

19 Yellow Sea

Overview

The Yellow Sea is a semi-enclosed sea bounded by the Chinese mainland on the west, the Korean Peninsula on the east and a line running from the north bank of the mouth of the Yangtze River to the south side of Cheju Island.

The name of the Yellow Sea comes from the color of its water. A large amount of yellow silt is carried into the Yellow Sea by the Yellow River from the Loess Plateau, the Huai River and the Yangtze River. The Sea receives a large amount of silt and sand from these rivers, which accumulates as bottom sediments.

(Source: Bilian, D., 2003. China Institute of Marine Affairs, State Oceanic Administration, People's Republic of China)

Location



Basic information

Surface area : 400,000 km²
Volume : 17,600 km³
Average depth : 44 m
Maximum depth : 100 m

Nature

< Background >

The Yellow Sea has a catchment area of about 502,000 km² in China and Korea.^{1,2} Chinese rivers appear to be heavily contaminated with agricultural runoff, and Korean rivers are heavily contaminated with municipal sewage. The contaminant pathways may have significant impacts upon the chemical-mass balance of the Yellow Sea, with the atmosphere being the major pathway of some trace nutrients. The impact of river inputs is limited to the river mouths, estuaries and coastal areas.³

Climate

Qingdao, a representative city on the Chinese coast, has a northern temperate-zone monsoon climate, with abundant rainfall and four distinctive seasons. The annual average temperature is 12.2 . The hottest month is August, with an average temperature of 25 . The coldest month is January, with average temperature of

1.3 .

< <http://www.globalsecurity.org/military/world/china/qingdao.htm> >

Korea enjoys four seasons under an East Asian monsoon climate. The summer monsoon (June-September) brings heavy rainfall, with an average of 383 mm and the winter monsoon (December-March) averages 126 mm. However, precipitation can vary greatly from year to year. There is usually an eight-year cycle of drought. Temperatures in Seoul range from 3.5 in January to 25 in July. Korea experiences cyclones, originating from China during March and April, and typhoons, originating from the east Philippines during July and August. Both bring abundant rainfall that is important for rice cultivation.

< <http://www.buyusa.gov/korea/en/page62.html> >

Topography

The Yellow Sea is shallow, with a mean depth of 44 m, and slopes gently from the Chinese continent. A sea-floor valley, representing the path of the meandering Yellow River (Huang He), flows across the shelf and empties sediments into the Okinawa Trough.

< <http://na.nefsc.noaa.gov/lme/text/lme48.htm> >

Hydrology

There are five major water masses in the Yellow Sea. The Yellow Sea Warm Current Water is warm and saline. It originates from the boundary of strong fronts formed during winter in the region that is west-northwest of Cheju Island. The Yellow Sea Bottom Cold Water forms as a result of convection in winter, and appears in the bottom layer of the trough region in summer. The Korea Coastal Water is seawater that has been tidally mixed with run-off and river discharge from the Korean Peninsula. The China Coastal Water contains coastal water from the Bohai Sea and flows southward throughout the year. The Yangtze River Diluted Water is the freshest water in the marginal seas of the Pacific Ocean.⁴

Based on temperature and salinity data, the circulation pattern of the Yellow Sea can be characterized into two seasonal types. In winter, there exists the northward Yellow Sea Warm Current in the interior and two southward coastal flows along the Chinese and Korean coasts. In summer, there is a southward coastal current and a northward Korean coastal flow, with a cyclonic flow system between the two. However, a lack of direct evidence on the current systems means that the description of the Yellow Sea Warm Current is inconclusive, especially regarding its origin in winter and its pattern in summer.⁴

< Surrounding environment >

Wetlands

The wetlands along the western coast of the Korean Peninsula are among the largest in the world. They include almost 100,000 hectares of tidal flats in South Korea alone, with North Korea also having many large tracts of coastal wetlands. Combined, the Korean peninsula boasts some 600,000 hectares of wetlands.⁵

The shallow and flat sea floor and large tidal fluctuations were the primary factors that created such extensive coastal wetlands. Tidal ranges along the west coast reach a maximum of over 10 m.⁵

Tidal flats absorb organic matter that flows in from the land. In urban coastal areas, a certain amount of sewage, no matter how well disposed of through treatment facilities, inevitably finds its way into the sea through rivers. Translated into the wet weight of organisms, 1 m² area of tidal flat is capable of purifying 1 to 2 kg of waste per year. There are very few natural environments capable of processing so much organic waste.⁵

Migratory birds

Many birds rest and feed on Korea's tidal flats during their migratory passage from Australia to Siberia. Among a variety of shorebirds, godwits and plovers are the most abundant. According to the National NGO Wetlands Report for Ramsar, 1999, about 500,000 godwits and plovers were estimated to have visited Korea's tidal flats in the previous year. About 50 species of godwits and plovers can be seen on Korea's tidal flats, of which about 30 species are found only on tidal flats.⁵



Breeding-plumaged Bar-tailed Godwit
Photo © Clive Minton/AWSG.

<<http://www.wbkenglish.com/>>

History and Culture

< Chinese people and Yellow Sea >

The Chinese people have known how to make use of the sea for thousands of years. Navigation (mainly for trade, travel and transportation), fishing and salt production have been the mainstay industries of the coastal people along the Yellow Sea and other Chinese seas. Shandong, a province of China bounded the Yellow Sea, is one of the birthplaces of China's ancient culture. The Chinese people had learned to fish at sea by boats with oars and had mastered basic navigation technology before the Xia Dynasty (2183-1752 BC). At least 2,700 years ago, the navigators of China opened the maritime route from the Shandong Peninsula to Japan, via Korea through the Yellow Sea, and started cultural and commercial exchanges with Korea and Japan, via the Yellow Sea.

There are many fairy tales in China describing the beautiful places in 'the East Sea', the general term for the Yellow Sea and the East China Sea. Tales such as 'Shan Hai Jing', 'The Eight Immortals', 'Journey to the West' and 'Jingwei Fills the Sea' describe the life of the people relating to the Yellow Sea. In the old days in China, people would say to an old person celebrating their birthday "I wish you a long, long, happy life, as long as the long-running water in the East Sea and a pine tree in the South Mountain", instead of "Happy birthday to you!", like people do nowadays. To see a mirage on the sea from the Penglai Pavilion, an ancient watch tower on the coast of Shandong Peninsula, has been what many people have yearned for since the old days.

(Source: Bilian, D., 2003. China Institute of Marine Affairs, State Oceanic Administration, People's Republic of China)

Social Environment

< Population >

The population in the catchment area of the Yellow Sea is estimated as 230 million.^{1,2} Another population estimate from the Pan-Yellow Sea Economic Zone is 264 million, as shown below with other economic indexes.

<<http://classes.web.waseda.ac.jp/z-taga44/top-koukai.doc>>

Status of the Pan-Yellow Sea Economic Zone

Parameter	Korea*	Japan*	China*	Total
Area (1,000 km ²)	54.8	50.5	518.4	623.7
Population (million)	37	16	211	264
Real GDP (billion US\$ in 1992)	249	370	101	720
Per Capita Real GNP (US\$ in 1992)	6,731	23,142	481	2,727

*) Korea: Seoul, Inchon, Kyonggido, Taejon, Chunchongnamdo, Chollabukto, Chollanamdo, Kwangju, Pusan, Kyonju, and Chejudo
 Japan: Yamaguchi prefecture and 7 prefectures in Kyushu
 China: Beijing, Tianjin, Liaoning, Hebei, and Shandong
 Source: Pusan Development Institute

< <http://classes.web.waseda.ac.jp/z-taga44/top-koukai.doc> >

< Land use >

With limited agricultural land, South Korea has been in constant search of additional farmland for growing food to be self sufficient. Reclamation in the shallow coastal zone has provided valuable land resources.

Since the end of World War II, a total of 62,090 ha of tidal flats have been reclaimed in South Korea. Currently, the government proposes to reclaim 60,000 ha of existing wetland for agricultural and industrial uses, which is almost equal to the total reclaimed land of the last 50 years.⁶

< Industry >

The urban areas are heavily dependent on the Yellow Sea for economic development, recreation, tourism and food. Tourism is in its infancy in both China and South Korea. Several sites of picturesque beauty could be promoted as tourist attractions. Aquaculture and mariculture are practiced in the coastal provinces of China, with seaweed being the main crop. The Yellow Sea waters are a highway for international shipping. Trade is growing between the neighboring countries of the Yellow Sea. Oil exploration has taken place in China and in the Democratic People's Republic of Korea.

< <http://na.nefsc.noaa.gov/lme/text/lme48.htm> >

Transportation

Huge infrastructure projects for transportation are underway to meet the expanding needs of the Pan-Yellow Sea Economic Zone. These projects include the Inchon International Airport and the new Pusan port in South Korea, the new Dalian port in China, the Hibiki District deep port and the Fukuoka Island city project in Japan.

< <http://classes.web.waseda.ac.jp/z-taga44/top-koukai.doc> >

Environmental Problems

< Water and sediment quality >

Water quality

The concentrations of nitrogen (N), phosphorus (P) and silicon (Si) compounds in the South Yellow Sea showed elevated levels in the southwestern, eastern and northern areas in 1988. Most of the compounds showed obviously stratified distributions. However, nutrient concentrations were comparable with historical data, showing that human effects on the South Yellow Sea may be insignificant. Nutrient concentrations in the South Yellow Sea are between those of the Bohai Sea and the East China Sea.⁴

Sediment quality

High organic nutrient concentrations are found in the surface sediments of the central area of the southern

Yellow Sea.³ Concentrations of trace elements, such as cadmium (Cd), copper (Cu) and zinc (Zn), are close to natural levels.³

< Other Environmental Problems >

Over exploitation of fishery resources

The fisheries industry in the Yellow Sea has developed to such an extent that the catch now exceeds 1 million tonnes per year. It is generally agreed that fishery resources are over exploited in the region.⁷ If fishing effort in the region is not controlled, the situation for fisheries resources will deteriorate even further.³

Harmful Algal Blooms (HAB)

Outbreaks of harmful algal blooms have increased along the coast of the Yellow Sea, particularly in the enclosed areas and in areas with huge artificial structures, such as landfills and dikes. These structures are probably restricting water circulation and promoting the rapid growth of red-tide organisms. These blooms cause losses to the fishing industry, and particularly to the aquaculture industry.

< <http://na.nefsc.noaa.gov/lme/text/lme48.htm> >

Water pollution by land reclamation

Large-scale reclamation in coastal waters will bring about significant environmental changes and related problems, such as water pollution from municipal and industrial discharges. The problem of water pollution has already been well demonstrated by the Shi-Hwa Reclamation project. It was publicly criticized as a failure because of the serious water pollution caused by municipal and industrial discharges into Shi-Hwa Lake, the newly-constructed huge freshwater reservoir.⁶

< Environmental Protection Measures >

Control over fisheries

The Chinese government has imposed strict controls on fishing effort. The fishing license system controls not only the total number of fishing boats, but also the total fishing effort. The government emphasized that during the 9th five-year plan (1996-2000), there would be zero-increase of fishing effort in Chinese waters. Apart from the control on fishing effort, fishing is completely prohibited in the Bohai, Yellow, and East China Seas during the months of July and August. Since 1988, there has been a total ban on trawl fishing in the Bohai Sea, with the aim of conserving the fish in the Yellow Sea. There was a recovery of small yellow croaker fish in the region, but greater effort is required to conserve the fish in the Yellow Sea.³

Transboundary cooperation

Due to the lack of a formal framework for achieving international cooperation in monitoring and research activities, China, the Democratic People's Republic of Korea, and the Republic of Korea have been trying to establish regional initiatives. These initiatives include a GEF-funded project, Northwest Pacific Action Plan (NOWPAP), Tumen River Area Development Programme (TRADP), the Asia-Pacific Economic Cooperation Forum (APEC), Fisheries Marine Resources Conservation Working Groups, and the GEF/UNDP/IMO East Asia Seas project.

< http://www.gefweb.org/COUNCIL/GEF_C15/WP/Yellow%20Sea%20Project%20Part1.doc >

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