

21 Sea of Japan

Overview

The Sea of Japan is located along the edge of the Eurasian continent and partially separated from the open ocean by the Japanese Archipelago and Korean peninsula. It is connected to the open Pacific Ocean through the Tsushima, Tsugaru, Soya and Mamiya Straits.

Location



Basic information

Surface Area : 1,300,000 km²

Volume : 1,750,000 km³

Average depth : 1,350 m

Maximum depth : 3,796 m

Nature

< Background >

The Sea of Japan is a marginal sea bordered by the Japanese Archipelago along the east and south, and the Eurasian continent along the north and west. It is an international sea with four bordering countries - Japan, Russia, North Korea and South Korea.

The Sea of Japan is connected to the Pacific Ocean through four straits, all of which are narrow and shallow. These straits enhance the closed nature of the water as well as limiting seawater exchange compared to other marginal seas. The widely known name 'Sea of Japan' probably stems from the geographic features of the Japanese Archipelago that visually separate the water from the northern Pacific Ocean.

Topography

Two large banks, the Yamato and Kita-Yamato Banks forming the Yamato Ridge, are found in the central part of the Sea of Japan. The Yamato Ridge is surrounded by deep basins - the Japan Basin in the north (over 3,000 m deep), the Yamato Basin (2,500-3,500 m deep) in the southeast, and the Tsushima Basin (1,500-2,500 m deep) in the southwest. South of the Yamato and Tsushima basins, along the Tsushima Strait, lies a shallow continental shelf approximately 120 m deep.

Hydrology

Two strong currents exist in the Sea of Japan - the warm Tsushima Current that enters from Tsushima Strait and heads northeast, and the cold Liman Current that runs along the Eurasian continent from north to south. The Tsushima Current is the main current and is a branch of the larger Kuroshio Current.

The Tsushima Current splits into three smaller branches upon entering the Sea of Japan. Although all of the branches head toward the north, the first branch goes along the coastline of the Japanese archipelago, the second along the Korean Peninsula, and the third cuts across the center of the Sea of Japan. Eventually, the majority of these currents flow into the Pacific Ocean or the Sea of Okhotsk, through either the Tsugaru or Soya Straits.

According to past records, the whole process of water entering through the Tsushima Strait and exiting through the Tsugaru Strait into the Pacific Ocean is estimated to take approximately two months. Some of the remaining current continues to travel northward. In the meantime, the water is slowly cooled and finally released into the open ocean through the Mamiya Strait. Due to the shallowness of the strait, part of this current turns around at the mouth of the Strait and becomes the Liman Current, which then heads south along the Eurasian continent.

The tidal range is small, with a maximum range of 20 and 30 cm. The tidal cycle is slightly irregular, and diurnal rather than semi-diurnal tides are occasionally observed.

Japan Sea Proper Water (JSPW)

A unique water body exists at the bottom of the Sea. Originating from near Vladivostok in Russia, the water body is cooled by cold winter breezes and experiences evaporation, which combine to increase water density and cause sinking to the bottom of the sea. This process maintains low temperatures and high oxygen concentrations deep in the Sea.

Due to the geography of the Sea, surface water is continuously exchanged through the warm Tsushima Current, whereas the bottom water described above remains untouched. The bottom water is thus called 'Japan Sea Proper Water'.

< Surrounding environment >

Located along the eastern edge of the Eurasian continent in the mid-latitude area, the Sea of Japan has a cool to warm climate. There are, however, two distinct types of climates - a cool and wet continental climate dominates the continental area from Khabarovsk in Russia, along the North Korean coastline to the Hokkaido area in northern Japan, and a warm monsoon climate dominates over Japan (except Hokkaido) and South Korea. The former has a wide range of air temperatures and is characterized by having a short hot summer and a long cold winter. The latter has four distinctive seasons, with a hot humid summer and a cool winter with little precipitation. These different climates enable the establishment of a 'wildlife transition zone' that accommodates plants and animals from both north and south. Also, due to the simultaneous occurrence of the warm Tsushima and cold Liman currents, a polar front is formed where the currents mix, with the temperature difference providing an ideal environment for fisheries.



Amur Leopard (*Panthera pardus orientalis*)
A leopard species only found in parts of the Russian coastal area. It is now under the threat of extinction, after been extensively hunted for its beautiful fur and its bones for Chinese medicine.

< <http://homepage1.nifty.com/archangel/zoo/ooji02.html> >

< Tourism >

Coastlines along Sea of Japan attract many domestic and overseas tourists, with numerous marinas, beaches, and leisure facilities developed along the coasts of Japan and South Korea.

On the other hand, tourism is still underdeveloped in the other bordering countries, which are still to fully exploit their coasts as tourist areas. Also, some countries are not always open to tourism for political reasons.



Cheju Is. (Popular tourist beach)

Cheju Island, located in South Korea is the largest island resort in Asia, attracting many domestic and international tourists for its natural beauty, unique culture and warm climate.

< http://www.koreanair.co.jp/local/jp/jpn/ld/tg/fd/tg_featuredest02_2003.htm >

Unique features/phenomena

1) Mirage

A mirage is an optical illusion. Through unusual light refraction, a distant landscape is seen as if it were much closer. It is often triggered by high air temperature fluctuations. Toyama Bay (Uozu City) is well-known for mirages, especially during spring to early summer.



Mirage in Uozu City

< <http://www.wni.co.jp/mic/docs/shinki.html> >

2) Submerged forest

A submerged forest is a terrestrial forest that is buried below the seafloor. These forests are formed by various events, including volcanic eruptions, rapid subsidence, flooding of rivers, and sea level rise. Tree roots excavated from the Uozu Submerged Forest national monument, for example, are thought to be part of a natural forest buried during the flooding of Katagai River 2,000 years ago, which was then submerged underwater by a rise in sea level. As submerged forests are sealed under the seafloor, tree trunks, seeds, pollen, and insects are often preserved in relatively good condition, which provides an ideal tool for studying the ancient environment.

History and Culture

< Formation of Sea of Japan >

The Sea of Japan is considered to have been formed sometime between 10 and 20 million years ago, following large scale crustal movement.

Twenty-five million years ago, a large lateral fault developed at the eastern edge of the Asian Continent, creating numerous rift valleys and lakes. Between 14 and 19 million years ago, these rift valleys and lakes drifted farther from the Asian Continent, and eventually created the deep Japan Basin. Large sea basins were also formed south of the Japan Basin, although they are occasionally interrupted by some ridges and plateaus, such as the Yamato Ridge and Korean Plateau.

< Cultures surrounding the Sea of Japan >

Being compact in size, the Sea of Japan boasts a long record of supporting cultural exchange between bordering countries, such that the history of countries can not be told without addressing the significance of the Sea. In ancient times, the continent introduced paddy-rice agriculture, Buddhism and writing to Japan. Simultaneously,



Japan tried to communicate and catch up with international affairs, culture and scholarship by sending official diplomats to continental countries, such as during the Sui, Tang and Bo Hai Dynasties in China, and the Silla Kingdom in Korea.

Restored envoy vessel

During the period between 630 and 838 AD, 16 envoy missions were sent to China, composed of government officials, students, doctors and others, usually totaling 100 to 250 people and in some cases including over 500 people. These envoy missions helped Japan to learn about the advanced cultural and political systems of the Tang Dynasty in China.

< <http://www.d9.dion.ne.jp/~senaun/pageBT14.html> >

Social Environment

< Population >

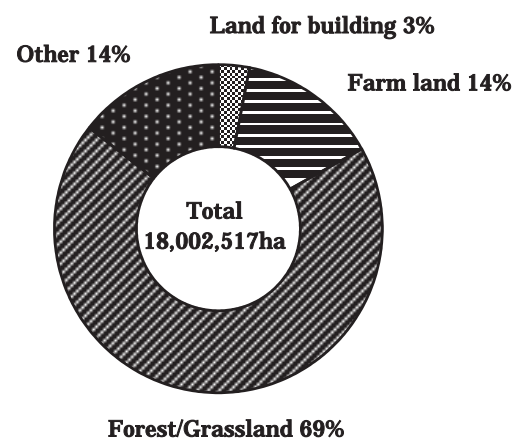
Approximately 200 million people live on the Korean Peninsula and the Japanese Archipelago, in the southern area of the Sea. In contrast, only 4 million people live in the northern area, along the coast of Russia.

< Land use >

Forest covers almost 70 per cent of the total land area of the Russian and Japanese coastlines. These forests provide valuable nutrients to the Sea but are threatened and are deteriorated by factors such as development, clear cutting, accidental fire and damage caused by insects.

< Industry >

The main industries in far-eastern Russia are iron working, food processing (mainly seafood), electricity generation, oil and machinery production and metal mining. This industrial structure is highly dependent on the area's rich natural resources and abundant energy sources. A serious problem in this area is that a large portion of land is covered by forests and permafrost, making agricultural development challenging. In contrast, the service industry is expanding in Japan and South Korea, further diversifying the industrial structure of their countries.



Status of land use along the Sea of Japan coast
< <http://www.stat.go.jp> >

Fisheries

The Sea of Japan has maintained its rich biodiversity and high biological productivity. It has contributed to the development of fisheries in all bordering countries. However, due to recent economic growth and rapid urbanization, nutrient loads are increasing and many shallow sea areas are being reclaimed, leading to the deterioration of many habitats. Consequently, fish landings have decreased.

Environmental Problems

< Water and sediment quality >

Concern over water quality in the Sea of Japan is increasing as economic and industrial development is taking place along coastlines. In particular, Russia, North Korea, and South Korea have a serious problem with industrial effluent, agricultural runoff and untreated sewage entering inlets and rivers in inland areas or coastal zones that are connected to the Sea.

Highly contaminated marine life is found around Vladivostok, Russia, many of them exceeding acceptable levels. Contaminated marine products are no good for food or as processed material. Frequent red tides along the southern coasts of South Korea have also affected the fishing industry of this region.

Number of red tides recorded along the South Korean coast and economic loss of fisheries

Year	1992	1993	1994	1995	1996
No. of red tides	27	38	29	65	61
Economic loss of fisheries (hundred million Won)	194	84		765	21

< <http://www.me.go.kr> >

< Pollution source >

Since the Sea of Japan is an international water body bordered by several countries, not just one country is accountable for its water pollution. Concern about this situation in the bordering countries is growing as pollutant loads increase with population and economic growth.

Old and inadequately equipped factories, and slow development of environmental infrastructure, including sewage treatment plants, result in the release of industrial effluents into the environment without proper treatment. This continuously exposes the Sea to water and sediment pollution. Other threats exist as well, such as runoff of byproducts from mining, such as soil particles flushing down rivers.

The major rivers that flow into the Sea from the Continent are the Tumen River running across the borders of China, Russia and North Korea, and the Rakuto Zen Tsu river in South Korea. The Ishikari, Shinano, and Agano rivers flow into the Sea from the Japanese Archipelago.

Organic pollutant loads in 1980 and 1993 from the countries bordering the Sea of Japan³

Country	Unit: kg/day	
	1980	1993
China	3,358,203	5,339,072
Japan	1,456,016	1,548,021
Korea	281,900	358,610

< Other Environmental Problems >**Radioactive pollution and oil spill**

Disposal of radioactive waste, which dates back to the former USSR era, as well as oil spills from tanker accidents, are becoming a big environmental threat in the Sea. This disposal is a long-term issue, the impacts of which will be a concern far into the future.

< Environmental Protection Measures >

Ongoing environmental protection measures, in and around the Sea area, are as follows.

Northwest Pacific Action Plan (NOWPAP)

NOWPAP is one of the Regional Seas Programmes initiated by UNEP (United Nations Environment Programme), and its aim is to protect the environments of highly-enclosed international waters. Adopted in 1994 by Japan, China, South Korea and Russia, NOWPAP implements various projects, in compliance with the intergovernmental meetings that are held occasionally.

NOWPAP projects

NOWPAP/1 : Development of marine environment protection database and information management system for target ocean regions.

NOWPAP/2 : Study into laws related to marine environment protection in related nations.

NOWPAP/3 : Production of environmental monitoring programs for target ocean regions.

NOWPAP/4 : Regional cooperation on ocean pollution (action in case of oil pollution incidents etc.).

NOWPAP/5 : Designation of regional activity centers to become centers of activity in respective areas.

NOWPAP/6 : Public awareness raising on the marine, coastal and associated freshwater environment.

NOWPAP/7 : Assessment and management of land-based activities.

< Resident participation in Environmental Protection >**Marine litter survey along the coasts**

In 1996, the local government of Toyama prefecture, Japan, launched a project to survey marine litter, with the slogan "Nurture your mind: no littering, protect the marine environment". During the initial phases, only Japanese local governments along the coastline showed any interest. In 2002, 22 local governments, from Japan, China, South Korea and Russia, participated in the project. The survey has expanded its area to as

far as the coastal zones of the Yellow Sea.

Related organizations and NGOs

- Northwest Pacific Region Environmental Cooperation Center (NPEC) - Regional activity center of NOWPAP.
< <http://www.npec.or.jp> >
- The Academic Forum for Northeast Asia
< <http://www.joho-kyoto.or.jp/~acdfo/> >
- The Association for the Japan Sea Rim Studies
< <http://human.cc.hirosaki-u.ac.jp/jsrs/> >

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