

# 8 Gulf of Thailand

## Overview

The Gulf of Thailand is located in Southeast Asia, immediately to the west of the South China Sea. Its bordering nations, Thailand, Cambodia, Malaysia and Vietnam have each historically profited from the Gulf's wealth of living and mineral resources. Millions of people derive their livelihoods from fish and mineral resources produced from the Gulf, and millions more are affected by changes in the Gulf's environment, whether physical or political.

<<http://www.start.or.th/got/gotwww/>>

## Location



### Basic information

Surface area : 320,000 km<sup>2</sup>

Volume : 14,400 km<sup>3</sup>

Average depth : 45 m

Maximum depth : 80 m

## Nature

### < Background >

The Gulf of Thailand receives water mainly from the Chao Phraya, Tha Chin, Mae Klong and Bang Pakong rivers. Among these rivers, the Chao Phraya has the largest catchment area (162,000 km<sup>2</sup>), which is one third of the whole area of Thailand.<sup>1</sup>

### Climate

The majority of the Gulf coastline belongs to Thailand. Thailand has a tropical climate dominated by monsoons. The climate is generally characterized 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 per cent of the rainfall occurs during the wet season. Annual precipitation ranges from 1,000 to 2,000 mm, depending on the region. In Bangkok, the average temperature ranges from 20 in December to 35 in April.

<<http://www.atlapedia.com/online/countries/thailand.htm>>

### Topography

The Gulf is part of the Sunda Shelf and is relatively shallow. The mean depth is 45 m, and the maximum depth is 80 m.

< <http://www.start.or.th/gotwww/gulf.html> >

### 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. 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.

< <http://www.start.or.th/gotwww/gulf.html>>

### < Surrounding environment >

The Gulf of Thailand is one of the most productive seas of the world. Large numbers of fish species and other organisms are harvested by fishermen to feed their families or for profit. However, many commercial fish species are becoming endangered by a number of factors, including pollution, overfishing, and other environmentally harmful-fishing practices. Sustainable fisheries management is necessary to preserve these important resources.

Environmental problems are discussed in more detail in a later section.

<<http://www.start.or.th/got/gotwww/living.html>>



### **Coral Reefs and Mangroves**

Coral reefs in the Gulf of Thailand are a haven for many species of small fish and other organisms. These coral reefs are very sensitive to pollution, and are currently under threat from certain destructive fishing practices

Mangroves are found only along tropical coastlines. These delicate environments are an important source of vital nutrients for many organisms, as well as a breeding ground for many marine animals, including crab, prawns and shellfish. As such, mangroves are important to fisheries. Mangroves are especially sensitive to environmental change, and the rate of mangrove degradation along the Gulf is becoming alarmingly high. In particular, aquaculture is known to have very negative effects, and while natural rejuvenation of mangroves is possible, conditions must be appropriate for this to occur.

<<http://www.start.or.th/got/gotwww/living.html>>



## *History and Culture*

### < **History** >

Formerly known as Siam, Thailand means “land of the free”, and throughout its 800-year old history, Thailand can boast the distinction of being the only country in South-East Asia never to have been colonized. Early in its history, the territory of what is modern-day Thailand was strongly influenced by the ancient Indian civilization, which laid the foundations for kingship, art, administration and language that lasted over several centuries. The great Khmer civilization of the 7th through 13th centuries also had a strong influence on the early states of Thailand, and controlled virtually all of what is now Thailand.

The first Thai State, Nan Chao, was established in 650 A.D. and lasted until 1250. Located in southern China, a great number of people from Nan Chao migrated south as far as the Chao Phraya Basin and settled down over the Central Plains under the sovereignty of the Khmer Empire, whose culture they probably accepted.

The Thai people eventually founded their independent state of Sukhothai around 1238. Sukhothai, considered the golden era of Thai history, religion and culture, lasted until 1378 when the Ayutthaya Kingdom annexed it.

Ayutthaya flourished from 1350 until 1767. An invasion from a Burmese kingdom destroyed Ayutthaya and forced the Thai people to settle in the area of present-day Bangkok.

Thailand traces its modern history to 1782, when Chao Phraya Chakri became the first king of the Chakri Dynasty. Since that time, nine kings have ascended the throne. The most famous of these was King Chulalongkorn, also known as Rama V (1869 - 1910), who is credited with the modernization of Thailand (then known as Siam) and for his skill in retaining Siam’s freedom when all the countries around him were succumbing to European colonialism.

During the reign of King Prajadhipok, Rama VII (1925 - 1935), Siam changed from an absolute monarchy to a constitutional monarchy. The country’s name was changed from Siam to Thailand with the advent of a democratic government in 1939.

The present monarch, King Bhumibol Adulyadej, is King Rama IX of the Chakri Dynasty and is currently the world’s longest reigning monarch (since 1946).

<[http://www.unescap.org/itid/publication/chap5\\_2183.pdf](http://www.unescap.org/itid/publication/chap5_2183.pdf)>

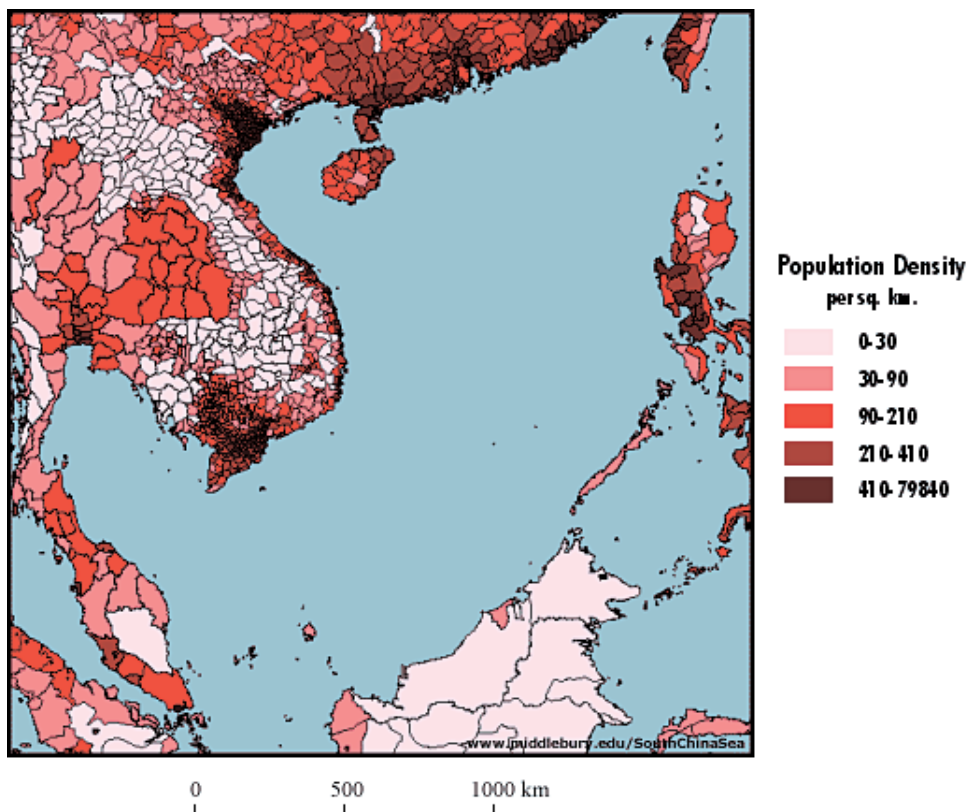
## Social Environment

### < Population >

The population of the bordering nations is shown in the following table, together with land and marine areas and the total coastline length. Population density in the region is shown on the map below.

Country	Total Land Area (km <sup>2</sup> )	Marine Area* (1000 km <sup>2</sup> )	Total Coastline Length (km)	Population in 1996
Cambodia	181,040	42	354	10,861,218
Malaysia	329,750	139	2200	19,962,893
Thailand	514000	95	2631	58,851,357
Vietnam	329,560	N/A	1750	73,976,973

<<http://www.start.or.th/got/gotwww/>>



<<http://www.middlebury.edu/SouthChinaSea/>>

### < Land Use >

Agriculture, aquaculture and mangrove utilization are the key economic activities conducted along Thailand's coast. Twenty seven per cent of Thailand remains forested, but this is down from 53 per cent in 1961.<sup>3</sup>

<<http://na.nefsc.noaa.gov/lme/text/lme35.htm>>

### < Industry >

Cambodia, Malaysia, Thailand and Vietnam have 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 Manila-based Asian Development Bank. Such loans markedly

reduced the cost of entry into the fishery.<sup>4</sup> The consequent increase in trawl fisherman led to overfishing and caused market failures through price depression.<sup>5</sup> Furthermore, the oil shock in 1973 increased the cost of fuel. This increase, along with the Exclusive Economic Zone (EEZ) declarations of neighboring countries, gradually forced large numbers of trawlers to shift into other fish-related economic activities, such as the traditional Nam-Pla (fish sauce) factories and aquaculture.<sup>6</sup>

Since the shift in the structure of the fisheries, the exploitation of fish resources in the Gulf of Thailand has exceeded its maximum sustainable level and caused adverse affects on the fish stocks in the Gulf. The result has been a drastic decrease in catch per unit of fishing effort, from about 300 to 30 kg per hour.<sup>7</sup>

In 1993 the marine fisheries landings were 33,100 tons for Cambodia, 1,047,350 tons for Malaysia, 2,752,486 tons for Thailand and 824,800 tons for Vietnam.<sup>8</sup>

### **Aquaculture**

With the depletion of natural fish stocks, aquaculture is becoming more widespread, particularly in Cambodia, Thailand and Vietnam. The total marine and brackish water aquaculture production in Malaysia and Thailand was 385,410 tons in 1993.<sup>8</sup>

### **Mineral Resources**

Petroleum hydrocarbon production, as reported for the first quarter of 1997 by Unocal Thailand (the largest producer in the gulf), was 957 million cubic feet per day of natural gas and 33,425 barrels per day of condensate. Unocal has drilled over 1,000 wells and has 74 platforms under operation. The total length of under sea pipeline is now over 1,200 km. Natural gas from the Gulf supplies about 30 per cent of the energy needs of Thailand. Moreover, at least, 1,000 million cubic feet of natural gas per day is extracted from new fields in Cambodia, Thailand and Vietnam, and the Thai-Malaysian Joint Development Area.<sup>8</sup>

### **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) of containers by over 5,000 vessels that called into Thai ports in 1997. These numbers are predicted to increase by about 12 per cent annually.<sup>8</sup>

### **Tourism**

According to the Tourism Authority of Thailand, the country's tourism was worth US\$6.73 billion in 2001. [http://newsroom.tat.or.th/about\\_tat/celebrating.asp](http://newsroom.tat.or.th/about_tat/celebrating.asp)

Tourism also has tremendous potential for Cambodia and Vietnam. However, tourism is sensitive to accidental spills of oil and other chemicals, and to the nearshore environmental degradation associated with aquaculture and other activities.<sup>8</sup>

## ***Environmental Problems***

### **< Water and Sediment Quality >**

#### **Water Quality**

Water quality along the coastal areas and tourist beaches is mostly fair, except for some locations at the mouth of Thailand's five major rivers. Primary productivity in the Gulf of Thailand is boosted by increased nutrients from rivers, shrimp farms and household sewage. Many cities have no sewage treatment and discharge directly into the Gulf. More fertilizers are being used on agricultural lands. They eventually reach the Gulf and contribute to the deterioration of water quality. The increase in inputs of nitrate, phosphate and silicate are causing harmful algal blooms, red tides and oxygen depletion.

<http://na.nefsc.noaa.gov/lme/text/lme35.htm>

The BOD load in the major coastal zones of Thailand, the Central basin; Eastern seaboard, Eastern south and Western south are shown as below.

Zone	BOD load (t/year)		
	Industrial	Domestic	Total
Central Basin	5343	29,033	34,376
Eastern seaboard	-	1,207	1,207
Eastern south	208	451	659
Western south	-	1,384	1,384

Source: Taranatham (1992)<sup>9</sup>

Another substance responsible for pollution in the Gulf is mercury (Hg). While some mercury is released into the waters of the Gulf through seepage from the ocean floor, it is industrial mercury, released in much higher concentrations, that presents a much higher danger to the many organisms of the Gulf. There has also been some controversy over whether mercury pollution is related to petroleum production.

<<http://www.start.or.th/got/gotwww/pollution.html>>

### Sediment Quality

Sediment cores taken from the inner Gulf of Thailand showed enriched concentrations of cadmium (Cd) and lead (Pb) at the surface of the bottom sediments near the Chao Phraya River Mouth area.<sup>10</sup> Most mercury concentrations in the sediments were still within the acceptable limit of 0.3 ppm<sup>11</sup>, except in certain locations, such as the Chao Phraya River estuary and the east coast of the Gulf.

### < Other Environmental Problems >

#### Food Poisoning

Food poisonings and illnesses have occurred in people who consumed toxic shellfish.<sup>3,12,13</sup>

#### Habitat Degradation

The clearing of mangrove forests for industrial, residential and tourist developments is leading to the deterioration of the coastal zone and changes in the ecological balance of the Gulf of Thailand. These mangrove forests have served as buffer zones between the land and the sea, and provided habitats and nursing grounds for many marine organisms.

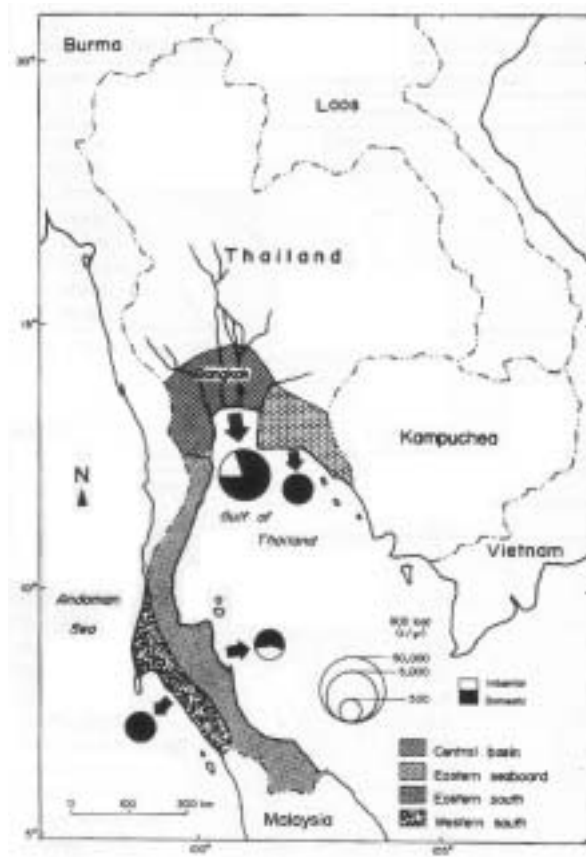
<<http://na.nefsc.noaa.gov/lme/text/lme35.htm>>

Human activities have directly caused catastrophic mortality on coral reefs, through dredging, dynamite fishing and pollution. The destruction of the coral reefs is expected to become more severe if preventive measures are not promptly taken.<sup>7</sup>

### < Environmental Protection Measures >

In Thailand, different agencies are responsible for coastal zone management under their own mandates. Coordination takes place through the committees in which concerned agencies are members.

Thailand has established a National Committee on Sustainable Development of the Sea. In general, representatives of stakeholders have been nominated as committee members. The local communities are encouraged to participate in the public hearing of any major development that potentially generates environmental impacts. The new



The major coastal zones of Thailand and their BOD loads in 1986. Source: Taranatham (1992)<sup>9</sup>

constitution has promoted information and management transparency. Access to development information must be open to the public.

< <http://icm.noaa.gov/country/thailand/thailand.html> >

### Regional Monitoring

The website of the International Cooperative Study of the Gulf of Thailand functions as a portal site of monitoring data.

Oceanographic and environmental data from various government agencies, national data centers, academic institutions, and other organizations in the Southeast Asian region and other data depositories are collected and processed for possible exchange under this program.

< <http://www.start.or.th/got/data/archive.htm> >

### Related Organizations and NGOs

The International Cooperative Study of the Gulf of Thailand is a regional research program for the sustainable management of the Gulf of Thailand. This is a non-profit network sponsored by the UNESCO Intergovernmental Oceanographic Commission-Sub Commission for the Western Pacific (IOC-WESTPAC), Southeast Asian Programme in Ocean Law, Policy and Management (SEAPOL), and Southeast Asia START Global Change Regional Centre (SEA START RC).

<<http://www.start.or.th/got/project/introduction.htm>>

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