

Marine ecosystem essay sample

[Science](#), [Biology](#)



The earth's oceans provide an enormous range of resources and affect the quality of life as we know it. The oceans cover approximately 70 percent of the surface of the earth and have a cyclical effect on weather, e. g. temperature, precipitation and air quality. Regardless of your views on global warming, the fact remains that humans have an impact on the marine ecosystems through waste from chemicals and debris polluting this vast renewable resource. Based upon current scientific evidence, emissions of greenhouse gases from human activities are projected to cause significant global climate change during the 21st century.

Such climate change will create novel challenges for coastal and marine ecosystems that are already stressed from human development, land-use change, environmental pollution, and over-fishing. (Eileen Claussen, 2002) Ocean and coastal marine systems are also affected by changes in climate, through increases or decreases in water levels. When water levels are altered naturally or unnaturally, nutrients and oxygen levels vital to the maintenance of marine organisms, are changed. A myriad of marine species including some birds, are impacted by the availability of marine food sources and will have long term implications regarding freshwater and seafood supply for humans as well as animals.

Due to increases in CO₂ introduced into the atmosphere, resulting climate changes will cause additional stresses on oceanic circulation. CO₂ levels have been estimated at double the earlier measurements of pre-industrial periods. These CO₂ increases also lower the pH in ocean waters, thus creating negative effects on the organisms' habitat. Add to this, the level of oxygen being reduced in the water and the biochemical changes, marine and

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aquatic species are forced to migrate for survival or potentially be eliminated.

Acid rain is caused by natural sources, such as, volcano eruptions and decaying vegetation, as well as unnatural sources from auto and industrial emissions, among other reasons. These emissions deposit nitric and sulfuric acids into the atmosphere, which in turn fall back to earth once mixed with precipitation. (Acid Rain, 2007) Oceans, lakes, rivers and streams are impacted by these chemicals along with the surrounding land and vegetation.

Humans, animals, plant and marine life all have a symbiotic relationship with the environment. Imbalances created by human over population and industrial activities, will imposed biochemical influences on atmospheric and marine systems and their sustainability.

There are three major classes of marine life; Plankton, nekton and benthos. Plankton is typically microscopic organisms, Nekton is bigger organisms such as fish, whales, and turtles, and benthos are bottom dwellers. As per the first law of thermo dynamics:” An organism may absorb energy from its surroundings, or it may give up some energy into its surroundings, but the total energy content of the organism and its surroundings is always the same. An organism can’t create the energy it requires to live. Instead, it must capture energy from the environment to use for biological work, a process involving the transformation of energy from one form to another.” What this means in the marine ecosystem is that whether the organism is a Plankton, Nekton or Benthos they cannot make energy from nothing but

must catch energy and transfer it. A good example of this is a shark must hunt for its food by eating smaller nekton.

The energy cannot be absorbed; the shark must use energy to gain energy. Another good example of energy transfer is the process of benthos decomposing a corpse of a nekton. They are using energy to gain biological fuel. There is a total amount of energy that drops over a long period of time in the physical sense but not in the universal since. As per the second law of thermal dynamics: "The amount of usable energy available to do work in the universe decreases over time. The second law of thermodynamics is consistent with the first law-that is, the total amount of energy in the universe isn't decreasing with time. However, the total amount of energy in the universe available to do biological work is decreasing over time." This law plays into the fact that energy in life-organisms is decreasing over time. If this were not the case then, these organisms would live forever. Instead the law is biological creatures are born and they die. Energy can only be transferred. It cannot be created or destroyed. In the marine life-system this is as evident as in any other life-system.

Benthos relies on nekton just as much as plankton. They are all locked in a complicated yet simple dance of consumption, reproduction, and death following in decomposition. This can be translated into energy examples such as taking in energy through capturing, transferring energy as in reproduction and dispersing energy back into the general eco system by death.

Abiotic factors are elements of an ecosystem that are non-living but still have an impact on the environment. Some examples of abiotic factors that impact the marine ecosystem include: water temperature, sunlight, ocean currents and the salinity of the water. Biotic factors in the marine ecosystem are the living organisms, which include plants and animals.

Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Many species develop their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

Fish in the ocean have adapted for survival by using their coloring and swimming in schools. One example is the queen parrotfish which lives around coral reefs. The queen parrotfish uses its natural coloring to blend in with the coral, thus hiding from their prey. The queen parrotfish has also adapted to its surrounding by secreting a bubble of mucous that surrounds it while the fish sleeps so that the prey cannot smell it.

Various plants and animals in our oceans need both a temperature and light balance in order to thrive. Temperature-driven creatures, such as Phytoplankton, have started their yearly growth cycle earlier in the season due to warming oceans. Light-driven creatures start their yearly growth cycle around the same time. Since Phytoplankton is thriving in earlier seasons, the entire food chain is affected. Animals that once traveled to the surface for food are now finding an area void of nutrients and light-driven creatures are

starting their growth cycles at different times. This creates an unbalanced environment needed for survival (About, 2008).

As the human population continues to increase at dramatic rates, the marine ecosystem has been affected across the board. Oil and gas exploration and development are ongoing activities fueled by the people's dependence on fossil fuels. Energy acquisition has the potential to damage marine biodiversity through seismic exploration, equipment construction, ongoing operations and waste disposal. Impacts can include disturbance to sediment, benthic fauna and other seabed flora and fauna, disturbance to marine mammals and other species; loss/destruction of seabed habitat; and effects on water quality (Burke, 2005).

Earth's coastal areas are facing pressures never experienced before with more than half of the world's population living within 40 miles of a coastline. Activity is increasing due to development, pollution and habitat alteration and destruction, as well as and natural environmental stresses such as climate change. Increasingly, world governments are directing their attention to these coastal areas in an attempt to regulate the human footprint on the coasts and decrease the human footprint. Per the World Resources Institute; development has threatened roughly one half of the world's coasts.

According to the estimate, about 34 percent of the world's coasts are at high potential risk of degradation, and another 17 percent are at moderate risk (World Resources Institute, n. d.).

Pollution is another stress on the marine ecosystem. Pollution comes from a myriad of sources and has many forms. From oil spills to land run off which

includes debris, oil spills, polluted runoff, and sewage wastewater, and all of it is a result and byproduct of human activities.

In the last several decades the over exploitation of the fishing of our marine ecosystem which has provided the global population with a major source of protein for hundreds of years has come to the forefront of the study of sustainability of our oceans. As the population of our globe increases the demand for this product increases. Poor policies, governance, and management of this increased fishing pressure has resulted in over-harvesting, which threatens this sustainability (Nutall, n. d.).

The world has slowly realized that the growth of the human population on our planet has affected the marine ecosystem in a myriad of ways. The goal of sustainability actions and planning is being work on by countries all over the world. Planning begins with the creation of detailed, comprehensive maps of a marine area, identifying where and how it is used by humans and what natural resources and habitats exist within it. With such information coastal communities can then use this information to set economic, environmental and social goals for that area, and allocate space within it for different uses, including fishing, shipping, recreation, conservation, oil and gas development, or renewable energy production. By bringing people together to plan the future of this ecosystem will result in a fairer and more effective approach to how the oceans are used while ensuring that diverse human uses are supported and healthy marine ecosystem are maintained for future generations.

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