

Module # 4 Environmental Protection & Conservation and related laws

Recreational diving is primarily depending on exploiting the marine ecosystems. The Red Sea offers a great opportunity to explore a high variety of marine life. This marine life, being basically part of the natural resources, is very sensitive to bad behavior.

Natural resources can be renewable, which means they have a certain recovery rate after being subject to exploitation. This is the case of living organism such as coral reef and fish. On the other hand, non-renewable natural resources do not have a recovery rate, which means they are subject to depletion when subject to exploitation. Minerals such as iron, copper and gold are examples of non-renewable natural resources.

○ **The different marine ecosystems:**

Ecosystems consist of living creatures and minerals functioning together as one mutual, often very complex interaction.

Ecosystems can be marine like coral reef, terrestrial like rain forests, or both like mangrove swamps.

In all ecosystems, the energy flows from one species to another through what is called a food chain. An example proper to the reef ecosystem are planktons being eaten by fusilier fish, which in its turn is being eaten by jack fish, which in their turn is attacked by sharks.

There are 3 major marine ecosystems in the Red Sea:

- Reef ecosystem: Composed mainly of corals which are lime stone skeletons built by a minute animal called a polyp. The polyps have the ability of producing enough food to sustain the population of creatures constituting the ecosystem.
- Seagrass ecosystem: Another productive ecosystem, which can sustain another population of different living creature
- Mangrove ecosystem: Less found in the Northern Red Sea, it is also very productive and help maintain a high biodiversity around it.

○ **The impact of tourism on the ecosystem due to bad practices:**

Like any other human activity, tourism can badly damage the ecosystem, especially when taking place in an arid zone like the Northern Red Sea where fresh water is scarce, therefore nutrition is not abundant making the recovery rate very slow.

Of course, other activities can be very harmful to the environment, like the oil extraction, which can lead to catastrophic spills. But when it comes to tourism, especially in the Northern Red Sea where it is primarily depending on the marine ecosystem, special care should be taken to protect it and stop bad practices.

Among the bad practices are:

- Landfilling: It produces a high amount of sand particles sedimentation on the coral reef, thus strangling it.
- Sewage water discharge in the sea next to the reef: Be it from hotels or from boats, it helps the growth of algae, which will also cover the corals, denying them solar energy and leading to their death.
- Solid & organic waste discharge: It can directly affect marine life that may feed on it. This will change the fish feeding regime, causing the fish to become ill or changing their behavior, or even choke on it.

- Breaking corals by the use of inadequate mooring systems or by the misbehavior of careless divers.
 - Harassing marine life: Again, because of the aridity and the scarcity of food, the marine life is very sensitive to harassment. Fish in general will not have enough energy to keep on running away from divers who are behaving like predators.
 - Another form of harassment is the use of speed boat to run after dolphins or other marine mammals.
 - Building hotels next to the fringing reef: The clients, who do not have a proper sandy beach allowing for safe entry and exit, will step on corals to have access to deep water.
- **The different types of boat waste and best way of disposal:**
Any operating diving boat will produce 4 different types of waste:
- Solid waste: Including paper, cardboard, plastics, metal cans, used filters, rubber, etc. These have to be stored on board in bags and disposed in the designated garbage collecting bins at the ports reception facilities.
 - Organic waste: Mainly comprised of food leftovers. Disposing organic waste next to the coral reef or on top of sea-grass sites can be very harmful for these ecosystems. It may be disposed of in the sea but far away from coral reef or shoreline. Such a safe distance is not to be less than 3 nautical miles.
 - Grey and black water: These are the sewage discharge being stored in the holding tanks. Like organic waste, it should never be discharge but away from coral reef and shoreline.
 - Bilge water and oil: Bilge water is the result of water infiltration inside the boat hull. It can be discharge back to the sea by use of bilge pumps but only after making sure it does not contain any polluting liquids. Oil produced from draining the machine lubrication systems should be stored in jerry cans to be disposed of at the ports reception facilities.
- **Fishing and overfishing:**
- Fishing activities have been taking place in the Northern Red Sea since prehistoric times without disturbing the ecological balance, until the start of tourism. During the past two decades, depletion of fish stock was witnessed and at an accelerated rate.
 - The reasons behind this depletion are mainly the high demand created by the increase human population, and the aridity of the Northern Red Sea.
 - It was explained previously that due to this aridity, nutrition is scarce in the water. This is due to the lack of suspended particles that may be produced after floods caused by rainfall. These suspended particles are the main source for plankton proliferation. As we have seen before, plankton is at the base of the marine food chain.
 - Areas like Southeast Asia or even Southern Red Sea receive heavy rainfalls on yearly basis. This induces high level of nutrition in the water thus renewable abundant stock of fish. In such case, and due to this high productivity, the ecosystem recovery rate is high, offsetting the intensive fishing activities.
 - Considering the low level of nutrition in the Northern red Sea, fishing activities must be regulated to be offset by the low recovery rate.

- Would the fishing activities surpass the recovery rate, the fish stock starts to be depleted, this is called overfishing.
 - The main energy producer in the Northern Red Sea is the coral reef. Most of the marine life is concentrated around the reef. In the blue, life is nearly non-existing. This is why the coral reef in the Northern Red Sea is often compared to the oasis in the Grand Sahara.
 - Overfishing is a problem that has to be tackled immediately. Its effect can be disastrous on both the fishing business and on the diving business. When fish stocks are depleted, certain species maybe close to extinction. And even if they are only endangered, it will take long time for the normal population to achieve full recovery.
 - Regulations to prevent overfishing include stopping fishing activities in the reproduction season, and the ban of use of small mesh size fishing nets.
 - From the dive operator point of view, fishing activities on the dive sites are not compatible with the business of diving, simply because it will decrease the sites quality.
 - On the other hand, it is important to stress on the fact that the dive operators are working with a license issued by the Ministry of Tourism. This license does not cover fishing activities. Therefore dive operators should abstain from selling or conducting fishing activities to avoid being penalized by the Ministry of Tourism.
 - Last, dive operators should encourage fishermen to abide to the “catch and release” of certain endangered species like sharks.
- **Mooring issues:**
- Throwing anchors or tying steel wires around corals can be very damaging to the ecosystems, be it reef or sea-grass.
 - Moorings are permanent installations that help boats to hold in place at a certain dive site without throwing anchors, with the main goal of reducing the impact on the ecosystem.
 - A mooring system consists of an anchoring element, a mooring line, and often a marker buoy.
 - The anchor element can be a normal but heavy metal anchor, a concrete block, an embedded metal plate or rod, or a group of any of the previous elements.
 - The mooring line can be a chain, a rope or a combination of both.
 - The Egyptian Environmental Affairs Agency has adopted two mooring systems to be used by dive operators’ boats: One for mooring on sandy sea floor, and one for mooring on flat or fringing reef.
 - In case of a sandy sea floor, the used anchoring element is what is called a “manta ray” which is a flat metal plate driven in the sand at a certain vertical distance, which is once pulled upward will rotate into a perpendicular lock position. This plate is connected to the mooring line through a metal chain. At surface, a buoy marks the end of the mooring line.
 - For mooring on flat or fringing reef, the used anchoring element is called a “pin”, which is more suitable for drop-off sites providing the corals present a solid base for this kind of system. It consists of a pin, which is metal rod of a certain length, embedded in the coral with the aid of a special grout. To the pin head is attached the mooring line, which in its turn is made out of a floating rope.

- Good practices are important to keep the mooring system in working conditions for a long time.
 - For example, when using a manta ray mooring line, the boat should be at least at a horizontal distance from the manta anchor equal to 3 times the depth. This is to avoid vertical pull on the manta element, which can lead to pulling it out of the seabed.
 - Also, using a rope that is thicker than the pin mooring line can break the pin or the corals around it.
- **The concept of ecotourism and sustained development:**
- As previously described, when using natural resources, human activities in general have a damaging effect on the surrounding ecosystem.
 - Sustained development is based on meeting human development goals in terms of boosting economy and achieving better standard of living, while allowing the surrounding ecosystem to recover its natural resources that have been damaged due to this development.
 - Thus, to achieve a sustained development, the use of the natural resources should always remain within the recovery rate limits. This can only be accomplished by lowering the development impact by abiding to environmental protection rules and regulations.
 - Like other human activities, tourism has its impact on the ecosystem. Mass tourism especially has a severe damaging impact. In the past few decades, a new form of tourism emerged. It is called Ecotourism, which is intended to have a low-impact, hence allowing sustained development.
 - Ecotourism involves visiting fragile ecosystem like the Northern Red Sea coral reef but with the chief goal to keep it undisturbed in what can be close to pristine conditions. To reach this goal, the main strategy is to educate the visiting tourists to minimize their impact, but also to limit the number of visitors. By following this strategy, the demand becomes higher than the offer helping the operators achieve better profitability.
 - In the case of Northern Red Sea diving operators, it maybe debatable which forms of tourism is more profitable, mass tourism or ecotourism. However, and on the long run, mass tourism may lead to the ecosystems' exhaustion and to the slow death of the recreational diving business.
- **The concept of reef carrying capacity:**
- The concept of carrying capacity is one that addresses the need to maintain development and activities at a level that is both ecologically and socially sustainable.
 - This concept is relatively new as it first appeared in the 1980s when the tourism impact started being noticed on certain frequently visited sites.
 - It is defined as the capacity to accommodate visitors without damagingly affecting the marine environment, which will lead to a decline in visitor satisfaction.
 - Several studies have been undertaken on recreational dive sites. It was found that in average, a diver would get incidentally in contact with the coral reef 7 times during the dive.
 - Therefore the reef carrying capacity is the edge limit for visitor use and consequent incidental damage that the coral reef can sustain without being degraded.

- There are several factors affecting the reef carrying capacity, including: size and shape of the reef, composition of coral communities, depth, current, visibility, level of experience of divers, accessibility and attraction.
 - Consequently, the carrying capacity will differ from one site to another. But in average it was found to be in the range of 20 000 visits per year.
- **The concept of zoning:**
- Following the previous studies of reef carrying capacity, it was found that sites could be categorized as very resistant, relatively resistant, relatively sensitive and very sensitive.
 - Because one of the main affecting factors in the reef carrying capacity is the level of experience of the divers visiting a specific site, it would be recommended to assign the most sensitive sites to highly experienced divers, while keeping the more resistant ones for beginners.
 - Therefore, when it comes to a certain resort where a variety of dive sites can be found, and for the interest of conservation, zoning is the process of assigning different sites to different level of experience divers according to the site's sensitivity.
- **Law 102 of 1983 & law 4 of 1994**, overview of the main concerning articles:
In 1983, Egypt adopted law no.102 to regulate the national parks, which was followed by law no. 4 in 1994 to protect the environment.
- Law 102, article 2: It is prohibited to undertake any works, actions, activities or procedures that causes destruction, damage or degradation to the natural environment, or harms terrestrial or marine life or vegetation, or diminishes its attractiveness level, within the national parks.
 - Amendment to Law 102, article 2: it is strictly prohibited to hunt, transport, kill or disturb any living creature terrestrial or marine, or otherwise undertaking actions that lead to their elimination. This also applies to any organic material including shells, corals, rocks, or soil for any purpose.
 - Law 102, article 3: It is prohibited to damage or destruct any geological, geographic or area considered being a habitat to animal or vegetal species or to its reproduction. It is prohibited neither to introduce foreign species into a national park, nor to pollute its soil, water or air by any means.
 - Law 4, article Law 37: it is prohibited to dispose of or burn garbage or solid waste but in the designated facilities, which are far from any residential, industrial, agricultural area, or water ways.
 - Law 4, article Law 58: Every ship owner or captain has to keep a special oil book where the person in charge shall document all oil process operations.
 - Law 4, article Law 90: Any person who has disposed of oil or oil mixture in the territorial waters or the exclusive economic zone will be punished by a fine not less than 150 000 LE and not more than 500 000 LE. However, if the same person repeats the same violation, the punishment shall be a detention plus the above fine. In all cases, the violator will have to eliminate the pollution or the authorities will do it on his expenses.
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