment. In the past, this environment was only changed by natural processes but recently it is changed by both natural processes as well as human activities. The changing coastlines have a strong impact on

the environment and on social and economic conditions within the coastal societies.

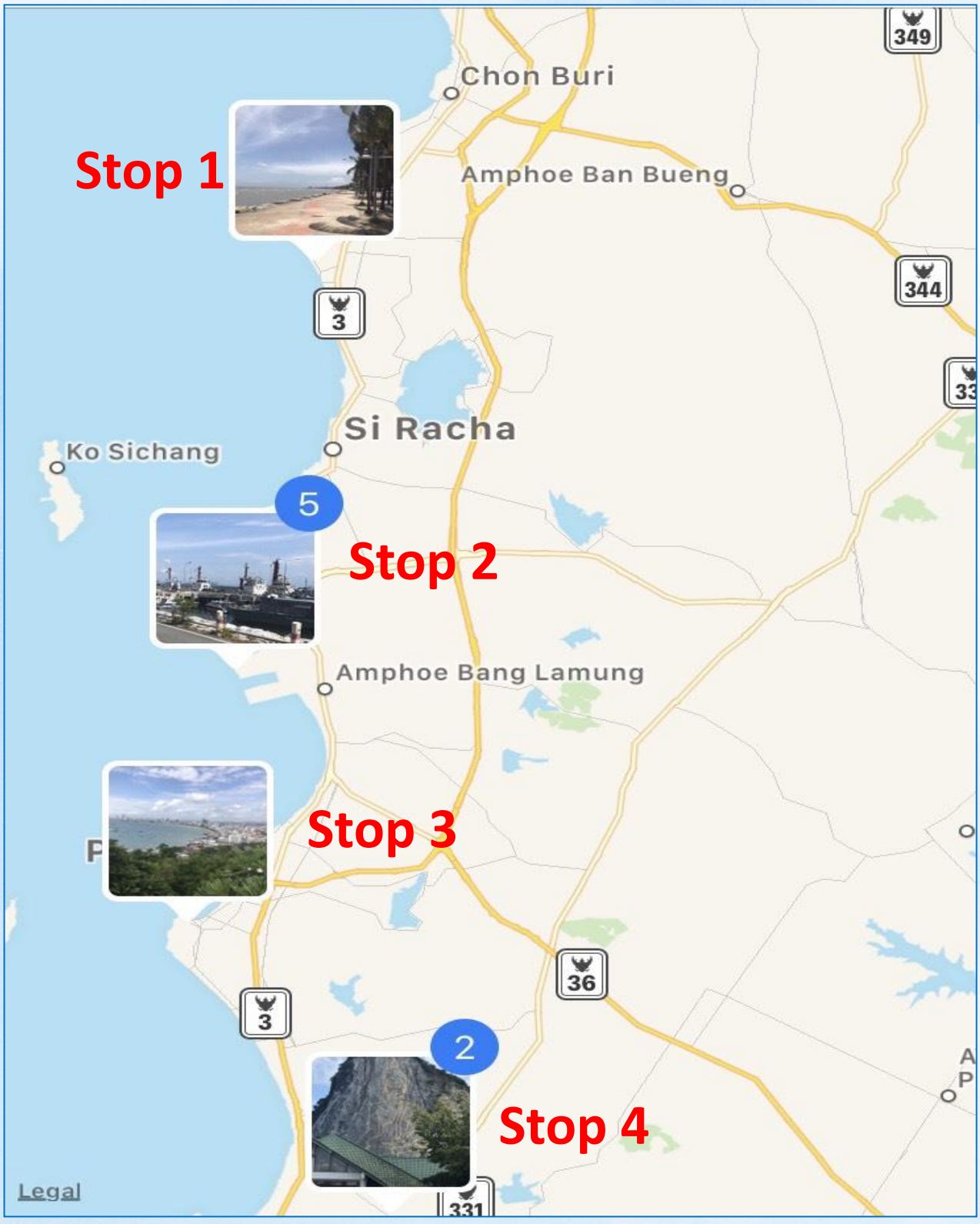
Coastal change, in particular coastal erosion, is a geological hazard which occurs continuously and has a trend of increasing magnitude. According to this concern the present study project on coastal change was conducted along the coasts of the Gulf of Thailand between1998-2000. In this study the different types of coasts and their related changing phenomena are based on geologic data while the rates of change per year are compiled from physical changes as well as from negative impacts on the societies in each coastal zone.



The results of the study reveal that there are many evidences of coastal change along the Gulf of Thailand. Severe erosion with rates of more than 5 m per year occur along a distance of 181 km or about 11% of the total coastline. Moderate erosion with rates between 1-5 m per year comprise about 302 km or 18% of the coast. Depositional coastlines exist along 127 km or 8% of the total coastal length. The remaining 63% describe a stable coast with seasonal changes and recovered by natural processes. According to this study, coastal change is documented at an overall length of 610 km or 37% of the total coastline in the Gulf of Thailand.

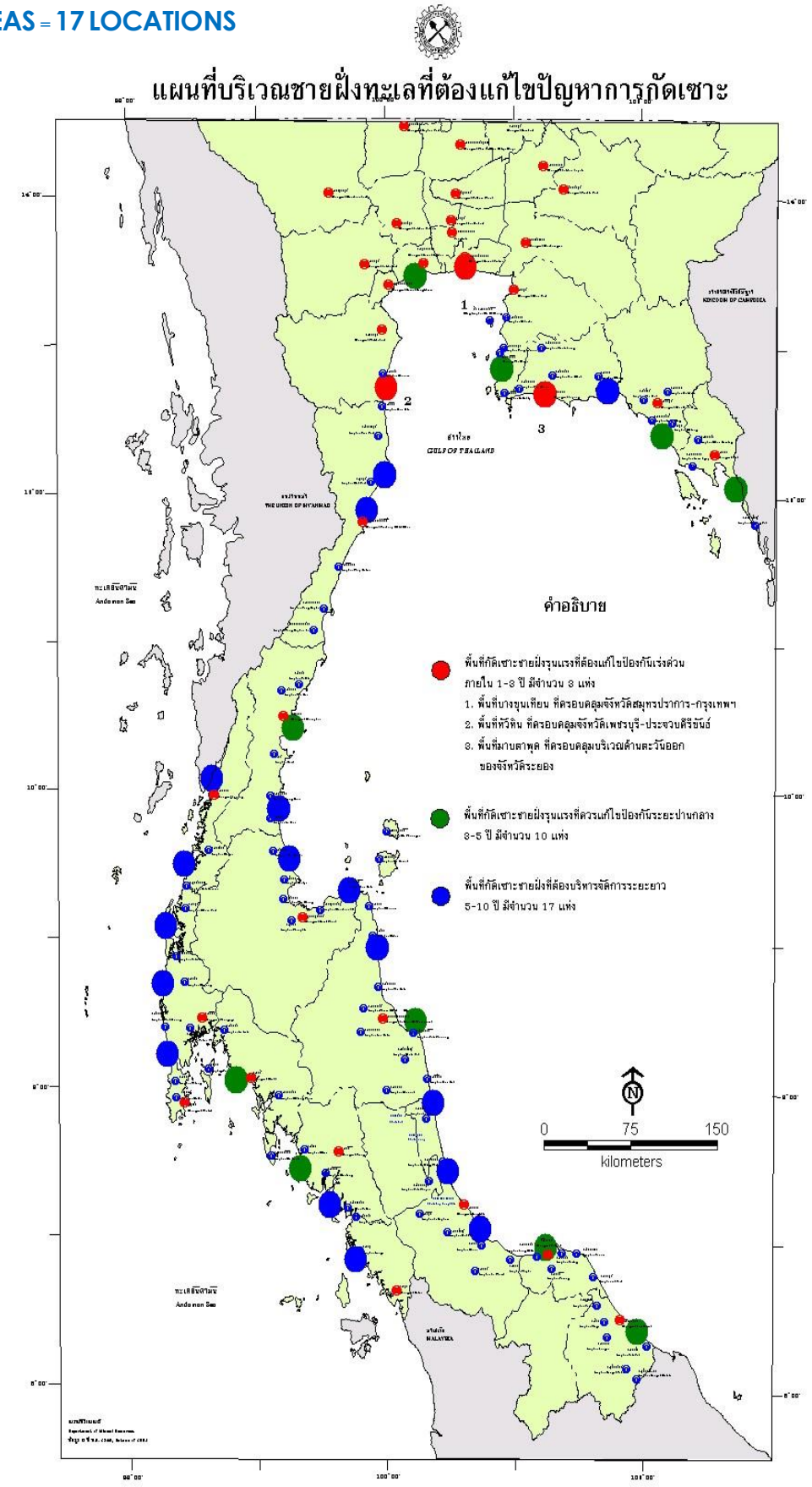
Erosional impacts are found in every provinces along the coasts of the Gulf of Thailand. The most sensitive areas with regard to severe erosion are the tidal flats in the Upper Gulf. They are lineated in east-west direction from Bang Pakong river mouth in Cha Choeng Sao province to Tha Chin river mouth in Samut Sakorn province. Erosion of the sandy beaches is usually seen in coastal areas in the eastern and western parts of the Gulf which are developed for the tourism This evidence indicates a strong human induced factor to coastal change besides factors related to geology or to sea-level rise in context with global warming. Protection measures against the erosional processes in the Gulf of Thailand should have a careful assessment with regard to their engineering design and structure.

Excursion route to the east coast of the Gulf of Thailand

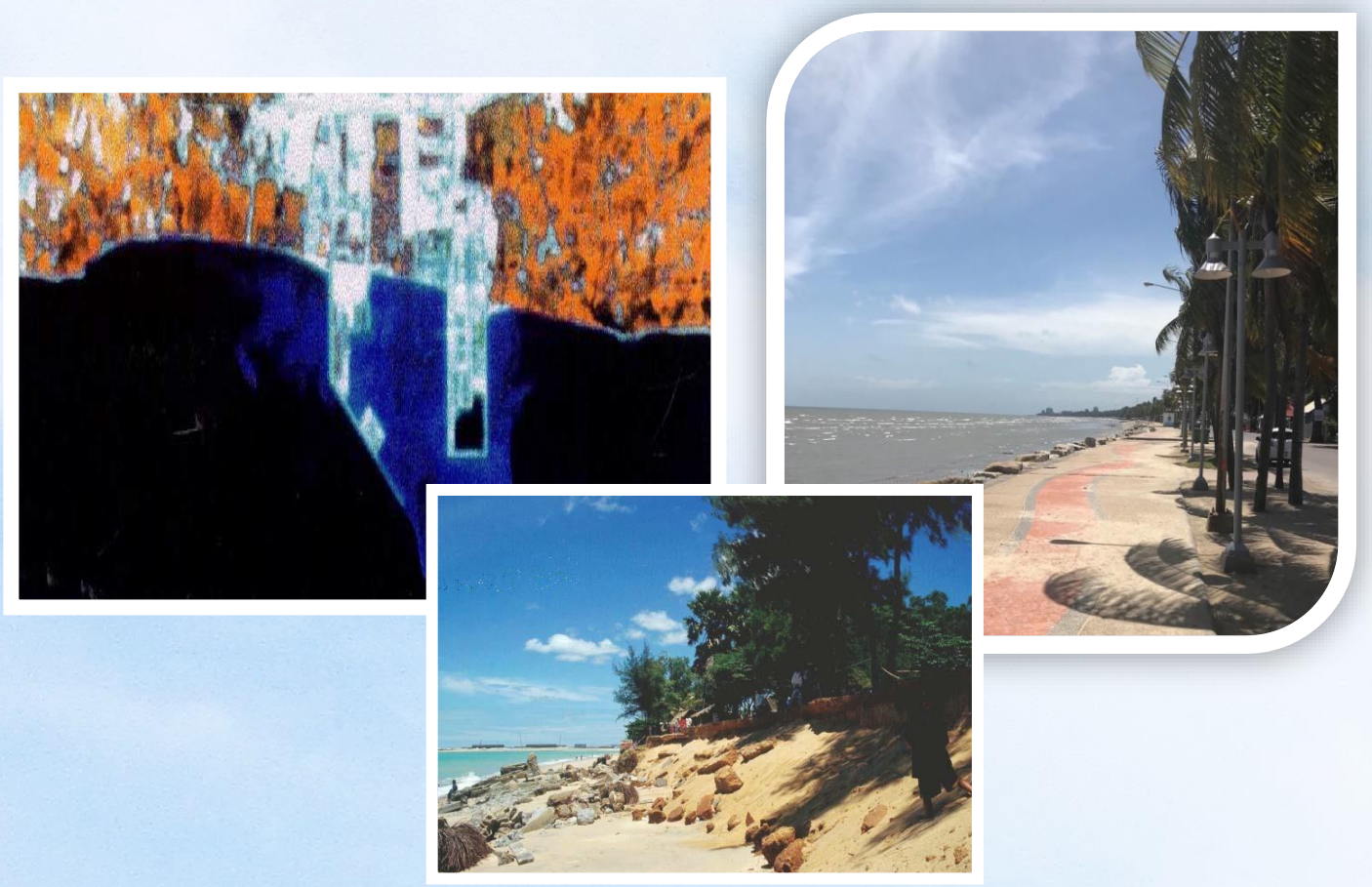


COASTAL EROSION RISK AREAS OF THAILAND

1. CRITICAL RISK AREAS = 3 LOCATIONS
2. MODERATE RISK AREAS = 10 LOCATIONS
3. LOW RISK AREAS = 17 LOCATIONS



Stop 1. Coastal Change Status of Bang Saen Beach compare to Rayong Deep Sea Harbor



Bang Saen Beach has been the oldest sea resort in Thailand and have preserved the status until now. The slightly coastal change occurred compare to severely erosion at Rayong beaches near Map Ta Phut Port.

Factors of coastal erosion

Mangrove

Ground formation ability protect coastline from wave action (functioned as an erosion control forest) Decrease in the mangrove forest was 54.7% in 32 years(1961-1993) because the cutting of the mangrove for shrimp farm constructions.

Subsidence

Serious land subsidence has taken place around Bangkok in cause of groundwater pumping from deep wells

Shrimp farm

Shrimp farm can be sustained for only a few years, leaving behind heavily polluted soil and a neglected wasteland in which the mangroves have been cut down.

Dam

Large-scale dams were built in the Chao Phraya upstream area after 1950s

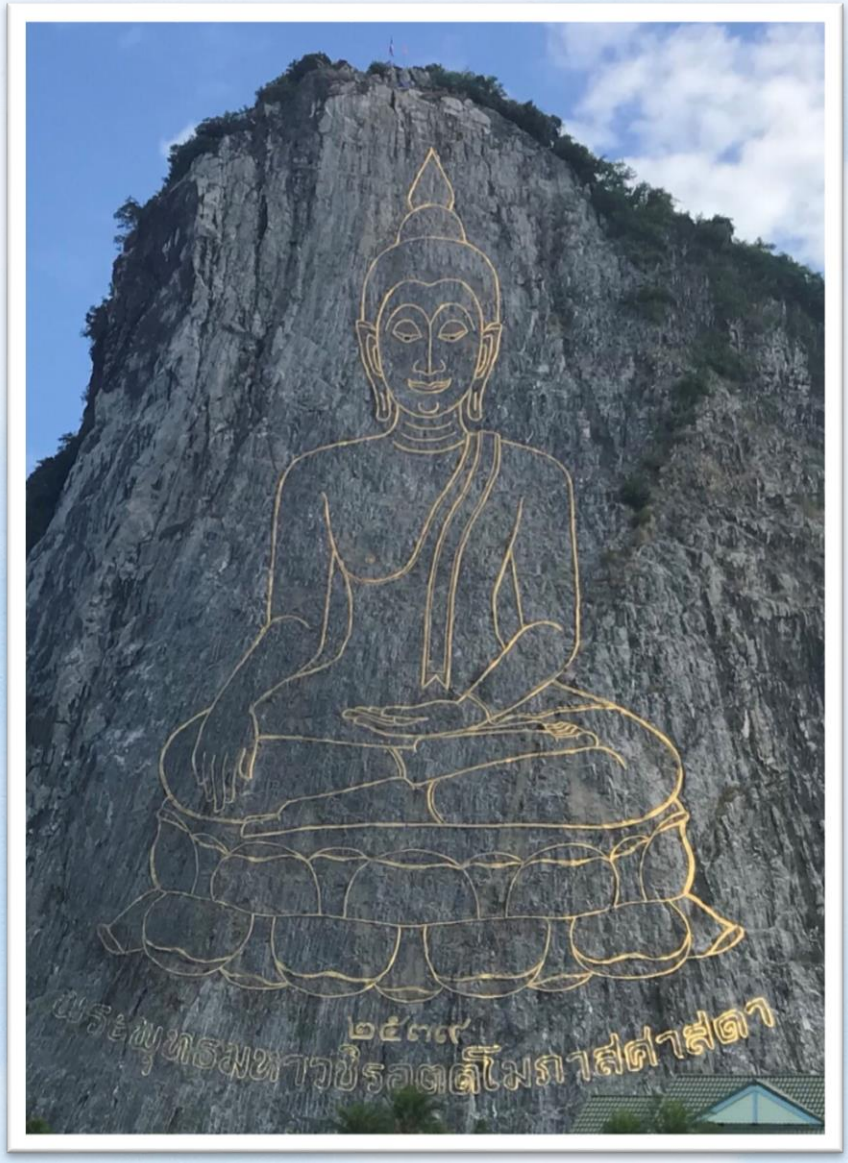
Stop 2. Laem Chabang Deep Sea Port Development

Laem Chabang port is a key of EEC Development Plan. The office of deep sea port will explain at observation tower.

Stop 3. Pattaya sea view

Pattaya Beach is the famous sea resort in Eastern Thailand with severe erosion problem.

Stop 4. Khao Chi Chan Stone carving



The rock composed of marble, calc-silicate and granite. The former rock mining was converted into Buddha image carving with golden porcelain decoration.

NOTE