The Impact of Oil Spills from the Pontoon 300 Incident on the Marine Ecosystem

Shigeyasu Tamaei
Aquaculture Expert
Japan International Cooperation Agency

In general, the impact of oil spills on the marine ecosystem can be divided into physical and chemical ones. The physical impact is that oil directly affects marine life in the process of its floating on the sea surface, settling into the seabed, or stranding on the shoreline and is conspicuously visible. Marine life covered with oil suffers respiratory failure and dies of suffocation. Because such marine life performs branchial respiration by taking dissolved oxygen in water through the gills and can hardly respire by their being covered with oil. Similarly, when sea surface and beach are covered with oil, the oxygen supply from the atmosphere is cut off, suffocating and killing the organisms living there such as fish eggs, fry, zooplankton, crabs, shellfish and clam worms. Phytoplankton, seaweed, and corals are also affected when the oil slick cuts off the light.

The chemical impact appears in some marine life when harmful substances in the oil dissolve in the water and are accumulated in them through branchial respiration, or when they also prey on small marine organisms in which those harmful substances have been highly concentrated. This impact is very difficult to be detected because the disorders occur internally after some periods of time. Especially when shellfish ingest plankton that have taken toxic substances, the amounts of accumulated toxic substances can rise to extremely high level, which is not detectable by their appearances. When toxic substances are accumulated in some fish, their internal organs tend to be damaged, particularly the liver and ovaries. Since the oil did not stay in the fisheries for such a long time in this incident, the physical impact was considered higher.

When the oil spill occurred, the fish swam away to safe waters, avoiding the spilled oil and the fish-eating sea birds did not stay in the contaminated area because they can not find food. The marine life being damaged were those unable to swim such as plankton, fry and fish eggs, and those living in the sands and rocks such as the shellfish, crabs and clam worms.

The stranded oil on the coast seriously damaged the mangrove ecosystem that comprised the coastal ecosystem in the area. Mangrove forest waters provides

productive habitats for an abundance of tropical marine life, including fry, young shrimps, young crabs and young shellfish. The waters are especially shallow, and the spilled oil even covered the exposed seabed at the low tide. Thus, the entire ecosystem from underwater to the seabed soil was affected. Physically speaking, the impact on the mangrove forest with the stranded oil is that leaves and aerial roots essential to the respiratory processes are covered by oil, and photosynthesis and respiration are prevented. The oil covering the aerial roots is easily washed away by the ebb and flow of the tide, but the oil adhering to the leaves and trunks can not be easily removed. The younger and weaker trees covered entirely with oil gradually get worse to die off from suffocation. Fortunately, many of the bigger and stronger trees are able to shed their contaminated leaves to reduce their stress and survive only with the leaves that remained clean In the upper position. The oil pollution this time killed the marine life under the mangrove trees as well as young mangroves themselves, but many mangroves have still survived with their leaves sparsely remained. With the survival of the forest, the damaged ecosystem is certain to recover in the near future.

It is a rapid recovery of oil that we should take first in case of an oil spill. This is the response to minimize damage to the marine ecosystem mentioned above and it is essential to increase equipment for oil recovery. Oil spills generally occur in rough weather, so recovery operations are often delayed. However, it is true that even partial efforts for recovery can reduce the negative impact on the marine ecosystem. If surfactants and dispersants with minimal environmental impact were to be used, the negative impact on the ecosystem could be largely reduced. The use of surfactants is prohibited along the coastal waters, but people might nonetheless be tempted to use such strong chemical agents to avoid charges of delays by mass media and local residents. Yet, in view of the chemical impact on the life of the residents and the ecosystem, this prohibition should be strictly observed. With dedicated efforts for recovery operations and enough compensation for damages, local residents and volunteers can effectively join the operations, and there will be a better chance of restoring the trust of the local community.

The removal of the oil we failed to recover and of the chemical impact on the ecosystem should be left to nature's own decontamination process. This natural process has proceeded far more quickly than we expected in our laboratory investigation. Fish and crabs started to return to their habitats in the water channels of the mangrove forest at Umm Al Qaiwain about five months after the spill. As of October, the mangrove ecosystem has been almost completely restored. This phenomenon tells us that the Great Sun and the Mother Sea work together to clear up our mistakes.