

18 South China Sea

Overview

The South China Sea encompasses a portion of the Pacific Ocean, stretching roughly from Singapore in the southwest, to the Strait of Taiwan, between Taiwan and China, in the northeast. The South China Sea is bounded by the coasts of Vietnam, China, the Philippines, Malaysia, Thailand, Brunei and Cambodia. It is separated from the Gulf of Thailand by a shallow sill to the West.^{1,2}

< <http://www.eia.doe.gov/emeu/cabs/schina.html> >

< <http://na.nefsc.noaa.gov/lme/text/lme36.htm> >

Location



Basic information

Surface area : 3.6 million km²

Volume : over 4.32 million km³

Average depth : over 1,200 m

Maximum depth : 5,000 m

Nature

< Background >

The South China Sea has a catchment area of 2,524,960 km², and 268,182,000 people live within the area.^{3,4} There are 93 cities each with a population of more than 100,000. Approximately 120 rivers run through the surrounding seven surrounding countries.

Climate

The surrounding countries are largely influenced by the Asian monsoon climate. In summer, hot and humid winds blow from the sea to the continent, and in winter cold and dry winds blow from the continent to the sea. However, the climate of the South China Sea is further complicated by the three major Northern Summer Monsoon (NSM) components - the Indian Summer Monsoon (ISM), the Western North Pacific Summer Monsoon (WNPSM) and the East Asia Subtropical Monsoon (EASM).

< <http://www.soest.hawaii.edu/~bwang/bw/pubs/54.html> >

The monsoon system in the South China Sea modulates inter-annual variability imposed by the El Niño - Southern Oscillation. The arrival of Rossby waves carrying a warm pool of water to the western margin of the equatorial Pacific is buffered by the South China Sea system.³

Topography

The bottom topography of the sea is characterized by two extended continental shelves on the northern and southern sides and a deep basin, with a maximum depth of 5,000 m, situated in the central-eastern region. The deep basin occupies 44 per cent of the total area of the South China Sea.

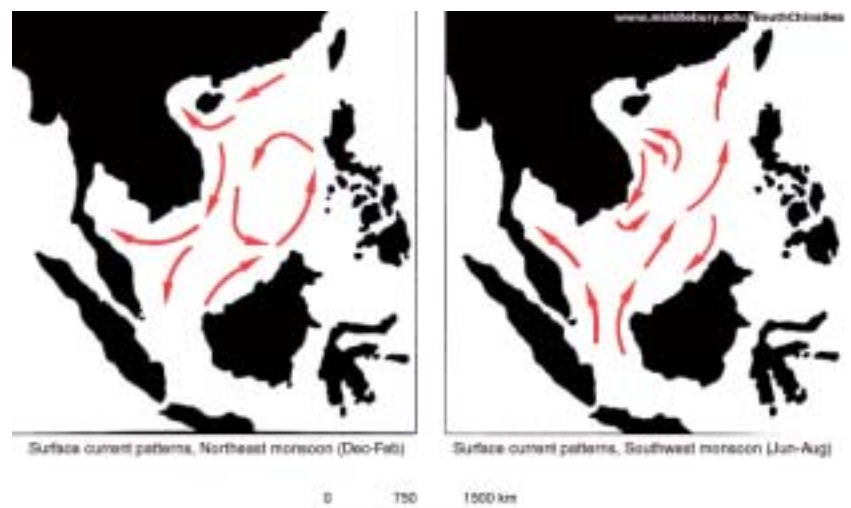
< <http://atlas.cms.udel.edu/database/rpages/007005245.html> >

Geologically, the Indian subcontinent collided with the Eurasian plate in the Late Eocene and led to the rifting of the Sunda Shelf, including Borneo, the Malaysian Peninsula and Palawan micro plate. The rift is hypothesized to be the origin of the northwest sub-basin of the South China Sea. North to south spreading occurred 27 to 16 million years ago, causing the formation of the eastern sub-basin of this marginal sea. The southwest sub-basin was formed 20 million years ago, and spreading ceased around 15.5 million years ago.³

Hydrology

Water circulation, particularly shelf water in the South China Sea is largely influenced by the monsoon system and undergoes a seasonal reversal of direction. Surface currents flow north to south along the Vietnam coast to the Java Sea during the Northeast monsoon (Dec - Feb). The flow reverses south to north during the Southwest monsoon (Jun - Aug).³

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



< Surrounding environment >

Biological Diversity

The South China Sea is composed of many archipelagoes, peninsulas and small islands, which provide various niches for marine organisms. Also, mangrove forests, seagrass beds, coral reefs and tidal flats are distributed throughout the Sea. These ideal conditions have facilitated a highly biologically-diverse marine ecosystem.

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

History and Culture

< History >

After the last ice age, the sea level rose and created many islands along the Asian continent. Slowly, the South China Sea evolved into an important shipping route between the islands and the continent. The importance of the South China Sea increased as trade developed between the Middle East, Europe and East Asia. Various commodities were transported and introduced into Asia via the South China Sea, including bronze, metal ware, gunpowder and guns. The importance of this area as a major shipping route continues to the present day.

< [http://www.carleton.ca/~bgordon/Rice/papers/zhimin90.htm#\(A\)%20Rice%20agriculture](http://www.carleton.ca/~bgordon/Rice/papers/zhimin90.htm#(A)%20Rice%20agriculture) >

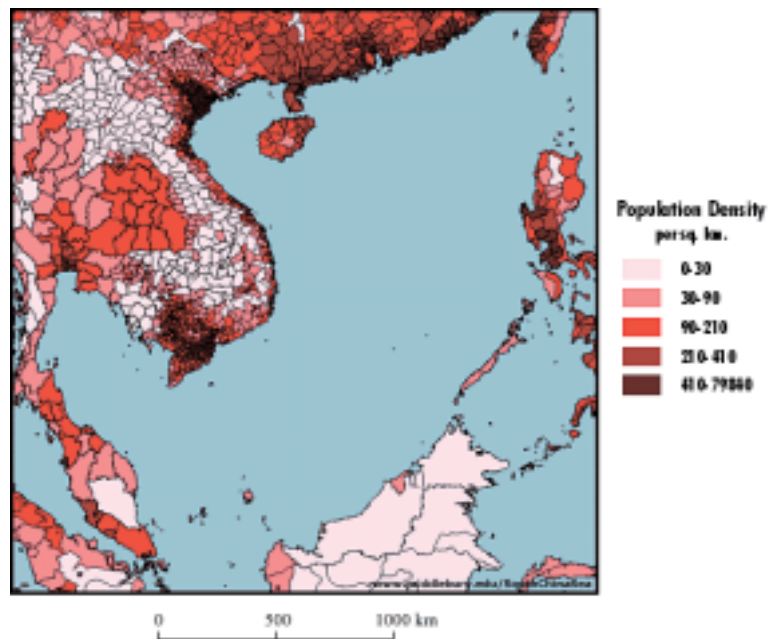
Social Environment

< Population >

Approximately 270 million people live in the coastal regions of the surrounding seven countries. The mean growth rate in the coastal South China Sea is 2.17 per cent, which would double the population in 32 years. In Cambodia, Indonesia and Malaysia, growth rates in the South China Sea regions are 1.5 to 2.0 times the national growth rates.

The population densities for the coastal regions of China and the Philippines are 471 and 472 people per km², respectively. In Vietnam, people live at even higher densities, with 500-1,000 people per km² along the northern part of the Gulf of Tonkin. In some parts of Hanoi, densities can reach 35,000 people per km². Malaysia and Cambodia are least dense at 21 and 49 people per km², respectively.

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



< Land use >

There has been a recent shift in common coastal land use in the seven countries surrounding the South China Sea, from mangrove forests into shrimp ponds, as shown below.³

Country	Original mangrove area (1,000 ha)	Present mangrove area (1,000 ha)	Area lost (%)	Causes of mangrove destruction			
				Shrimp culture	Wood chip, pulp, charcoal	Urban development, Human settlement	Domestic use
Cambodia	170	85	50	●			●
China	42	15	65	●		●	
Indonesia	N/A	936	N/A	●	●	●	
Malaysia	505	446	12	●	●	●	
Philippines	400	160	60	●		●	●
Thailand	280	160	57	●			
Vietnam	400	253	37	●			●
Total		1,852					
Global Total		18,108					

< Industry >

The surrounding seven countries are at various stages of industrialization. Cambodia, with a national GDP of US\$0.12 million earns 45 per cent of this from agriculture, and 20 per cent from industry. In contrast, Indonesia relies on the industry sector for 57 per cent of its GDP. In terms of increasing reliance on industry for the generation of GDP, the countries may be ranked as follows: Indonesia > China > Thailand > Philippines > Cambodia.³

Fisheries

Despite nutritional requirements and current population growth rates, the South China Sea countries are generally net exporters of fisheries products. Because the need to generate foreign currency to buy capital inputs for industrialization has a higher priority than food security, this trade pattern will most likely continue unless policy shifts occur to make food security of utmost importance in the national agendas.³

Shipping

The South China Sea is one of the world's busiest international sea lanes. More than half of the world's supertanker traffic and over half of the world's merchant fleet (by tonnage) pass through the South China Sea every year. Tanker traffic through the Strait of Malacca, at the southwestern end of the South China Sea, is more than three times greater than Suez Canal traffic and over five times that of the Panama Canal.⁵

Over the next 20 years, oil consumption among developing Asian countries is expected to rise by an annual average of 4 per cent, with about half of this increase coming from China. If this growth rate is maintained, oil demand for these nations will reach 25 million barrels per day, more than double the current consumption levels, by 2020.⁶ Almost all of this additional Asian oil demand, as well as Japan's oil needs, will need to be imported from the Middle East and Africa. Most of it will pass through the South China Sea, via the Strait of Malacca.

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

Environmental Problems**< Water and sediment quality >****Water quality**

According to the State of the Environment report by the Chinese government, water quality in the South China Sea (China region) showed some improvement in 2001 compared to the previous year. However, 20 per cent of the total area still exceeded the Class IV water quality level. Class IV is the level for port, harbor development and construction areas.

< <http://www.zhb.gov.cn/english/SOE/soechina2001/english/2-marine.htm> >

Regarding domestic wastewater, about 6 million tons of BOD are generated each year by the coastal population of the seven countries surrounding of the South China Sea, and only a limited amount is removed by sewage-treatment facilities. Assuming that the same population growth rates prevail into 2005, the generated BOD will increase to 6.6 million tons. If this BOD load persists, and if sewage treatment remains at the same level, the coastal waters will become highly eutrophic.³

< Other Environmental Problems >**Trans Boundary Issues associated with Regional Food Security**

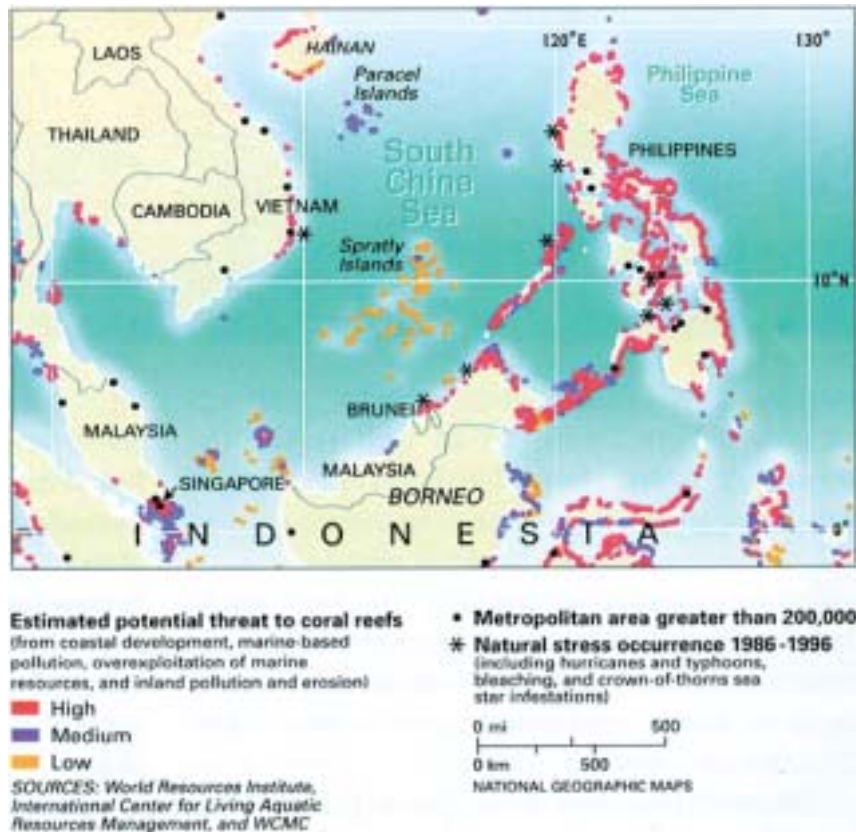
Currently, South China Sea countries are net exporters of seafood and will most likely remain so, assuming that there is no drastic reduction in fish production. Regionally, the total population will reach 503 million by 2005 using current growth rates. To secure the minimum nutritional requirement, about 86 per cent of current production must be allocated for domestic consumption. This implies that the region can export 14 per cent at most.

If export levels are to increase beyond 14 per cent, either domestic consumption will fall below the minimum requirement, total fish production will have to increase, or population growth rates will have to decline. The

options may be difficult to optimize toward one goal or the other, but a compromise towards long-term benefits for society, the ecology, and the economy will have to be formed soon.³

Threats to coral reefs

Although coral reefs are widely distributed along the coast of the South China Sea, many areas are currently under threat from coastal development, marine-based pollution, overexploitation of marine resources and land-based pollution and erosion. Corals in the Philippines, Malaysia and Vietnam are at particularly high risk of extinction. Relatively healthy corals are found in the Spratly Islands.



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

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