Coral Reef Report

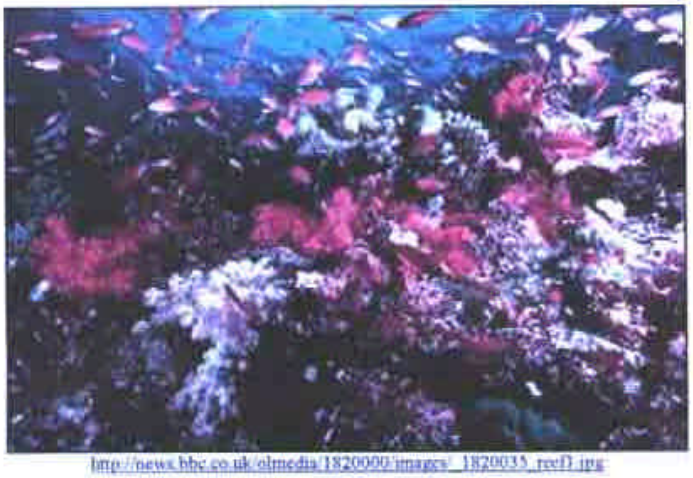

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Table 3

Student Sample

Period 6 Oceanography
Ms. Packheiser

Coral Reefs Report

Coral Reefs contain the most diverse ecosystem in the ocean and support more species than any other ecosystem. They are colonial organisms, composed of polyps, and are night feeders found in tropical/subtropical climates with shallow, salty, and warm waters in euphotic zones. Zooplankton and small fish feed on the corals, while the corals pick up organic molecules by drawing them into their mouth. They reproduce asexually and sexually, and grow in colonies, and thus are very important because besides sustaining a huge ecosystem, they provide medicines for many diseases of the 21st century. They are in danger, and this report will explain the stresses that cause the corals to be in danger and will discuss reasons as to how to absolve such problems.

Zooxanthellae are algae that live inside of the coral. Theses tiny organisms photosynthesize to produce their own food but cannot live outside the coral host while the coral cannot live without their beloved Zooxanthellae. What happens is the coral provides the zooxanthellae with nutrients produced by excretion (a sort of fertilizer if you will) and, of course, shelter. In return for this generous act, the zooxanthellae photosynthesize food for the coral (sugar molecules) as well as enough for themselves. So, without the coral, the zooxanthellae would be deprived of proper nutrients for existence and, without the zooxanthellae, the coral would starve. This mutual symbiosis between the two organisms allows healthy reefs to form because the coral is able to produce the calcium carbonate needed for its reproduction to thrive. Without this symbiosis, we would have no reefs and therefore, no healthy and diverse underwater habitats!

Corals could not live without zooxanthellae, which are organisms that live in coral tissue. They have a symbiotic relationship in which the zooxanthellae give oxygen and get rid of waste, as well as make food for the coral. Corals obtain their Zooxanthellae, or algae, luckily because they live within the cells of the polyps in incredibly large numbers. Typically about 1 million algae live in each square centimeter of coral tissue. These zooxanthellae give anemones and corals their color. Consequently, they are dependent upon growing in sunlight and for that reason usually found not far beneath the surface, although in clear waters corals can grow at depths of 60 m. Other corals, notably the cold-water genus Lophelia, do not have associated algae, and can live in much deeper water, with recent finds as deep as 3000 m. However, we can see the importance the algae have on most coral reefs (Wikipedia).

Environmental stress plays an important role in altering the symbiosis of coral reefs. Bleaching, which can be very detrimental to a coral reef is just one result of environmental stress. High temperature changes, exposure to excessive irradiance, lowered salinity and pollution, all can also be a result of stress from the environment. When Temperatures are raised, the zooxanthellae's ability to photosynthesize is greatly reduced. It has been predicted by scientists that if the temperature continues to increase along with various other stresses, we will experience a widespread loss of our coral reefs. The scary thought is that if this does end up happening, it can take 500 or more years to recover those losses. If there is an increased amount of atmospheric carbon dioxide, the ocean will consequently experience an increase the dissolved carbon dioxide in seawater. The negative aspect of this is that solubility of calcium will be increased, which will reduce calcification. The fact of the matter is that we have to pay more attention to our

coral reefs, and the environmental stresses that we can control, such as pollution. Coral reefs are a beautiful and integral aspect of our earth, and we should do everything that we possibly can to protect them.

Coral reefs suffer severely at the risk of human interference. Anchors are dropped on them, people stand on them, and often times toxic waste or excessively heated water contaminates the fragile ecosystem destroying all life within. With some help from the Environmental Protection Agency, steps could be taken to avoid further destruction. Some ways which have proven helpful have been stricter laws regarding the proximity a boat can have to coral reefs. Mooring areas and harbors can be clearly designated to boaters, telling them what areas it's okay to drop anchor in. Along with these areas, there could be more severe punishment for violators of the proximity laws. Violators of the preexisting laws regarding pollution of coral reefs should also be punished more severely; as it stands a firm slap on the wrist obviously has had very little effect. Any effort made to redress the harm caused by humans on the environment will be difficult and costly and require the dedication and patience of all of us, but in the long run it is much better to protect now than to suffer the consequences of our actions later.

Problems that NEED to change:

Pollution

-Cause: increase in expansion within a human development, sewage excretion and runoff, commercial/ private vessels.

-Result: The runoff carries large amounts of sediments and chemicals into the water, increasing the nutrient levels and turbidity, which, in turn, stresses the coral out causing coral bleaching (aka zooxanthellae excretion). The high nutrient levels may, also, cause an increase in the growth of other reef organisms (ex. Sponges) which end up out competing corals for space.

Tourism

-Cause: increase in human fascination for exotic places/vacation spots

-Result: When snorkeling or diving, the humans can either break off a piece of coral in its natural habitat or touch it in some way wiping off the protective layer of coral mucus and leaving the organism open for infection, which leads to death. Purchasing coral at a gift shop also increases encouragement for coral companies to break off the best corals in the best reef habitats.

Dropping Anchors

-Cause: increase in sea-bearing vessels around the reef areas and want to stay in one place either to fish or whatnot.

-Result: The anchor that is dropped crashes into the coral on the sea floor causing the organism to break, opening it up to infection. This problem usually destroys entire colonies of coral.

Global Warming

-Cause: increase in chemicals/pollution released into the atmosphere by man.

-Result: Global warming increases the water temperatures (changes the temperature) causing most coral to stress out and excrete zooxanthellae, which in turn increases the organism's susceptibility to disease. According to the American Association for the Advancement of Science, 40% of sea fans become infected by a fungal disease due to global warming.

Thermal Pollution

-Cause: an increase in industrial excretion of heated water/heated chemicals.

-Result: The heated water is dumped into the ocean and raises water temperature, which stress the coral out and…well, you know the rest. This is a huge problem in Southeast Asia because 30% of the world's coral is located on their coast, which constantly dumps heated water into the ocean as a result of industrialization.

Solutions to Coral Reef Problems

Thermal Pollution

- Using and wasting less electricity
- Limiting amount of heated water discharged into the same body of water
- Transferring the heat from the water to the atmosphere by means of wet or dry cooling towers.

Global Warming

- Using energy more efficiently and moving to renewable energy (wind, solar, geothermal, etc.)
- Reduce emissions from cars/ trucks

- More efficient energy

Pollution-Sewage

- Proper Sewage treatment
- Contained Farms
- Recycling
- Energy Alternatives

Dropping Anchors

- Designated "Anchor-Drop" Areas
- Designated Moors Area
- Higher punishments for violated mooring laws

Tourism

- Provide educational series before dives
- Raise Fines for damage done to the reefs
- Special flippers that are "coral-reef" safe

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Pollution and the Coral Reef

Many cities on the coasts are becoming more densely populated. As the population grows, the more buildings go up. And the more people that dump pollutants into the ocean. Help keep the ocean clean and the fishes in the reef alive by reporting any dumping you witness along you coasts. Every year, many of the reef's turtles, dolphins, and other creatures are caught in empty pop bottle wrappers, or discarded nets. Many can no longer swim to the surface for air, and others end up with garbage embedded in their flesh as a result of litter on beaches. Do your part, clean up after you self and those around you. Also, littering is illegal, if you see an individual or a group of people littering or polluting our ocean, report it to your local life guard, or head of you community.

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REEF RELIEF

SAVE CRASH!!!

Don't Be A Thief To The Reef!

Boating and the Coral Reef

Anchors contribute to an immense amount of physical damage to coral reefs that takes years and years to grow back. Damage from anchors is equivalent to the size of the boat they are dragged by. Before your boat outing, please take the time to collect information on the locations of the coral communities in the area and try to stick to permanent boat moorings and designated anchorages. Crush will thank you!

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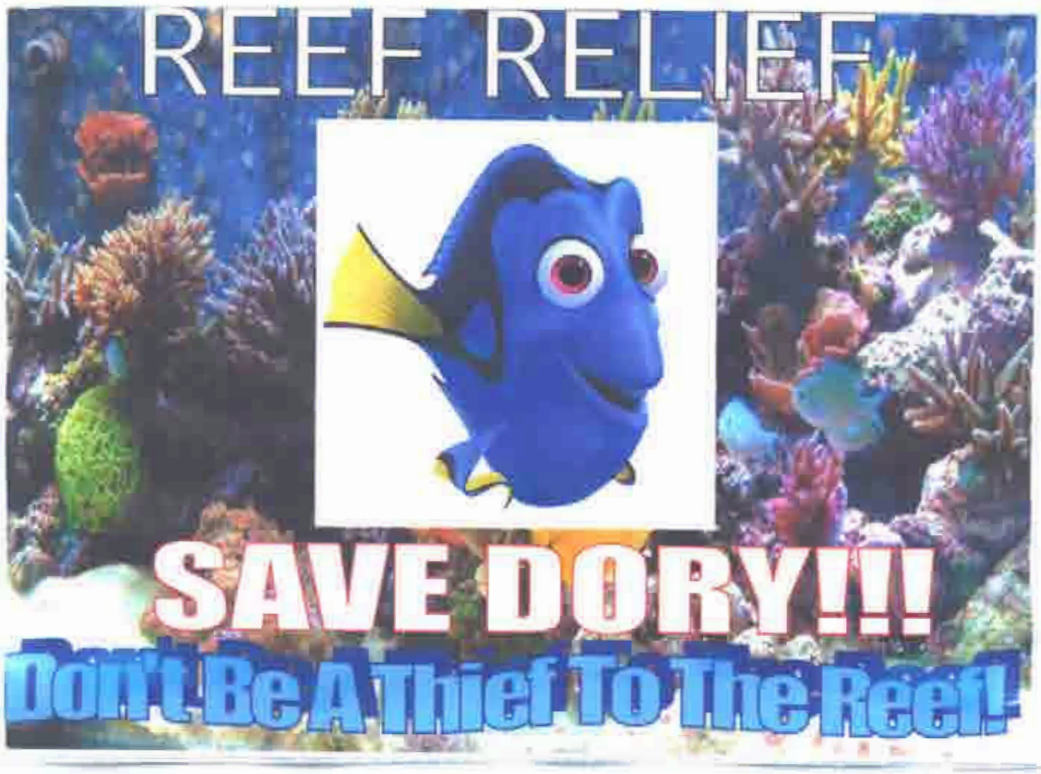

Storms and the Coral Reef

Pollution causes water to warm up and rise with the melting of ice, and the storms get worse each El Nino year. These storms, along with tsunamis, seiches, and other large waves, are damaging to the reefs them selves, and the organisms that live in them. If we do not pollute the air and water, the storms will lessen, and not hit as hard on the reefs, hitting the strongest in open ocean.>Reefs form natural buffers from storms for the shorelines next to them. They lessen the intensity of the storm, but end up taking a beating themselves. If we build buffers before the reefs, we may be able to take the pressure off of the fragile lives of the coral, and help it to live longer.

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CORAL REEF BLEACHING

Basically, bleaching is spurred on as a result of global warming. If the temperature of the water is raised by as little as one degree Fahrenheit and remains that way for about a month, it can create severe coral bleaching. Warm waters and other stresses that cause algae to die therefore resulting in beaching. Algae is necessary to the health of the coral reef because they provide food and energy for its animals and organisms. The corals then may try to react by changing in ways incompatible with the needs of their zooanthellae. Without the algae the coral may die. The best solution to these problems is to have the government pass legislation to prohibit CFC gases and educate the public and the industry on safer methods and how to conserve energy, which will help the ozone layer.

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Tourism and the Coral Reef
Tourists play a large part in the diminishing of coral reefs around the globe. Just a light touch on your snorkeling trip can kill the beautiful coral that you are admiring! Please help preserve our coral communities by not touching, standing on, breaking off, or resting on coral while you're diving and snorkeling. Sebastion will thank you!

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