# CERTIFICATE COURSE ON RESOURCE ON RESEARCH METHODOLOGY



## IMPACTS ON THE MARINE SYSTEM

Sayuri Peries 30th December, 2016

### Acknowledgement

Firstly. I would like to express my gratitude by thanking the Alexis Foundation for providing me with a golden opportunity to do this project, on the topic based on Marine Biology. As it has helped me in engaging myself with ample research materials, related to many Marine related topics.

Secondly, I would also like to thank my family who encouraged me to continue and complete this project within the limited time given.

This book is based on the many aspects of Marine Biology and research found on many journals, magazines and Internet sources.

~Sayuri Peries.

Dedicated to my future self, who will find use of the gathered materials.

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Foreword

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The insights of various behavioural patterns and interactions of marine organisms and the environment is known as **Marine Biology.** Oceanography and ecology are some of the well-know areas of Marine Biology.

Sampling of organisms, reefs and habitats are mainly observed by deep sea/scuba diving, boat based analysis and also the usage of waterproof cameras.

**Aristotle** is often referred to as the Father of Marine biology. In fact he is the first to record observations of marine life in the fourth century.

However, the first person to create dependable statistical data and tests on marine fauna and flora was Captain **James Cook**, who was a British explorer and a Captain in the Royal Navy.

Furthermore, more scientific research were conducted by scientists such as Charles Darwin and by many famous expeditors. Soon these investigations lead to the the growth of marine laboratories.

Currently there are less than 2% of the earth's oceans are being protected. Most protected areas are under the United Nations. Meanwhile the rest of the Marine Protected Areas (MPA) are similar to National Parks.

#### Resources

Most occupational opportunities are attributable to the presence of oceans and the recourses gifted by the heavenly bodies.

- → The shellfish and fish provide a food for a massive community around the world.
- → Macroalgae and microalgae are used to manufacture biofuels, bioplastics and as ingredients for pharmaceutical industry. Certain species are edible and used in many oriental dishes.
- → Ocean views attract tourists, strengthening local economies and provides an ideal environment for recreational activities.
- → Seas provide a medium for transportation where heavy ships carry international cargo and aids in importing and exporting business goods between countries.
- → Deep Sea Mining, where the ocean floors are mined to extract metals (such as nickel and cobalt) and crude oil.
- → Sea floors provide an ample amount of sand and gravel, which are used in the construction industry.
- → Ocean waters play critical roles in most gaseous cycles and absorbs excess heat from the atmosphere.
- → Most of the carbon dioxide emitted into the atmosphere are absorbed and stored by the ocean waters.
- → Therefore, plays a crucial task in regulating the Earth's climate.
- → Waste has been disposed into the seas as certain marine creatures are able to detoxify the sewage released.
- → Oceans provide a habitat for organisms who live in the marine ecosystem. It is where marine mammals and other organisms breed and populate each species.

### **Corruption & Effects**

★ Overfishing

Fish are a rich source of protein and many people rely on these creatures for sustenance. A study of catch data published in 2006 in the journal Science grimly predicted that if fishing rates continue apace, all the world's fisheries will have collapsed by the year 2048.

National Geographic

Overfishing occurs when the extent of fish caught is inversely proportional to the amount of fish that can replace the loss by breeding.

The depleting amount of fish in the oceans are mostly due to the overfishing. Most fish stocks, in the seas, are reduced below average levels. These conditions have led to losing certain species and endangering other barely existing species.

Overfishing, itself could be the cause of the collapsing of an ecosystem. Fisheries companies are aware of the threats caused to the fish populations. However, illegal fishing and poaching still exists.

★ Air / Ship Horns

Ocean traffic causes harm to the ocean inhabitants as much as poachers and fishermen do. The commotion caused by the loud air whistles interrupts the mating calls and echoes used by cetaceans and other marine creatures. The loud noises which interrupt mating calls could be a major cause for depleting marine mammal populations.

★ Ship strikes

The ocean traffic injures mammals, when vessels collide with whales and vice versa. These strike are frequently to be expected in the future, due to increasing traffic. There has been many strikes that have not been reported across the globe. Since 2009, there has been over thousand strikes reported.

It is proven that the reason for the premature death of manatees and the disappearance of North Atlantic Right whales are ship strikes. Some strikes have left alarming injuries on whales, as they have barely managed to escape similar strikes.



### ★ Military Activities

Submarine and ship activities related to military activities use low frequency sonars, similar to cetaceans who use bio sonars. These test signals gives false alarms for many creatures and isolates them from their herds. The interferences of submarines also causes commotion and disturbs the breeding, feeding and resting grounds of many species. Further studies prove that, military exercise distress most cetaceans.

### ★ Whaling

Whales are constantly being poached for meat, oil and blubber since the 3000 B.C. Many whale species such as orcas and humpback whales are held captive for recreational and scientific research purposes.

Since the 1990's, whaling has been practised by many communities around the globe. Japan, Norway and Iceland being frequent to be reported for whaling activities due to their traditional aspects. Allowing the trading of whale meat internationally, could cause a rise in whaling.

## ★ Trawling

Using open nets and trawlers while hunting for massive shoals of fish, countless numbers of other organisms could be tangled in these giant nets. Due to the by-catching of other animals, most turtles and seals are traumatically injured.

In 2003 it is confirmed that most whales, dolphins and porpoises are killed by gill nets. By-catching has been announced illegal by the International Union for Conservation of Nature, as it poses great threats for the survival of cetaceans.



★ Farms

Fish farms usually occupy the shallow areas of the

seas. These areas play important roles in the life-cycles of cetaceans. For instance, Dugongs feed and breed mainly in the shallower areas.

The toxic wastes and bacteria from the farms are either washed into the ocean waters or left to settle on the shallower areas. Fish farms mainly pollute the seabeds These toxic releases could affect certain fish populations and causing imbalances in the marine food chains and webs.

★ Sewage Release

Gallons of raw untreated sewage are released into the marine ecosystem through pipelines. These sewage contaminate ocean floors and waters. Most of these are buried in the deep seas and are consumed by organisms when resurfaced.

Plastics and other marine debris which stay afloat on the water surface are consumed by seals and turtles. As they have are unable to distinguish between a floating bag and a jellyfish, turtles consume these plastics which settle in their systems leading to death. Seabirds, preying on fish for their nutrition, fall victim to beer can holders floating on the water surface. The tangled material around their necks suffocate these victimized creatures.

The contaminated toxics contain heavy metals and plastics accumulates in each organism and spreads through each consumer in food chains.

★ Contaminated Air

Due to deep sea mining and burning fossils, the metal concentrations in the oceans have gone haywire.



Liquid mercury is slightly volatile and known to have an immense impact on the neurones in the brain. Organic mercury, formed by the combustion of fuels, causes to accumulate in most creatures and passes along the food chains.

Mercury settled in the bodies of fish, cetaceans and also birds influences not only neurologically, but also their reproductivity. Studies have proven that other effects of mercury such as blindness, sense of smell and damaged gills.

Pollutants in the contaminated air are transported towards the Arctic regions by ocean and air currents. These chemicals are converted by microorganisms, who are eventually consumed by larger fish, hence passing along the entire food web.

★ Oil Spills

Perdido, is one of the deepest oil rigs drilled in the Gulf of Mexico by the Shell company. It lies nearly 8000 feet deep in the ocean and is as tall as the eiffel tower. The rig is capable of extracting roughly a hundred thousand barrels of oil per day.

Rigs are not the only source for oil spills, due to the increased ocean traffic there are increasing amounts of oil trails left behind by vessels. During accidents and storms, oil seeps into the waters through damaged tanks.

The damage done by these layers of oil. Feathers of birds, who dive into the oil suspended waters for their daily nutrients, are covered in the sticky fluid. Feathers dry up and is caked together, unforgivingly stealing its ability of flight. The blowholes of whales are blocked by layers of accumulated oil. Therefore suffocating the cetaceans. Fish, turtles and seals whose skin, scales and fur are coated with oil too restricts locomotion.

Many organisms consume oil layers and oil smeared plants or fish. The consumed oil accumulates in their systems and eventually cease to function.

The layer suspended on the surface on the ocean waters due to its low density properties, blocks sunlight and critical gases such as oxygen and carbon dioxide from dissolving. These actions lead to suffocation for marine flora as well as fauna.

★ Climate Changes

With the rapid approach of global warming and depletion of the ozone, due to the emission of greenhouse gases, the ultra-violet rays directly affect the marine ecosystem. Many reefs are bleached and as the the oceans absorb most carbon dioxide in the atmosphere, ocean waters have been acidified, killing many useful bacteria, algae and shoals of fish.

The higher temperatures constantly reducing the areas of glaciers and jeopardizing life in the Arctic regions. These temperature changes have also vastly affected the breeding patterns of many organisms, resulting in the population decrease of many species.



#### Conclusions

The effects humans pose to the marine ecosystem are reversible. It is unavoidable to cease fishing as, most of the protein requirements for human growth is distributed by fish.

However, limiting the amount fish caught per day could drastically make an impact on the fish stocks. Passing laws, with heavy penalties over poaching and trawling could potentially save many species from going extinct.



Overfishing has been considered a global disaster. When fishing, certain species should be relieved for time periods to breed and repopulate. This process would reduce the chances of the species being pushed to extinction. In the fields of fisheries, most management is controlled by the Government. These officials are at times pressured by economics, therefore, to avoid the amount of boats sailed to hunt for seafood and the number of fish caught daily should be left to be assessed and controlled by scientists.

Shallow areas used for fish farms should be registered and restricted. The waste released should be carefully handled as to prevent water pollution. Delicate sea floors, coral reefs and untouched ecosystems should be protected at all costs. This would preserve the areas for a longer time.

Open-net fishing and trawling should be reduced to a minimum. Only experts should be allowed to handle massive nets. Underwater sensing systems should be improved to recognize illegal activities and trawling. Gill nets should be stripped off its use, as these nets are designed to trap fish who try to escape by tangling from their gills. Gill nets pose greater threats to cetaceans and turtles compared to fish. Sea-traffic is mainly caused by military activities and importing or exporting goods. The transportation of cargo by seas are critical as it is highly convenient. Military activities are inevitable as safety of regions are critical. It is only precise to follow the rules and regulations to minimize ocean traffic to a minimum.

Marking areas where species gather and ecosystems are located to avoid commotion and using routes to avoid fish populations could drastically minimize collisions of vessels and marine organisms.

Whaling has been a heated topic recently. It has been pointed out and documented by the National Geographic and many other environmental documentaries, the number of whales killed by poachers and governments who abuse the scientific rights for whaling.

Japan has been criticized for hunting hundreds of Minke whales in 2016. Roughly, four thousand tonnes of whale meat is consumed per year, only in Japan. Passing heavy penalties for those who engage in whaling activities and limiting access to equipment for such activities should be banned and restricted.

By holding campaigns and many other activities, society should be exposed to the dangers humans have contributed to the marine ecosystems. Educating people regarding the depleting populations in the oceans and the long term effects caused. Releasing Sewage into the ocean floors due to convenience, should be ceased and reconsidered. Although raw sewage is harmful due to the presence of toxic waste, when rid of these toxins, sewage water could be used in algae farming.

The Nitrogen, Phosphorus and Potassium compounds are critical for plant growth, hence, it provides an ideal medium for the algae growth. These algae farmed could be processed to extract biofuels and replace the usage of fossil fuels. Algae extract is also reveals a significant role in the pharmaceutical industry. Sea lettuce, seaweed and kelp are dishes rich in dietary fibre and are a critical ingredient in oriental dishes.

Labourers involved in oil rigs should take extra precautions and highly qualified peopl. As oil is a low density fluid which poses a threat to the existence of marine life. The oil should be handled precisely and the surrounding environment should always be cleaned after rigorous activities. Reducing the usage of these extracted oils and finding environmentally friendly solutions to replace natural gases and fossils should be thoroughly considered.

Land activities directly influence the marine life, as both land and water share the same atmosphere. The polluted air causes imbalances in the composition of gases.Due to these ins and outs, it is important to reduce the toxins released into the air. Minimising air pollution could reduce global warming, ocean warming, coral bleaching as well as ocean acidification.

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