7 Persian Gulf

Overview

The Persian Gulf is a shallow semi-enclosed sea between the Arabian Peninsula and Iran. It is bordered by Oman and the United Arab Emirates on the south, Qatar, Bahrain and Saudi Arabia on the west, Kuwait and Iraq on the north and Iran along the entire east coast.

The Gulf sits on top of the largest hydrocarbon reserve in the world, which makes this area extremely important for oil production and one of the most important strategic waterways in the world.

Location

Basic information

Surface area：260,000 km^2

Volume：9,100 km^3

Average depth：35 m

Maximum depth：> 100 m

Nature

< Background >

The Persian Gulf is separated from the Gulf of Oman and the open ocean through the Strait of Hormuz, where the narrowest point is only 56 km wide. From the Strait of Hormuz, the Gulf stretches northwest to Shatt Al Arab of Iraq over a distance of approximately 1000 km, its width ranging between 200 and 300 km.[1]

The western coast of the Gulf is bounded by vast desert plains, the northern coast by the river delta of Shatt al Arab and the eastern coast by extensive mountain ranges of Iran.

Climate

Since the Gulf region is surrounded by arid land masses, it has high seasonal and daily air temperature fluctuations. Air temperature can drop to 0℃ in winter and reach up to 50℃ in summer. The average air temperature in January is around 16℃ and in July around 35℃.[1]

Annual precipitation in the area averages 152 mm and is limited almost entirely to the winter months.[1]

Topography

The bottom topography of the Gulf is mostly flat and featureless, dominated by soft sediments. It is generally deeper in the southeast, where depths of over 100 m are found, and is deepest near the opening of the Strait of Hormuz. The western part of the Gulf is very shallow, with extensive intertidal areas that are less than 5 m deep and up to 5 km wide.[1]

Hydrology

The dominant water circulation pattern in the Gulf is counter-clockwise and driven by density gradients. Water of normal oceanic salinity enters the Gulf through the surface waters of the Strait of Hormuz, moves northwards along the Iranian coast, turns southward along the western coast and exits along the bottom of the Strait as dense hypersaline water[1]. This process takes between 1 and 3 years.

< http://oils.gpa.unep.org/framework/region-13-next.htm >

The major freshwater inflow (1,456 m^3/s) into the Gulf comes from the Shatt Al Arab, which is a combination of the Euphrates, Tigris and Karuan Rivers. Despite its large inflow rate, salinity is high in the Gulf due to low precipitation and high evaporation, and can reach up to 60 - 70 in some regions with limited water exchage.[1]

Water temperatures in the Gulf show high seasonal fluctuations. For example, the water temperature in the northwestern region can reach up to 35℃ in summer and drop to 15℃ in winter. Also, an unique temperature environment exists in the southern region, where southwestern monsoon winds (June ― September) generate upwelling along the western coast. The surface water temperature during this period can drop to between 16℃ and 19℃.[1]

< Surrounding environment >

Unique Habitats

A series of islands extending along the western coast have fringing and patch coral reefs, representing one of the most diverse habitats of the Gulf. Productive seagrass beds are found along the coast of Bahrain and Qatar. Some mangrove vegetation (approximately 90 km^2) occur along the southern coast of Iran.[1]

Rich Wildlife

Despite the extreme environmental conditions, a wide variety of marine life is found in the Gulf, including sea turtles, marine birds, dugongs, whales, dolphins and over 500 fish species. Many of these animals are endemic and heavily dependent on the Gulf environment.[1]

Some beaches are important sea-turtle nesting grounds, while the offshore islands are breeding grounds for many

Dugong
< http:funkman.org/animal/mammal/dugong.html >

seabirds, and the intertidal and shallow subtidal zones are important feeding grounds for migrating birds. Also the Gulf region is estimated to support over 7,000 dugongs, which makes the area second only to Australia in global importance for this species.[1]

▶Marine Protected Area

The Qarnein Island has recently been declared a marine protected area by the United Arab Emirates (UAE) Government. This is the first protected marine area in the Gulf. The island has a mixture of sand, rocks and corals around its shores, providing three types of shallow marine environments. The endangered green and hawksbill turtles nest on the beaches, and the island is also recognized as the most important breeding ground in the Gulf for various seabirds.

< http://www.panda.org/about_wwf/what_we_do/marine/news/news.cfm?uNewsID=5723 >

History and Culture

The Persian Gulf was an important transportation route in antiquity but declined in use with the fall of Mesopotamia. In succeeding centuries, control of the region was contested by the Arabs, Persians, Turks and Western Europeans. In 1853, Britain and the Arab sheikhdoms of the Persian Gulf signed the Perpetual Maritime Truce, formalizing the temporary truces of 1820 and 1835. The sheikhs agreed to stop harassing British shipping in the Arabian Sea and to recognize Britain as the dominant power in the gulf. These sheikhdoms thus became known as the Trucial States. An international agreement among the major powers in 1907 placed the gulf in the British sphere of influence.

Although oil was discovered in the Gulf in 1908, it was not until the 1930s, when major finds were made, that keen international interest in the region was revived. The Gulf oil fields, among the most productive in the world, have been extensively developed since World War II, and modern port facilities have been constructed. In the late 1960s, following British military withdrawal from the area, the United States and the USSR sought to fill the vacuum. In 1971, the first U.S. military installation in the Gulf was established at Bahrain.

The long-standing Arab—Persian conflict in the Gulf, combined with the desire of neighboring states for control of large oil reserves, have led to international boundary disputes. Iraq and Iran argued over navigation rights on the Shatt al Arab, through which Iran's main ports and most productive oil fields are reached. Iran and the sheikhdom of Ras al-Khaima contested ownership of the oil-rich islands of Abu Musa and Greater and Lesser Tunb at the entrance to the Gulf. Iranian forces occupied these islands in December 1971, infuriating Iraq. The much-contested rights over the Shatt al Arab led Iran and Iraq into an 8-year war in the 1980s. The security of the Persian Gulf countries was threatened throughout this war.

When Iraq invaded Kuwait in August 1990, the Persian Gulf was once again a background for conflict. International coalition ground forces were stationed in Saudi Arabia and neighboring gulf countries during the Persian Gulf war. Before Iraq was expelled from Kuwait in Febraury 1991, Iraqi soldiers set fire to over 500 Kuwaiti oil wells and dumped millions of barrels of oil into the Persian Gulf, causing an environmental crisis and threatening desalination plants throughout the area. The Persian Gulf's vast oil reserves make the area a continuing source of international tension.

< http://www.bartleby.com/65/pe/PersGulf.html >

Social Environment

< Population >

Approximately 15 million people live and work along the Gulf's highly developed coastline.

< http://oils.gpa.unep.org/framework/region-13-next.htm >

< Industry>

For the past three decades, the Persian Gulf region has experienced one of the world's highest rates of

economic growth, which is mainly due to the exploitation of abundant oil and gas reserves.

< http://www.unep.ch/seas/kapcap.html >

Other major industries in the region include manufacturing (fertilizers, chemicals, petrochemicals, minerals, plastic), oil refineries, agriculture (dates) and fisheries.[1]

Oil and gas industry

By far the most important and biggest industry in the region is oil production, with over 76 billion metric tons of recoverable oil and 32.4 trillion cubic meters of reserve gas in the region. About 25,000 tankers sail in and out of the Strait of Hormuz annually and transport about 60 per cent of all the oil carried by ships throughout the world. There are about 800 offshore oil and gas platforms and 25 major oil terminals in the region. Saudi Arabia produces almost half of the net oil export in the region.

< http://oils.gpa.unep.org/framework/region-13-next.htm >

Gas production is also an important and developing industry in the Gulf, especially for Iran and Qatar, holding the world's second and third-largest gas reserves (behind Russia), respectively.

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

Fisheries

The fishing industry in the Persian Gulf has been important since ancient times, but the per capita fish catch has been slowly decreasing. The decline is due to adverse climatic and ecological conditions and unsustainable fishing practices. Major target species include shrimp, Spanish mackerel and various percid fishes, but the abundances of these species are declining. Although pearl fisheries in the Gulf were famous in the past, they now operate at a fraction of the level of former times.[1,2]

Environmental Problems

< Current status >

The greatest threat to the marine environment of the Persian Gulf is oil pollution. Large numbers of offshore installations, tanker terminals, petrochemical plants and oil tankers operate in the Gulf. These operations spill vast amounts of oil and waste into the Gulf waters, causing considerable damage to water quality, habitats (mangroves, coral reefs, beaches) and marine resources.

Another major source of pollution comes from land-based activities, as the Gulf region has experienced a rapid rise in industrialization, population growth and urbanization. Major land-based sources of pollution include industrial effluents, coastal development (dredging and landfilling), sewage discharge and the disposal of solid waste.[1]

Oil pollution

Oil spills from oil tankers and oil-related industries have contributed extensively to the deterioration of the environment. Approximately 25,000 oil tankers navigate in and out of the Strait of Hormuz every year, and with all this oil being pumped and transported, the area's waters have become heavily contaminated with oil residues and tar balls. Roughly 2 million barrels of oil are spilled into the region every year from the routine discharge of dirty ballast waters and from the 800 or so offshore oil and gas platforms. The illegal discharge of crude and fuel oil by tankers has also been a major source of pollution.[1]

In addition to the routine discharges, an estimated 2 to 4 million barrels of oil were spilled into the Gulf during the Iran/Iraq war and a total of 6 to 8 million barrels were intentionally spilled into the Gulf and the Arabian Sea during the Gulf War.[2] The oil spill during the Gulf War is the largest spill recorded in human history; over 700 km of coastline from southern Kuwait to Abu Ali Island were smothered by oil and tar, killing many seabirds, sea turtles and other marine life. Although habitats such as rocky shores, sandy beaches and mangroves have shown dramatic recovery, widely distributed salt marshes are still heavily polluted and will take decades to fully recover.

< http://www.uni-regensburg.de/Fakultaeten/phil_Fak_III/Geographie/phygeo/forbarthgb.htm >

Land-based pollution

Millions of tons of industrial effluents are dumped into the Gulf shallow waters every year, with little or no treatment. As a result, high concentrations of heavy metals occur in some areas. For example, high levels of lead, cadmium and zinc were found in oysters, and the sediment contained high levels of cadmium, nickel and chromium in some regions. Also, eutrophication is common in some industrialized areas, where dense mats of filamentous green algae are observed and indicate high nutrient levels.[1]

Since the 1950's, the Persian Gulf region has become more reliant on desalination plants for freshwater supply. However, thermal pollution, waste brine and pre- and post-treatment chemicals pose a serious threat to the marine environment. Despite these problems, reliance on desalination plants is predicted to increase.[1]

The shallow coastal areas of the Gulf are being used as repositories for industrial, commercial and residential solid waste, including plastics, metal containers, wood, tyres, scrapped vehicles and oil sludge. Oil sludge represents 15% of the total industrial solid waste, and some of the sludge is inadequately contained.[1]

< Other Environmental Problems >

Destruction of habitat

To accommodate the expanding industries and increasing population, large areas of important and biologically-productive coastal habitats, such as intertidal flats, mangrove forests and shallow embayments have been altered or lost. By the early 1990's, some countries had developed more than 40% of their coastline, and significant proportions of the shoreline of Kuwait and Bahrain are now artificial.[1]

< Environmental Protection Measures >

Kuwait Convention and Action Plan

In April 1978, the 8 governments of the Gulf region (Bahrain, Iraq, Islamic Republic of Iran, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates) adopted the Kuwait Convention and Action Plan to counter activities relating to oil pollution, industrial waste, sewage and marine resources. Also, 4 protocols were adopted to address marine emergencies, hazardous wastes, land-based activities and sea-based pollution. To implement the Kuwait Convention, its protocols and Action Plan, the Regional Organization for the Protection of the Marine Environment (ROPME) was established in 1978. Also, the Marine Emergency Mutual Aid Centre (MEMAC) was established in 1982 to implement one of the protocols regarding marine emergencies. Since the establishment of ROPME, various projects have been carried out with the cooperation of international organizations such as UNEP and IUCN. ROPME also recognized the importance of developing and organizing various training courses on oil sampling, data handling, marine monitoring and so on.[1]

< http://www.unep.ch/seas/kapcap.html >

Activities of ROPME have been hampered by the ongoing war in this region and by lack of funding. Also, each country has their own national policies and legislation and some countries are not implementing adequate actions and measures to protect the marine environment.[1]

Monitoring program

Bahrain, Kuwait, Oman, Qatar and Saudi Arabia have monitoring programs dealing with marine pollution and routinely report the results to ROPME.[1]

Related organizations and NGOs

- Regional Clean Sea Organization — An oil industry co-operative organization aiming to protect the marine environment from oil pollution < http://www.recso.org/rec-whatisrecso.htm >

References

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