EFFECT OF OIL SPILL POLLUTION IN MALACCA STRAIT TO MARINE ECOSYSTEM

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Abstract: Tanjung Kukup is located in the Malacca strait which is an environmental sanctuary as a home to many species of birds and mangrove dwellers like mangrove crabs, beady-eyed mudskippers and crab-eating macaques. In recent years, the number of ships using the strait Mallaca has been increased and higher marine pollution rates have been recorded. The most important pollution in the marine environment and coastal waters is oil spill. This paper discusses the effect of oil spill pollution to environment ecosystem in Tanjung Kukup. It is found that most of the mangrove roots are already being covered by oil slicks. Oil spill can also be spotted at the rocky sea bank and near the seaside walk. Fisheries, agriculture, coastal tourism, and crops are also affected and other impacts of oil spills on marine fisheries such as loss of revenues for fishermen because of fouled nets or closure of fishing areas, reduction in fish stocks and tainting of fish tissue.

Key-Words: Oil Spill Pollution; Tanjung Kukup; Malacca Strait; Marine Ecosystem.

1 Introduction

Marine pollution caused by the shipping and oil industries is enormous. It was estimated 3.6 million tons of oil spilt into the sea annually, mainly as a result of shipping accidents involving oil tankers and deliberate flushing of tanks and engines as well as offshore and onshore oil well blowouts. The issue of marine pollution has taken an international dimension [20]. The most important pollution in the marine environment and coastal waters therefore is petroleum and its products.

In memorable cases of large scale pollution of the marine and coastal environments by petroleum include such tanker disasters in the North Atlantic sea route as the Torrey Canyon (1967) and the Amoco Cadiz (1978). Over 120,000 and 223,000 tons of crude oil were released into the sea off Cornwell (South West England) and the coast of Brittany (France), respectively.

The straits of Malacca and Singapore is one of the most important shipping channels in the world connecting the Indian Ocean with the South China Sea and the Pacific Ocean. The straits of Malacca and Singapore is recognized as one of the most economically, strategically and the busiest shipping lanes in the world. The straits remains as one of the world's most congested straits used for international shipping. The Malacca and Singapore straits have become a very important trade route. In 1993 and 1995, over 100,000 oil and cargo vessels traversed it each year, each day carrying 3.23 million barrels of crude oil through the straits. Approximately over 60,000 vessels pass through the Straits annually and recorded over 74,000 vessels in 2010, the straits play role in producing of shipping emission and contributed to air pollution.

The straits of Malacca and Singapore also rich in renewable and non-renewable resources, including productive coastal ecosystems, extensive capture fisheries, aquaculture, coastal tourism, mining and valuable natural gas reserves. Recently, shipping accidents occurred more frequently, which is attributed to heavy traffic in the straits with shallow, narrow channels and shoals. Despite these hazards, economic efficiency dictates that vessels continue to use the straits.

This paper discusses the oil spill pollution in the strait of Malacca. The purpose of this study is to see how the effects of the marine pollution on the environment biology and the law and enforcement by Malaysian agency at the straits of Malacca.The study is conducted by directly survey to Tanjung Kukup, Johor, Malaysia.

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2 Research Location in Kukup Johor

Tanjung Kukup is located in the strait of Mallaca which is in a narrow stretch of water lying between the east coast of Klein Karimun, Sumatra, Indonesia and the west coast of Peninsular Malaysia and it is linked to the strait of Singapore at its Southeast end as shown in Figure.1. Tanjung Kukup is geographically and ideally shadowed by one of the world's largest mangrove swamp island, which numerous fish-farms bob up and down on the surface of the Kukup Sea. The Tanjung Kukup is an environmental sanctuary, where the earth, sea, plant and animal life exist in complete harmony. This area is home to many species of birds and mangrove dwellers like mangrove crabs, beady-eyed mudskippers and crab-eating macaques.

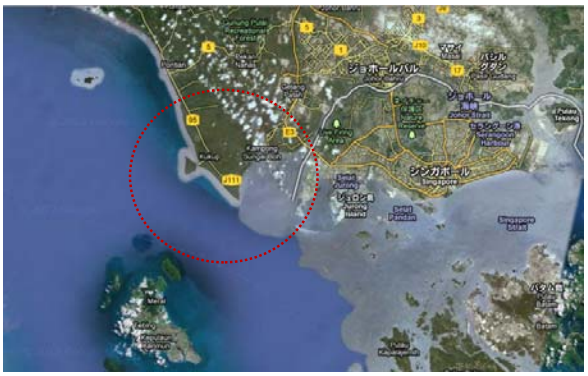

Figure 1: Survey location at the Tanjung Kukup, Johor, Malaysia.

3 Source of Marine Pollution in Kukup, Johor

The major sources of marine pollution were accidental oil and chemical spills. There were around 476 vessel accidents in the straits of Mallaca from 1978 to 1994. The sources of marine pollution happen in the normal course of operation of a vessel and of gas platforms or as a consequence of accidents. Vessel accidents are caused by collision or grounding of ships, accidental operational discharges and accidents. Kasmin S. reported that during the five-year period from 2000 to 2005, there were 144 cases of oil spills into the strait of Mallaca [4,5]. The most recent oil spill in the Singapore strait took place in 1997 with the collision of Evoikos and Orapin Global when an estimated 29000 tons of oil were spilled. In Sept 1992, tanker Nagasaki Spirit with a cargo of 40000 tons of crude oil collided with container vessel Ocean Blessing in the Malacca Strait and caught fire spilling oil into the sea. It was the potential beaching of oil on Pangkor Island and Langkawi Island.

Most of oil pollution incidents are operational discharges from normal tank operations. It usually happens during deballasting, oil tank and cargo cleaning, and operation of fishing boats and small vessels. The residue of oil in a tank is estimated to be 0.1% of its total load. Then these residues are washed off with sea water and eventually discharged directly into the sea [1,2]. An estimated two tonnes of oily waste are discharged daily into the Straits, mainly as a consequence of tanker ballasting [17]. From author's direct observation, quite many number of ships and oil tankers are near and can be seen from the shore in Tanjung Kukup, Johor shown in Figure 2. This number of ships and oil tankers are the major contributions of oil pollution in the study area.

Figure 2: Number of oil takers viewed from the shore

Small fishing vessels also contribute a large volume of oily discharge. The 10,000 small fishing boats operating in the Malaysian side of the straits of Malacca discharge around two tons of oil daily not included the small fishing boat from Indonesia side [1,2].

3 The Effect of Marine Pollution on Ecosystem in Kukup, Johor

In 1993, a collision between an oil tanker and an LPG carrier one mile from Sentosa Island, a popular tourist resort, resulted in a financial loss estimated at million dollar for the hotel business. Popular tourist destinations in Malaysia such as Pangkor, Penang and Langkawi, the sandy beaches of Port Dickson and Lumut and in Indonesia such as Batam and Bintan are also at risk. The fouling of beaches,

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coastlines and visitor facilities can have a negative effect on tourism. At the study location in Tanjung Kukup, Johor, Malaysia, oil pollution can be spotted along the beach. In Figure 6, most of the mangrove roots in the area were already being covered by oil slicks as shown in Figure 3.

Figure 3: mangrove roots covered by oil slicks.

Tar pollution has exceeded the UNEP standards in the Pantai Pasir Panjang, Perak, the Tanjung Rhu, Kedah in Malaysia and in the Kepulan Riau islands in Indonesia, which lie 16 km south of Singapore. Beaches are considered to be polluted when tar levels reach 10 grams per meter of shoreline. Recent studies also show an increasing sulfur deposition in areas bordering the straits of Malacca, mainly from shipping emissions. Tar balls can be seen along the beaches lining both sides of the strait of Mallaca. The tar ball can be spotted during the study conducted in the study area. As shown in Figure 4, there are quite a few tar balls along the shoreline near the mangrove area. There are quite a few tar balls along the shoreline near the mangrove area. Most of the fish landings on the west coast Peninsular Malaysia are associated with mangrove. It provides an important breeding ground for many fish, crab, prawns, and other marine animals. This uncontrollable marine pollution will damage the ecosystem in Tanjung Kukup.

The oil spill incidents can have a serious impact on the fragile ecosystem of the strait of Malacca, especially the intertidal zone. Recovery of mangroves affected by major oil spills can take many years between 50 to 80 years. Fisheries, agriculture, coastal tourism, and crops are also affected and other impacts of oil spills on marine fisheries. This includes loss of revenues for fishermen because of fouled nets or closure of fishing areas, reduction in fish stocks, tainting of fish tissue and consumers refusing to purchase fish products from affected areas.

Figure 4: Tar ball found in the mangrove roots.

Figure 5 shows that the effect of oil pollution on marine ecosystem at the location were already in serious conditions. Black oil can be easily spotted at the mangrove roots in most places. Mangrove tree protective value is sometimes overstated. Wave energy is typically low in areas where mangroves grow, so their effect on erosion can only be measured over long periods of time. Their capacity to limit high-energy wave erosion is limited to events such as storm surges and tsunami.

Figure 5: Oil pollution in mangrove area.

Figure 6 and Figure 7 show that the mangroves roots effect by the oil slicks. The roots will slowly decay and this will contribute to the death of mangrove tree itself. The mangrove tree is very important to the ecosystem at the area as it helps to protect the coastline and preventing erosion. Over time, the roots can collect enough debris and mud to extend the edge of the coastline further out. Mangrove forests are teeming with life. Shorebirds, crab-eating monkeys, and fishing cats all make the mangrove home. Mangroves provide a safe haven

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and a nursery for a variety of fish, birds, crustaceans, and shellfish. The aquaculture industry of cockles, oysters, and mussels is also particularly vulnerable to damage from oil spills. For example, the aquaculture industry in Malaysia was expected to lose an estimated RM66.5 million (US$26 million) as a consequence of an oil spill in Johore [17].

Figure 6: Decay mangrove roots.

Tanjung Kukup area also one of the tourist spots in Johor. From Figure 7 and Figure 8, oil spill can be spotted at the rocky sea bank and near the seaside walk. This oil spill will leave a bad impression to the tourist visiting the area. If no prevention in the future, the amount of tourist visit will surely decrease and the income of local people which depend on the tourism industry will surely drop.

Figure 7: Near the rocky sea bank.

Figure 8: Seaside walking area.

4 Conclusion

As a conclusion, the existing environmental issues and potential environmental treat at the strait of Malacca demand serious consideration. The shipping community should also shoulder the cost of marine environmental protection. With the increase the sea traffics and activities in the strait of Mallaca, the Malaysian government will be unable to subsidize the cost of maintaining the strait without the help of the users.

The importance of mangrove forest at the area should also be noted. This is because mangrove forest can protect coastal areas from erosion, storm surge especially massive hurricanes, and tsunamis. The mangrove massive root systems are efficient at dissipating wave energy. The mangrove forest is a natural barrier against erosive wave action and strong coastal winds will become extinct if no effort to protect the mangrove ecosystem pollutions.

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