

8 Gulf of Thailand

Overview

The Gulf of Thailand is located in Southeast Asia immediately to the west of the South China Sea. It is surrounded by Cambodia, Malaysia, Thailand and Vietnam. The living and non-living resources of the gulf are great value to the people of four littoral countries. ¹

Location

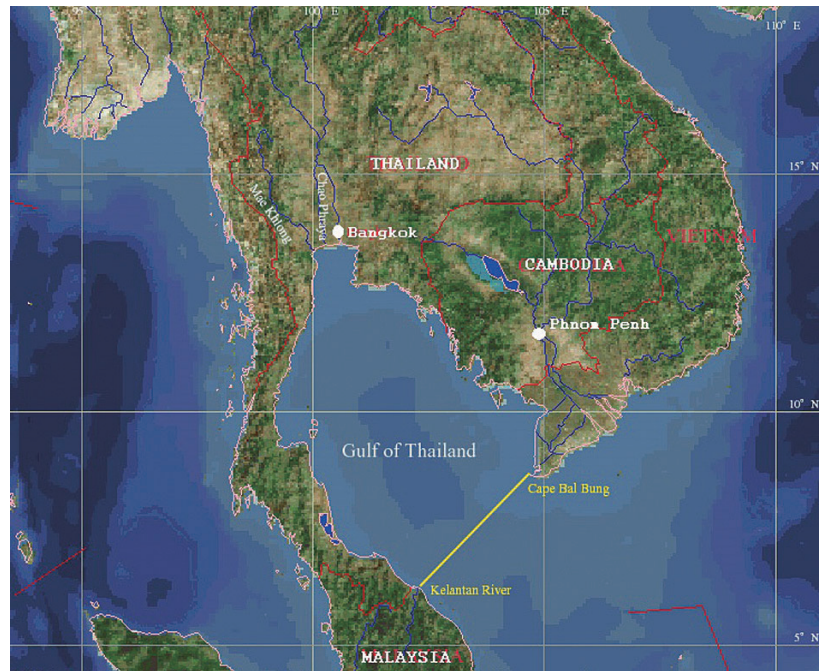
Basic information¹⁹

Surface area : 320,000 km²
Volume : 14,400 km³
Average depth : 45 m
Maximum depth : 100 m

Nature

< Background >

The fresh water from four major rivers - Mae Klong, Thachin, Choapraya, and Bangpakong - all flow into the upper Gulf of Thailand while the gulf is also supported by minor rivers from the east and west parts of Thailand and is the basin of deposited sediments from those rivers. ²



Climate

The majority of the Gulf coastline belonging to Thailand has a tropical climate dominated by the monsoons. The climate is characterized in general by four seasons: a dry season from January to February; a hot season from March to May; a wet season from June to October; and a cool season from November to December. Approximately 90% of rainfall occurs during the wet season. Annual precipitation varies from 1,000 mm to 2,030 mm depending on the region. In Bangkok, the average temperature ranges from 20 °C in December to 35 °C in April. ³

Topography

A pan-like shape seabed of the Gulf of Thailand with the deepest point of about 100 m has the main deep channel of over 50 m deep laying on the middle of the gulf. The upper Gulf of Thailand has an inverted U-shape with the area of approximately 100x100 km², the deepest point of the upper Gulf of Thailand is about 40 m on the east part while the west part is more shallower about 15 m. The Gulf of Thailand is split from the South China Sea by two underwater ridges. The first ridge stretches south-eastward from Khota Bharu for 160 km with the average depth of 50 m. The second ridge stretches south-westward from Cape Camou for about 100 km with a sill depth of about 67 m. Moreover, there is an underwater sill that acts as a hydraulic controller of current flow in the lower Gulf of Thailand. ^{2,19}

Hydrology

The Gulf is a two layered, shallow-water estuary. The upper layer has low salinity due to rain and freshwater runoff from rivers. The deeper layer has high salinity due to cool water flowing into the Gulf from the South China Sea at the mouth. Monsoons, tidal currents and precipitation drive the Gulf's circulation and influence its salinity and turbidity. Monsoons also have a significant influence on the surface currents. During the southwest monsoon season, the surface current moves clockwise and during the northeast monsoon season it moves counterclockwise. ²

< Surrounding environment >

Habitat

The Gulf of Thailand has extensive coral communities in three distinct areas: the inner part of the Gulf, the east coast, and the west coast. The most inner islands have the most diverse coral community, with 85 species of hermatypic coral found. The inner coastal area also contains a series of intertidal mudflats. In addition, most of the coastal areas have mangrove forests. ^{3,6}

History and Culture

Indian traders first visited the Gulf of Thailand around 600 BC and introduced Hinduism, which rapidly became the principal faith in the area. By 230 BC, when Chinese traders showed up on southern shores, large parts of Thailand had been incorporated into the kingdom of Funan, the first state in Southeast Asia. At its peak the state included large parts of Thailand, Laos, Cambodia and Vietnam and had active trade with agrarian communities along the Malay Peninsula, as far south as modern-day Pattani and Yala.

Following the decline of Funan, a series of city-states developed in the upper southern gulf. Tambralinga was one of the most notable and it became part of the Srivijaya kingdom, a confederation of maritime states that ruled southern Thailand and Malaysia from the 7th to 13th centuries. The Srivijaya became hugely wealthy from tolls extracted from traffic through the Strait of Melaka. Tambralinga and nearby states adopted Buddhism in the 13th century, while those further south fell under the influence of Islam, creating a religious boundary that persists to this day in southern Thailand.⁴

Social Environment

< Population >

The Chao Phraya basin is the most important basin in Thailand. The basin covers 30% of Thailand's land area, is home to some 40% of the country's population, employs 78% of its work force and generates 66% of its Gross Domestic Product (GDP). In 1996, the total population of the Chao Phraya basin was 23 million inhabitants.⁵ Total population of Thailand was greater than 65 million people in 2004, and coastal development is progressing rapidly accompanied by the industrialization and economic development of the country.⁶

< Land use >

Land use problems in Thailand arise from competing, mutually exclusive uses for the same advantageously located piece of land. Coastal land is a prime example of this category: it is in demand as a desirable place to live, as a recreation resource, as a low-cost site for electrical power plants and industry, as a site for agriculture cultivation and plantation, and as tin mining and salt production area. Coastal land attracts commercial infrastructure as well as marine resources exploitation for mangrove products, aquaculture, mariculture and artisanal fishing. The complex overlap of land uses indicates that an integrated coastal zone management approach is necessary to resolve land use conflicts, and that it can aid in making resource allocation decisions for competing uses.⁷

< Industry >

Thailand has historically utilized the Gulf of Thailand through fisheries, aquaculture, mineral resources (particularly hydrocarbons), shipping and tourism.

Fishery

The early trawl operators had extremely high rates of profit and were able to obtain relatively cheap loans for further fisheries development, mainly from the Asian Development Bank. Such loans markedly reduced the cost of entry into the fishery.⁸

The consequent increase in trawl fisherman led to overfishing and caused market failures through price depression. The consequence of this over-consumption is the clear over-fishing and exploitation of the varieties of fish that can be consumed.⁹

In 2007, the fisheries landing for the Gulf was about 902,000 tons, and was 2,200,000 tons for Thailand.¹⁰

Aquaculture

Thailand's coastal area has about 1 million hectares suitable for coastal aquaculture. Fisheries production in Thailand demonstrated a remarkable growth over the last three decades. The total production exceeded 2 million tons for the first time in 1977, then a fall in production followed, but later production recovered to over 2 million tons and has been above this volume since 1982. In 2007, total production was about 3.9 million tons, of which 58.2% came from marine capture fisheries.¹¹

Mineral Resources

Mining activities were performed in several basins i.e. coal of mainly lignite and sub-bituminous ranks from Mae Moh, Mae Than, Chiang Muan, Bo Luang, Li, Nong Ya Plong, and Krabi basins with prospective reserves in number of basins such as Wiang Haeng, Ngao, Wang Nua, Chae Khon, Mae Ramat, Mae Lamao, Khian Sa, Saba Yoi; petroleum from Phitsanulok, Supan Buri, Fang, and basins in the Gulf of Thailand.¹¹

Shipping

The use of the Gulf of Thailand as a shipping route is of immense value to the littoral states. For example, the shipping volume was about 140 million tons of cargo and 2.4 million TEU (20-foot equivalent units: 1 TEU is 6.1m x 2.4m x 2.6m) of containers by over 5,000 vessels that called into Thai ports in 1997. These numbers are predicted to increase by about 12 % annually.¹⁰

Tourism

The Thai tourism industry is currently facing a serious downturn due to a combination of unfavorable factors such as the worldwide economic recession, the H1N1 flu outbreak, political instability and, more recently, the crisis of legitimacy of the Thai state. These factors are frequently found both inside and outside the country, and they are linked to each other.¹²

Environmental Problems

The Gulf of Thailand has been a major marine resource for Thai people for a long time. However, recent industrialization and community development have exerted considerable stress on the marine environments and provoked habitat degradation. The following pollution problems in the Gulf have been recognized:

- (1) Untreated municipal and industrial waste water;
- (2) Eutrophication in the gulf of Thailand;
- (3) Rapid decrease in mangrove forest, coral reefs, and fisheries resources.¹⁴



Pollution due to oil spill in the Gulf of Thailand¹³

< Water and Sediment Quality >¹⁴

Water Quality

In Thailand, most of the natural waterways serve as sewerage for domestic and industrial waste water. A study in Bangkok Metropolitan Area estimated that 60-70% of domestic waste was discharged to the Chao Phraya River and eventually to the Gulf of Thailand without prior treatment.

Four main rivers that flow into the inner Gulf of Thailand are the Chao Phraya, Thachin, Mae Klong and Bangpakong. According to the national water quality assessment conducted by the Ministry of Natural Resources and Environment in 2011, the Mae Klong and Bangpakong rivers had a water quality level of fair, and Chao Phraya and Thachin rivers were evaluated as deteriorated. Moreover, for coastal water quality the Chao Phraya River Mouth was assessed as highly deteriorated, while the Inner Gulf areas of Mae Klong River Mouth, Bangpakong River Mouth and nearby areas were deteriorated.¹⁵

The table below shows the water quality of the main rivers that flow into the Gulf of Thailand.¹⁵

Average and Minimum-maximum Values of Water Quality Parameters in Main Water Sources, 2011

River	BOD (mg/L)	Total coliform (MPN/100mL)	Fecal coliform (MPN/100mL)	NH ₃ (mg/L)
Lower Chao Praya	2.1 (0.8-9.0)	24,000 (1,300-160,000)	7,900 (450-160,000)	0.47 (0.13-2.35)
Lower Tha Chin	3.2 (1.0-6.8)	510 (20-2,400)	240 (20-2,100)	0.34 (0.10-1.34)
Mae Klong	1.5 (0.8-3.0)	8,650 (490-490,000)	1,300 (110-70,000)	0.07 (0.01-0.26)
Bangpakong	1.6 (0.6-3.9)	2,200 (20-35,000)	430 (20-17,000)	0.24 (0.03-0.59)

Another substance responsible for pollution in the Gulf is mercury (Hg). However, monitoring results during 1993-2008 found a gradual decrease of mercury concentration in fish near to the baseline level of 0.2 µg/g. The percentages of fish having mercury concentration exceeded the safety limit of 0.5 µg/g were also decreasing.¹⁶

Sediment Quality

Since the east coast has been developing with a high expansion rate of industrialization and urbanization, heavy industry activities will substantially increase the potential risk of heavy metal pollution along the coast which will subsequently degrade natural resources and aquatic environments. Lately, this area has faced the problem of mercury discharged by industries especially around Map Ta Phut Industrial Estate.¹⁷

< Other Environmental Problems >

Degradation and decline of habitats

Along with Thailand's population increase and economic development, much of the coastal habitat has been destroyed or

lost. Mangrove destruction is the most serious, and since the 1960s 50-80% has been lost, mainly being converted to shrimp farms. Coral reefs have also been reduced greatly, both by natural causes such as storms and monsoon waves and anthropogenic causes such as increased turbidity and nutrient pollution.⁶

< Environmental Protection Measures >

Regional Monitoring

The project entitled "Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand" funded by GEF is implemented by UNEP to stop the environmental degradation trend.¹⁸

Related Organizations and NGOs

- Partnership in Environmental management for the Seas of East Asia <<http://www.pemsea.org/>>
- CORE sea <<http://coresea.com/>>
- Mangroves for the Future <<https://www.mangrovesforthefuture.org/countries/members/thailand/>>
- Bird Conservation Society of Thailand (BCST)
<<http://www.birdlife.org/asia/partners/thailand-bird-conservation-society-thailand-bcst>>

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