

GLOBAL PERSPECTIVES

Degradation of Ocean Biodiversity

Hook Line and Sinker

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Preface

The purpose of this report is to provide insight into issues surrounding the degradation oceanic biodiversity. This insight will be provided by documenting a thorough investigation into the main cause of the loss of biodiversity, overfishing. The effect that overfishing, and, consequently, the decline in biodiversity has on the economies of the world will be investigated. The loss of biodiversity will be discussed in relation to the implications for the future of the planet and, more specifically, the future of the human race.

In order to understand the full meaning of the topic being pursued in this paper, it must first be understood from the root level, beginning with the meaning of biodiversity. Biodiversity is a word used to define all life on earth, and the variation in species residing within all life on earth. The biodiversity being focused on in this paper is that found in the oceans.¹ The decline in ocean biodiversity will, and already has begun to show its effects on the economies, and wellbeing of people worldwide. The decline in biodiversity is a result of declining fish stocks, destruction of coral reefs and unsustainable fishing methods.² Although these effects seem to be different, the main cause remains the same, over-fishing, and the methods used to conduct that fishing. "Over-fishing was reported to be the greatest threat to marine biodiversity in all regions, followed by habitat loss and pollution."³ Although it may seem that habitat loss is a

¹ Kinkenber, Brian. "What Is Biodiversity?" *UBC Department of Geography*. Department of Geography. Web. 10 May 2011. <<http://www.geog.ubc.ca/biodiversity/Whatisbiodiversity.html>>.

² Shah, Anup. "Loss of Biodiversity and Extinctions — Global Issues." *Global Issues : Social, Political, Economic and Environmental Issues That Affect Us All — Global Issues*. 6 Apr. 2011. Web. 10 May 2011. <<http://www.globalissues.org/article/171/loss-of-biodiversity-and-extinctions>>.

³ Shah, Anup. "Loss of Biodiversity and Extinctions — Global Issues." *Global Issues : Social, Political, Economic and Environmental Issues That Affect Us All — Global Issues*. 6 Apr. 2011. Web. 10 May 2011. <<http://www.globalissues.org/article/171/loss-of-biodiversity-and-extinctions>>.

separate cause from over fishing, habitat loss is, in fact, a direct result of methods used to conduct fishing.

This loss of fish stocks due to unsustainable fishing methods will cause coastal economies around the world to collapse. This is because the majority of the coastal economies around the world are based on fishing industries. Canadians have already seen what effects overfishing can have on economies which rely on these fish stocks. For instance, not too long ago the coast of Newfoundland was teeming with North Atlantic Cod. The discovery of such a profound abundance of fish brought large fishing fleets from all over the world which decimated the cod stocks in Newfoundland. This caused the government to enforce strict quotas. The local fishing economy was destroyed! Large fishing corporations from around the world had come and fished these Canadian waters, decimating a species that would otherwise have continued to be abundant. This is now happening in oceans to many other species. The only difference now is the elimination of these species of fish is happening on a much larger scale, and must be stopped before it is too late.⁴

Over-fishing has not, until recently, been regarded as a world issue. The belief was that you cannot cause serious threats to populations of fish in the oceans. Scientists have been doing a myriad of studies regarding the issue and have found that there are hundreds of marine organisms worldwide becoming endangered. This is a result of the expanding fishing industry dominating the seas. The effects of the decimation of marine organisms will prove to be

⁴ Oliveira, Alvaro. "The Tragedy of the Commons: Is the Newfoundland's Cod Crisis a Good Example - Coastal Wiki." *Main Page - Coastal Wiki*. 12 Nov. 2008. Web. 10 May 2011. <http://www.coastalwiki.org/coastalwiki/The_tragedy_of_the_commons:_Is_the_Newfoundland's_cod_crisis_a_good_example?>.

catastrophic. This is because the oceans are being fished to a point of no return. The populations of fish and mammals being accidentally or even intentionally killed will reach a point from which they cannot rebound.⁵ The effects are already being seen, as “we have overwhelmed the mighty armies of herring, capelin, and sardines along with their ravaging consorts of whale, dolphin, shark, and tuna. The oceans today are filled with ghost habitats, stripped of their larger inhabitants, the dismantling of marine ecosystems having had destructive and unpredictable consequences.”⁶ Fishing not only has effects on the populations of fish, but also on the abundance of other life on the sea floor, like coral. The loss of coral is due to negligent methods of fishing, like bottom trawling, which essentially bulldozes the sea floor, destroying anything and everything in its path.⁷ These methods of fishing will eventually put an end to the diversity amongst the organisms found in the ocean, and when this happens’, the earth’s great blue heart will stop beating.

⁵ Sylvia Earle TED award winning speech [Video]. (2008). Retrieved March 8, 2011, from <http://www.youtube.com/watch?v=43DuLcBFxoY>

⁶ Soares, Mário. *The Ocean Our Future*. Cambridge, England: Cambridge UP, 1998. Print.

⁷ Soares, Mário. *The Ocean Our Future*. Cambridge, England: Cambridge UP, 1998. Print.

Table of Contents

<u>Section</u>	<u>Pages</u>
Preface	1, 2, 3
Summary	5
Background	6, 7, 8, 9, 10, 11
Expert Contributions	12, 13, 14
Role of Control	15, 16, 17
Religious, Spiritual, and Cultural Influences	18, 19, 20
Shark Finning	21, 22, 23, 24
Bluefin Tuna- Near Extinction	25, 26, 27
Southeast Asia Coastal Degradation	28, 29, 30
NGO's and IGO's	31, 32, 33
Canada	34, 35
Solutions	35, 36, 37, 38, 39

Summary

This report is a comprehensive study of the degradation of the oceans' biodiversity, due to the effect of over fishing. It looks at the current economic problems associated with that degradation, as well as the economic issues that will appear as fish populations decline and the loss of biodiversity progresses. It also explores the effect on the oceans' ecosystem, and how

the devastating challenges will affect world populations. The information in this report has been found in books, on web sites, in films, and newspapers.

This report defines what biodiversity is and it narrows the focus of the paper to the main cause of loss of biodiversity which is over-fishing. It goes into detail about the progression of the issue, and each facet essential to understanding the effects of over-fishing. There is a passage included outlining what Sylvia Earle has done to advocate for the issue, and to create advances in technology to study it. This paper also delves into the controls of the issue, including who has control, and who should be concerned with the issue. There are also several connections made between religions, spirituality and the issue. Three case studies have been included in the paper. This has been done to show the reader that effects of this issue are real, and are already manifesting themselves in the oceans. It explores the different international organizations responsible for the protection of the oceans. The issue is also brought close to home, in the section bringing awareness to the prevalence of this problem in Canada. Lastly, there is a section which contains several different suggested methods to resolve this issue.

Background & History

The oceans are 20 million years old, quite young in the grand scheme of things. There once was one large ocean called Panthalassa, which surrounded just one land mass called Pangaea. It was the separation of this land mass that formed the divisions that shape the oceans seen today. The oceans today are the product of millions of years of geological

evolution. In these oceans, the amount of biodiversity continued to grow throughout time to form not what is seen today, but what was seen a couple hundred years ago.⁸

Why is this? Why are things so different today, than they were a couple of hundred years ago? This is because of man's selfish desire to exploit the riches of the sea. Ever since man discovered the sea, it has been fished. The thought that nothing put into the ocean or anything taken out of the ocean could possibly harm it is the root cause of the oceans demise. This has compelled people to commit acts which are essentially destroying the oceans. The old fashion method of a stick with string suspending bait to catch food was quickly replaced with nets, which grew much larger and were soon pulled by large boats. The boats pulling these nets are funded by large organizations all over the world built on the sale of fish.⁹ Some of these large organizations include Mitsubishi (which reportedly catches up 60% of the Bluefin tuna caught each year) and governments around the world, like that of Costa Rica, which are reaping profits from this lucrative business.

Fish have been used for domestic consumption and trade since at least medieval times.¹⁰ Cod was a staple food, on both rich and poor plates, and it often came at a low price implying that there was an abundance of it. In the 16th and 17th centuries, Europeans were making the long voyage across the Atlantic Ocean to see the shoals of cod you could supposedly

⁸ Pauly, D., and J. L. Maclean. *In a Perfect Ocean: the State of Fisheries and Ecosystems in the North Atlantic Ocean*. Washington: Island, 2003. Print.

⁹ Pauly, D., and J. L. Maclean. *In a Perfect Ocean: the State of Fisheries and Ecosystems in the North Atlantic Ocean*. Washington: Island, 2003. Print.

¹⁰ Murray, Rupert. "RED VIC MOVIE HOUSE•The End of the Line." *RED VIC MOVIE HOUSE•Welcome*. Arcane Fims, 25 Mar. 2009. Web. 10 May 2011. <<http://www.redvicmoviehouse.com/show.php?pageid=797>>.

walk across. They were making the voyage to see the whales which followed boats and to obtain the riches of the sea. During this time, there were hundreds of written accounts like this:

...there were turtles in “inestimable numbers”, “an infinite number of them all over the sea”; “Harbors writhing with the silver headed splashing of the stripers” (striped bass); huge salmon in “prodigious quantities”; sturgeons “in great plenty” and “so numerous that it is hazardous for canoes”; “the greatest multitude of lobsters ever heard of” in the Gulf of the St. Lawrence; and a great abundance of oysters and mussels.¹¹

The oceans were once teeming with life, and accounts from the past like the one above are indicative of the diverse and flourishing life that was once present. Many of these stories are often misinterpreted as folktales. Although, despite a slight exaggeration, they give great evidence to the state of the abundant life that was once found in the ocean before man began to fish it.¹²

Fish are at risk of extinction but it is not just the fish at risk, their habitat is also being destroyed. Coral reefs house 10 – 15% of all life in the oceans, yet they only account for .2 % of the total ocean area. Despite this, they are being systematically destroyed by the use of bottom trawlers, the onset of ocean acidification, and changing ocean temperatures. Fishing by large boats funded by commercial industries and governments tends to be very negligent and wasteful. Sylvia Earle (renowned Scientist and Oceanographer) once said “what ocean trawlers are doing to the sea floor is equivalent to using a bulldozer to catch song birds”¹³. She also said “a few hours of indiscriminate trawling are, for example, sufficient to destroy a million years of

¹¹ Jay Maclean. In a Perfect Ocean. (Washington. Island Press. 2003)

¹² Author Unknown. Canadian Atlantic Fisheries Colapse. <http://archive.greenpeace.org/comms/cbio/cancod.html>

¹³ Sylvia Earle TED award winning speech [Video]. (2008). Retrieved March 8, 2011, from <http://www.youtube.com/watch?v=43DuLcBFxoY>

coral growth and the assets required to support marine tourism or to maintain the livelihood of traditional fishing communities”.¹⁴ It is very evident, as you can clearly discern from these quotes, that bottom trawling is a very destructive, wasteful practice and it needs to be stopped!¹⁵

In 50 years, humans have eaten more than 90% of the big fish in the sea, nearly half of the coral reefs have disappeared, and there has been a mysterious depletion of oxygen in the Pacific. The ocean is undergoing a vast array of very rapid changes. These will certainly affect us negatively unless action is taken to halt the rapid degradation of the oceans’ biodiversity. Silvia Earle once said “health to the ocean means health to us”¹⁶ which is true because when the ocean is healthy the human race prospers and when it is no longer healthy, the human race will suffer. No ocean means there is no life support system, which means no life. Most of the oxygen in the atmosphere is provided by the sea, and it is the home of 97% of life on earth. Humans don’t care about what is happening to the oceans, when without them they cannot survive. Essentially nothing else will matter if they fail to protect the oceans.¹⁷

Today’s oceans are obviously much different than they once were. Many of the species of fish that once dominated them have been seriously depleted. Some examples of decimated species are once abundant Bluefin tuna, salmon, sailfish, whale, and cod. There are hundreds of other species of fish affected in this same way but these are the most common cases. Currently,

¹⁴ Soares, Mário. *The Ocean Our Future*. Cambridge, England: Cambridge UP, 1998. Print.

¹⁵ Sylvia Earle TED award winning speech [Video]. (2008). Retrieved March 8, 2011, from <http://www.youtube.com/watch?v=43DuLcBFxoY>

¹⁶ Sylvia Earle TED award winning speech [Video]. (2008). Retrieved March 8, 2011, from <http://www.youtube.com/watch?v=43DuLcBFxoY>

¹⁷

the fish which is victim to the effects of over fishing to the greatest degree is the shark. Sharks are killed in the range of 72 million each year, and their populations have declined 90% in the last 30 years. This will be a major setback in the oceans' well-being if the slaughter continues, as the apex predator in the oceans will soon be extinct. When you remove an apex predator from an ecosystem, the entire ecosystem goes out of flux.

It is not only the large fish which are in danger of overfishing. Due to a possible "solution", the smaller fish, such as anchovies, herring, and mackerel are also being targeted by fishing fleets. They are being used as food in fish farms. To many people this seems like a perfect solution, but if you look a little deeper you find that this causes more species of fish to be targeted, exploited and decimated without putting any more fish in the mouths of consumers. In the year 1997 there were 10 million tons of feeder fish fed to the 29 million tons fish farmed in that year. This means that 10 million tons of fish were caught and killed and never reached the mouth of a human being. This is a wasteful practice being tolerated merely because of the annual output fish farming produces. The effect it has on the environment should not be tolerated, and all fish should be caught in their natural habitat. If this happens, the oceans' sustainability will be enhanced and the world will be a better place for it.¹⁸

Some coastal communities, like those in Southeast Asia, have been dependent on the sea since the beginning of their existence. The destruction of coastal marine ecosystems will greatly threaten or destroy the livelihood of the people who live in coastal communities around the world. Shark finning (the practice of taking only the fins and discarding the rest of the carcass) is an example of a fishing practice which negatively affects coastal communities. This is

¹⁸ Murray, Rupert. "RED VIC MOVIE HOUSE•The End of the Line." *RED VIC MOVIE HOUSE•Welcome*. Arcane Fims, 25 Mar. 2009. Web. 10 May 2011. <<http://www.redvicmoviehouse.com/show.php?pageid=797>>.

because those discarded carcasses are a source of protein vital to the citizens of coastal communities. This effect has been seen in Africa, Latin America and India where they have experienced noticeably lower catches, and a reduction in the protein available to the citizens of these regions. This brings out new moral dilemmas that begin to appear in arguments regarding this issue. People often do not see the harm in destroying populations of animals, but when it is humans who are being affected they tend to notice and take action. This, therefore, means that this new moral ground is a strong base for future persuasion in arguments regarding a stand on how to deal with the ocean.

Now the question which needs to be answered is what will happen when fish stocks reach the point of no return? The point of no return is that at which fish have been slaughtered in numbers from which they cannot possibly recover. If this happens, it is essentially the end of the oceans. When the oceans no longer exist, life on earth can no longer exist. Sylvia Earle once said that “an earth without water brings Mars to mind”¹⁹. So the question remains, why do consumers knowingly continue to deplete oceans’ fish stocks, and continue causing damage to ocean habitats with indiscriminate fishing methods, when the inevitable future is being clearly presented.

¹⁹ Sylvia Earle TED award winning speech [Video]. (2008). Retrieved March 8, 2011, from <http://www.youtube.com/watch?v=43DuLcBFxoY>

Expert Contributions

Silvia Earle is most famous for her adventure 1250 feet below the ocean's surface. This great feat which no one else has accomplished, and the work people are beginning to recognize her for the most, spreading awareness of the unsustainable use of the oceans has made her famous. Silvia Earle is the former chief scientist of the National Oceanic and Atmospheric Administration (NOAA), and current leading American oceanographer. Sylvia is regarded by many as one of the greatest influences in the education regarding issues faced by the oceans. She was one of the first underwater explorers to create modern SCUBA gear and she designed and built a submersible which can travel 3000 feet below the ocean's surface.

Sylvia Alice Earle was born in Gibbstown, New Jersey on August 30th, 1935. She is the daughter of Lewis Reade and Alice Freas Earle. Both of her parents were very fond of the outdoors. Sylvia inherited her love of nature from her parents and from her childhood which was spent on the west coast of Florida, an area riddled with natural beauty. Her parents were full supporters of her pursuit of a career in biology, however they also adamant that they wanted her to receive her teaching credentials and to learn how to type just in case her career in biology didn't work out. These precautions, however, were not necessary.

Sylvia received her Bachelor of Science degree in 1955 at Florida State University. In the same year, Sylvia entered a graduate program at Duke University and received her degree in botany the following year. Sylvia's Masters paper was a detailed analysis of the algae present in the Gulf of Mexico. This is a project that is still followed by Sylvia and to this date she has collected more than 20,000 samples. ²⁰

Sylvia received her Ph.D. in 1966 from Duke University. Following the receipt of her Ph.D., she immediately applied to the Cape Haze Marine Laboratories, and was accepted. Cape Haze Marine Laboratories is a non-profit research facility focused on sharks. Later in her career, in the year 1975, Sylvia received the title of Researcher at Harvard University. In 1976, she was named a Fellow (a Fellow is a member of an educated scientific society) in botany at the Natural History Museum. In the same year, Sylvia became a research biologist and curator of California Sciences. Despite many of the above academic achievements, her true desire was, and still is, to study the sea and the life within it. This is why in 1970 she and four other

²⁰ Unknown, Author. "Biographies on Sylvia A. Earle | Research Papers on Sylvia A. Earle." *Custom Writing Service :: Essays :: Term Papers :: College Essays :: Thesis :: MLA*. Web. 10 May 2011. <http://www.dedicatedwriters.com/biographies/Sylvia_A_Earle-34080.html>.

oceanographers spent 14 days underwater in a research facility. This was the Tektite II project, which was designed to help oceanographers study undersea habitats. Sylvia went on perusing new technology to help her achieve her underwater goals. This is when she became one of the first divers to put on a mask and an oxygen tank, and use them to study plant and animal habitats beneath the oceans' surface. With access to new technology, she made a discovery of a series of large undersea sand dunes off the Bahama Islands which was vital to understanding formation of the area. Silvia and her former husband Graham Hawkes pooled their expertise and attempted to conquer the depth limitations which are present in SCUBA diving. They were successful when they designed and built a submersible in 1981, called Deep Rover which could travel up to 3000 feet below the oceans' surface. In 1990, Sylvia was recognized as the first woman to be a part of the National Oceanic and Atmospheric Administration. This organization conducts research, manages fisheries and keeps tabs on marine spills. To date, Sylvia has logged in excess of 6000 hours under water. She is obviously an accomplished intellectual; she has put her considerable intellectual talent toward saving the thing which humans rely on most, the life support system, the ocean.

Today, Sylvia is known for her frequent speeches advocating the current and pressing issue of the unsustainable use of the oceans. In her speeches, she aims to reach her goal of raising awareness of the issue through teaching about the degradation of the oceans' biodiversity. From watching many of her speeches, one begins to notice that she often creates a comparison between a heart and the ocean by saying, the ocean is the heart of the earth. It is also obvious

that she has an unconditional love for the ocean and her heart lies within it and she will fight to protect the ocean as long as her heart is beating.²¹

Role of Control

Who is it that has the role of control in fueling or stopping the need for excessive fishing? The groups that have the greatest effect on fisheries are: consumers, governments and non-profit organizations worldwide.

In order for an industry to exist, there must be consumers. In this case, the thing that makes the fishing industry so powerful is the fact that the market for the product encompasses the entire world population. In today's society, fish is found on tables everywhere and it is renowned as a healthy food choice. The problem is that people continue to lay the blame for what is happening to the populations of the fish on the fishing industries. Yet without the

²¹ Sylvia Earl TED award winning speech [Video]. (2008). Retrieved March 8, 2011, from <http://www.youtube.com/watch?v=43DuLcBFxoY>

consumer, who is eating the fish they provide, they cannot function, because they would not be able to fund the industry.²²

The problem is consumption of the fish, without the knowledge of where it comes from or how it is caught. A large number of the fish eaten today come from an unsustainable source. Consumers don't know whether the fish they eat is coming from a sustainable source or an unsustainable source. So the key, in order to provoke awareness, and cause people to eat from a sustainable source, is knowledge. If consumers understand what is happening to the ocean because of negligent fishing practices they will become more responsible when consuming fish. If they know whether or not the fish they are eating comes from a sustainable or unsustainable source, they can make an informed decision. The hope is that knowledge will encourage people to purchase and eat their fish from a sustainable source. It is not just up to consumers in this situation, the fishing industry must also pull its weight. It must provide consumers with more fish from sustainable sources. When both ends meet, and consumers are happy buying sustainably produced fish, then the issue is well on its way to being resolved.²³

Despite all of the negative things happening in the oceans, it isn't all bad. People around the world have been campaigning for awareness about what is currently occurring. To date, there are over 4000 protected and patrolled areas in the ocean. Despite this fairly large number of protected sections, they only account for .8% of the oceans' total area. Also the majority of these zones are navigational channels, pipeline/cable corridors, disposal areas and military

²² Murray, Rupert. "RED VIC MOVIE HOUSE•The End of the Line." *RED VIC MOVIE HOUSE•Welcome*. Arcane Fims, 25 Mar. 2009. Web. 10 May 2011. <<http://www.redvicmoviehouse.com/show.php?pageid=797>>.

²³ Bowermaster, Jon. "Unknown Chapter Title." *Oceans: the Threats to Our Seas and What You Can Do to Turn the Tide : a Participant Media Guide*. 1st ed. New York: PublicAffairs, 2010. ?? Print.

firing ranges.²⁴ Although these 4000 zones do not encompass very much of the ocean, the people campaigning for these protected zones are taking control, and forcing the hand of governments. If governments see that their constituents will support them on the decisions they make regarding this issue, they will be more likely to take action. In Costa Rica there is an extremely large and prospering illegal fishing industry. One of the most common practices of this illegal fishing is the practice known as shark finning. When this industry was brought to the attention of Costa Rican citizens they began to protest. The government, up to this point, had been turning a blind eye to the situation because it was providing them with large sums of money. However, when the population protested, the government had to show they were doing something about the issue. To demonstrate their action in resolving it the Costa Rican government issued laws that slowed the process of illegal fishing. For example, they made it law that sharks had to return to shore with fins attached. This quickly caused a substantial decrease in the number of sharks killed.²⁵ This series of events shows us that when the governments are forced, persuaded or encouraged to make a decision regarding issues, they are more likely to do so if they know the majority of the population will back them on their decision.

²⁴ Pneill. "Ocean Zoning: More Effective Marine Management | World Ocean Observatory." *Programs & Services | World Ocean Observatory*. 09 Sept. 2010. Web. 10 May 2011. <<http://www.thew2o.net/blog-entry/ocean-zoning-more-effective-marine-management>>.

²⁵ Author, Unknown. "Costa Rica Shark Finning Law Does Very Little to Help | Costa Rica Fishing - News, Reviews, & Reports." *Costa Rica Vacations - All Inclusive Packages*. 6 Aug. 2008. Web. 11 May 2011. <<http://www.vacationscostarica.com/fishing/blog/?p=133>>.

Religious, Spiritual and Cultural Views

In many cultures around the world there are different religious beliefs about the use of resources from the ocean. Some religious views are beneficial to the ocean, and some are harmful. For instance, shark fin soup is a soup that is enjoyed by the Chinese culture. In China, eating shark fin soup is seen as a wealthy status symbol. The practice of shark finning is immensely wasteful and extremely cruel. Despite the negatives, like shark finning, there are several positive practices found in religious and spiritual views. These views are evidently being ignored or misinterpreted in today's society.

In many religions including the Christian religion people are not abiding to the full extent of their religious "code". In Christianity it is believed that "Christ suffers not only when people

are denied their rights and exploited, but also when seas, rivers and forests are desecrated”²⁶.

Christianity is the most popular and powerful religion in North America and the Christian religion clearly states that Christ will suffer as a result of environmental degradation. Despite this, little respect is shown to the oceans and the wildlife in them. This shows how prevalent an issue this is because people have become so oblivious to what they are doing to the ocean that they have abandoned the beliefs of their religion.

In the Hebrew religion there are also written scriptures which tell man that exploitation of the environment is a sin. This is found in the Hebrew scriptures as “all that I have created has been for your sake; take care not to spoil and destroy my world”²⁷ This is basically telling the people of the Jewish religion that all life on earth is at their disposal, but to use it on earth unsustainably is looked at as a sin. Despite this, Judaism also takes part in the destruction of the ocean. They participate in the destruction through the unknowledgeable consumption of fish coming from an unsustainable source.

Al Gore, an advocate for environmental issues, once said:

“The more deeply I search for the roots of the global environmental crisis, the more I am convinced that it is an outer manifestation of an inner crisis that is, for lack of a better word spiritual....I have come to believe in the value of a kind of inner ecology that relies on the same principles of balance and holism that characterize a healthy environment.”²⁸

²⁶ Integrity of Creation: An Issue for Religious Today: Global Warming and Climate Change. Global Warming Working Group of the JPIC Promoters, 2002.

²⁷ "Jewish responses to environmental concerns." [ReligiousTolerance.org by the Ontario Consultants on Religious Tolerance](http://www.religioustolerance.org/tomek13.htm). 10 May 2009 <<http://www.religioustolerance.org/tomek13.htm>>.

²⁸ Education and the soul: toward a ... -. " [Google Book Search](http://books.google.com/books). 11 May 2009 <<http://books.google.com/books>>

This is saying the feeling which compels us to commit the unsustainable acts towards the environment, is essentially a spiritual feeling.

An aspect to Buddhism that relates to the impact of religion on ocean biodiversity is the flaw of self-cherishing. Self-cherishing is when one believes that the world was created for humankind. It also means that one believes that problems which they are faced with are a result of other people's actions. Geshe Kelsang Gyatso, a meditation master and an internationally renowned teacher of Buddhism, states in his book that self-cherishing is the cause to almost all world issues and if one finds inner peace and is able to cherish other's, world issues would begin to diminish.²⁹

Religion is yet another cause which oddly enough contributes to the degradation of ocean biodiversity. Although, it seems to be the misinterpretation of religion which leads that degradation rather than the religion itself. So it is not right to lay the blame on religion, the more appropriate interpretation of what is happening is the ignorance of human beings towards the creed of their religion.

²⁹ Kelsang, Gyatso. *Transform Your Life: a Blissful Journey*. Ulverston: Tharpa [u.a., 2002. Print

Shark Finning

What is shark finning? Shark finning is the process of the removal of the fins from a shark followed by the disposal of the live shark carcass back into the ocean. When the shark is returned into the ocean it will die a certain death due to suffocation because in order for a shark to breathe, it must swim and have water moving through its gills. If the shark does not die because of suffocation it will die because it will be consumed by another shark. The process of shark finning is one of the most wasteful and unsustainable practices known to man. The fins of a shark only amount to approximately 4% of a sharks total body weight. The rest of the shark,

which is full of protein and nutrients vital to many impoverished coastal communities, is simply discarded back into the ocean.³⁰

Sharks are the top predator in the sea, and have no hunters but man. The earliest known sharks date back 450 million years. The majority of modern sharks found in the ocean date back 100 million years. Sharks have very streamline bodies and a heightened sensory system which makes them a great predator. There are over 200 species of sharks found in the oceans. Some of the well-known sharks include the great white, the tiger, the whale, the blue, the Mako and the Hammerhead shark. These animals are extremely skilled and adapted to killing and consuming their prey of choice, which is small to medium sized fish, not humans.³¹

Sharks kill on average 12 people per year. These killings are almost a 100% result of shark curiosity, which results in death due to loss of blood, and not consumption. There have been few or no cases in which a shark has actually removed flesh from its victim. There are more deaths each year due to falling coconuts, elephant attacks, lightning strikes or even vending machines than there are deaths due to shark attack. The belief that sharks are man eaters partly stems from the Stephen Spielberg film *Jaws*. This film has caused a profound fear of sharks within people who have viewed it. This fear is a result of portraying a shark which consumes human flesh. It is believed by many people that this film instilled an unrivaled fear of sharks in its viewers. It is also due to this fear that people are not responding to the rapid decline in shark populations. Sharks have been reported to have declined in the realm of 75% - 95% depending on the type of shark in question. These numbers are staggering considering the

³⁰ "Find out about Shark Finning and How You Can Help to End It." *STOP SHARK FINNING*. Web. 10 May 2011. <<http://www.stopsharkfinning.net>>.

³¹ "NEPTUNE Canada: Marine Life and Climate Change." *NEPTUNE Canada: Home*. Neptune Canada, 2011. Web. 10 May 2011. <<http://www.neptunecanada.ca>>.

importance of the shark to the oceans' ecosystem. Not many people realize that without the shark, the oceans top predator, the entire ecosystem would simply go out of balance. For instance, with fewer sharks there will be more octopi, which would rapidly consume its prey, resulting in major population losses, and this would continue to affect each and every animal in the food chain. A major reshaping of the oceans' ecosystem would result. It is impossible to predict the extent of the repercussions if the slaughter of this magnificent animal continues.³²

The main problem within the issue is shark finning operations, and the consumption of shark fins. Shark fins are a delicacy in Asian culture. Shark fin soup has been a part of Asian culture since the Sung dynasty. Shark fins are served at celebratory dinners like weddings and banquets. It projects a sense of wealth and health. The belief that it projects a sense of health is seriously misguided because levels of mercury in shark meat are harmful to expectant mothers and those with weak immune systems. Shark fins are tasteless and provide nothing but texture to soup. The demand for shark fins has progressed rapidly since 1985. The increase in demand for fins during this time period coincides with the growth of Asian culture. The increased demand for shark fins and the rapid degradation of the species is tolerated by people and fueled because of the natural fear people have towards sharks.

There are organizations like The Sea Sheppard Conservation Society which raise awareness of this issue. They try to encourage publicity about it, so people understand the effects of shark finning and what is happening to the shark. With this knowledge, consumers can better understand the gruesome methods which are used to obtain this "delicacy". Despite this organizations best efforts, as well as many other organizations efforts, there are still very

³² "Find out about Shark Finning and How You Can Help to End It." *STOP SHARK FINNING*. Web. 10 May 2011. <<http://www.stopsharkfinning.net>>.

few laws in place. Of the existing laws, there are even fewer which are monitored. There are some countries which demand that fins must arrive in a 5% weight ratio to carcasses that are found on board. Only a few countries demand that sharks come to port with fins attached. This method of demanding that shark fins come to port attached to the shark is the easiest way to control the rapid demise of this animal. Despite the best efforts of laws and quota's there is still a very large illegal trade for shark fins which is continuously growing. In Costa Rica, there is even an organization known as the shark fin mafia which operates out of private docks to avoid being apprehended for illegal fishing. It is also a known fact that the Costa Rican government is not willing to intervene with these operations because of the amount of money they are receiving from the Asian governments.³³

As you can see, the practice of shark finning is a very unsustainable and wasteful fishing practice and it has many sources of fuel, to essentially keep the finning industry burning. This is implying that because of the fear and the demand there is no reason to stop the slaughter of this animal. Shark populations will continue to suffer losses until drastic action is taken, and awareness of the issue is increased. Until then, this prehistoric animal will continue to be wiped of the earth.

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"Who We Are." *Sea Shepherd*. SSCS, 2011. Web. 10 May 2011. <<http://www.seashepherd.org/who-we-are/>>.

Bluefin Tuna

Bluefin tuna, a giant among the fish in the oceans, have been known to weigh up to three quarters of a ton and grow as long as twelve feet. The Bluefin tuna is essentially a massive hunk of power and muscle, and it is one of the fastest fish in the ocean clocking in at a maximum of fifty five miles per hour. An interesting feature of the Bluefin is that it is warm blooded, which allows it to adapt to changing ocean temperatures more quickly. The Bluefin is therefore able to travel farther distances into areas of colder temperatures. The Bluefin tuna were never considered an ideal fish for eating, until fishermen began to hunt this fish for sport

because of its raw size and power. Overtime the consumption of this animal increased and soon enough its population was at risk.³⁴

A very influential factor in the demise of the Bluefin tuna was the misconception that there are two different breeding grounds for Bluefin, which there are, but from this information people assumed that there are two completely separate populations. This belief was eventually debunked by Frank Mather and Frank Carey in a series of tagging experiments. These experiments clearly show that there is one meta-population of Bluefin, because many Bluefin tuna were traveling between the two breeding grounds. This journey is across the entire Atlantic Ocean is yet another testament to the abilities of this magnificent fish. The belief in two separate populations caused problems because quotas set were not realistic. This happened because the tuna traveling between the two populations skewed the recorded data that was used to make the quotas. The International Convention for Conservation of Atlantic Tunas (responsible for tuna population's world-wide) failed to apply reasonable quotas. Eventually, this resulted in a collapse of the entire Bluefin tuna population.

Also adding to the demise of the Bluefin tuna was the use of an idea pioneered in Australia. This was to gather adolescent tuna and place them in marine corrals where they could feed them, fatten them and prepare them to be shipped to Japan. In the Mediterranean, there are catch limits on Bluefin tuna but there are no catch limits on immature tuna, which allows fisheries to catch them in an immature state and fatten them for sale. This is a loop hole which is currently being exploited by several countries including Spain, France, Italy, Greece,

³⁴ Ellis, Richard. "Introduction." Introduction. *Tuna : a Love Story*. New York: Alfred A. Knopf, 2008. Vii-Xi. Print.

Turkey, Croatia, Egypt, Libya, Tunisia, Algeria, Morocco and Malta. This method of fishing, being used by so many countries, is one of the most devastating in terms of effects on population. These effects are devastating because the fish are captured before maturity and mating age and are then kept penned until they become fit for the Asian market. This will rapidly reduce populations of a species because they will have reduced reproduction rates. When scientists began noticing what was happening and realized the permanent effect this method of fishing will have and already has had on the populations of tuna worldwide, the World Wildlife Fund (WWF) called for a cessation of all tuna fishing in the Mediterranean. Despite the best intentions of the organization, there was simply too much money being made and the plea WWF made was virtually unheard.³⁵

Currently the greatest threat to the populations of Bluefin tuna is the country Turkey. Turkey has announced that it will ignore the agreed upon Bluefin quotas. This is a major issue because Turkey currently runs the largest Mediterranean fleet targeting Bluefin tuna. This ignorance could mark the beginning of the rapid demise of the remaining Bluefin tuna populations. The logic behind the actions of Turkey is misguided. There will be large sums of money made in the short term but in as little as one year's time their entire fleet devoted to the exploitation of the Bluefin will be rendered useless. They will have caused a complete depletion of the species and possible extinction. It is the greed of countries like Turkey which is going to

³⁵ Ellis, Richard. "Tuna Farming." *Tuna : a Love Story*. New York: Alfred A. Knopf, 2008. 159-82. Web. 25 Apr. 2011.

cause irreparable damage to the oceans and cause mass extinctions of species which once ruled the oceans in unimaginable numbers.³⁶

The organization responsible for safeguarding tuna populations is under heavy criticism. They are being accused of mismanaging the population and for ignoring long lining despite several warnings from scientists studying the effects of this fishing method on the Bluefin tuna. Scientists have been advising since 2006 that the annual catch of Bluefin should be below 15,000 tons. Despite the best efforts of the scientists, the International Commission for the Conservation of Atlantic Tunas (ICCAT) is yet to apply the advice given by them, and in 2007 61,100 tons of Bluefin were caught. 61,100 tons is twice the quota set by ICCAT and four times the amount recommended by scientists.³⁷ The ignorance of ICCAT will no doubt cause them to be a leading member in those responsible for the devastating plunder of Bluefin populations if negligent fishing of this species continues.

South East Asian Coastal Degradation

The coral reefs hugging the coast of Indonesia and the Philippines are home to the world's most diverse coral species and organisms. Southeast Asia contains 100,000 square kilometers of coral reefs, almost 34 percent of the world's total. In this region, there are approximately 600 to 800 reef-building organisms, these reefs are home to the greatest levels of marine biodiversity on earth. This region is also home to 51 of 70 mangrove species and 23 of

³⁶ Hance, Jeremy. "Turkey Ignores Bluefin Tuna Quotas, Further Imperiling Critically-endangered Species." *Conservation and Environmental Science News*. Mongabay.com, 12 May 2009. Web. 10 May 2011. <http://news.mongabay.com/2009/0512-hance_turkeytuna.html>.

³⁷ Knowles, Oliver. "ICCAT Fails to Protect Bluefin Tuna | Greenpeace International." *Greenpeace USA | Greenpeace USA*. 27 Nov. 2010. Web. 10 May 2011. <<http://www.greenpeace.org/international/en/news/Blogs/makingwaves/iccat-fails-to-protect-bluefin-tuna/blog/29151>>.

50 sea grass species. Mangroves are an immensely diverse ecosystem and sadly they are now at risk because of unsustainable fishing methods and urban development.

The worth of the resources found in this aquatic ecosystem is immense, yet despite its worth Southeast Asian coastal waters face unprecedented threats from human activity. The main threats to the reefs include overfishing, destructive fishing practices, sedimentation and pollution from land based sources. Some of the fishing activities of an unsustainable nature being carried out in this region include blast fishing and cyanide fishing. Blast fishing, banned in 1985, is currently a grave threat to Indonesian coral reefs. The use of improvised explosives which often contain kerosene and fertilizer give fishermen the ability to kill many fish at once with an explosion. This method of fishing also causes irreparable damage to the coral. Cyanide fishing, pioneered in the 1960's due to the growing market for aquarium fish in North America and Europe is another unsustainable fishing method. Fishermen who use this method take the cyanide poison and insert it directly into the crevices of the coral. When fish come in contact with the cyanide it stuns them allowing the fishermen to catch their targeted fish with ease. The cyanide, much like the explosives, causes irreparable damage to the coral. The death of the coral will cause a rapid and devastating reduction of all species of fish relying on the coral reefs for breeding and refuge. This negatively affects all fisheries and the livelihood of all people who depend on those fish for survival.³⁸

Most southeastern Asian coastal communities are socially and economically dependent upon coral reef ecosystems. Reefs provide people with occupation, goods and services. In this

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Lu, Andrea. "Turmoil in the Sea: Blast Fishing Destroys Coral Reefs." *The Daily Californian*. 30 Mar. 2005. Web. 10 May 2011. <http://www.dailycal.org/article/18135/turmoil_in_the_sea_blast_fishing_destroys_coral_re>.

region, reef related fisheries make the largest contribution to Southeast Asia's fish catches. It is estimated that around 350 million people live within 50km of the coast and each and every one of these people is dependent upon the coral reefs and the fish which reside in them. In fact, the single greatest source of protein consumed by the coastal people of Southeast Asia is fish. The depletion of the coral reef will and already has shown its social effects on the population and culture dependent upon them. Around 86 million people live in the Philippines and approximately 40% of those people live on less than one dollar a day. The majority of these people make a living off the sale of fish they catch and they also survive off the consumption of the fish they catch. Due to unsustainable fishing methods, catches are down. When catches become increasingly lower, the fishermen, who are already surviving off of a pittance from the sale of fish, will in turn make less money. When catches are reduced, fishermen are forced to resort to less sustainable methods of fishing because they provide greater catches. This will worsen the problem thereby causing further degradation of the biodiversity in this region and accelerating the process.³⁹

The situation in Southeast Asia is not good. The reefs are being destroyed by industrial trawlers as well as the degrading fishing methods that are used by local fishermen in the area. The destruction of the biodiversity in this area is happening at a rate unrivaled in any other part of the world. This is also happening in an area which is host to the greatest level of marine biodiversity in the world. If this continues, many species which are uniquely found in this region will be lost to the world. This is a perfect place to set an example of how the effects of over-

³⁹ Author, Unknown. "Destructive Fishing Is Widespread in Southeast Asia | World Resources Institute." *World Resources Institute | Global Warming, Climate Change, Ecosystems, Sustainable Markets, Good Governance & the Environment*. World Resources Institute, 25 Sept. 2008. Wed. 10 May 2011. <<http://www.wri.org/map/destructive-fishing-widespread-southeast-asia>>.

fishing can be reversed. If people see coastal degradation like this example recover from an unrivaled downward spiral, they will begin to see that there is hope and change can happen.

NGO's and IGO's

There are thousands upon thousands of non-governmental organizations (NGOs) dedicated to being advocates of the issues which the oceans are currently facing. Despite the immense number of NGOs there are still not nearly enough to counter the rapid destruction of the ocean resources. Many people believe that peace and security in the ocean is accomplished by governments and their naval and other security forces. This however couldn't be farther from the truth. One of the largest roles is played by the NGOs. NGOs tend to be very vocal about the issues. The main role of NGOs is advocacy, which is possibly the most important one

because knowledge is the key to saving the oceans. NGOs have been able to influence government positions and public opinion in support of the oceans. For instance, when the Galapagos Islands reopened long-lining hundreds of NGOs rallied to have it banned in this sanctuary once again and soon enough it was.⁴⁰

One of the more influential NGOs is the Sea Sheppard Conservation Society (SSCS). This is an international non-profit, marine wildlife conservation organization. The goal of this organization is to stop the destruction of habitat as well as the slaughter of the oceans' wildlife. By doing so, the SSCS aims to conserve the oceanic ecosystem and the species which reside within it. This is a group which takes action instead of advocating. They hunt down vessels which are illegally fishing. The SSCS is trying to expose and confront illegal fishing at sea to safeguard the delicately balanced ocean ecosystem.⁴¹

Another NGO known as The Cousteau Society tackles the issue in a much different manner than SSCS. They are an organization that aims to raise awareness of the "fragility of life on our water planet"⁴². This organization was founded in 1973 by Captain Jacques-Yves Cousteau. The society currently has more than 50,000 members worldwide and continues to grow and increase knowledge worldwide about the unsustainable use of ocean resources.⁴³

There are very few intergovernmental organizations (IGOSs) which have taken action, and developed a prominent role in the maintenance of ocean biodiversity. Some intergovernmental organizations, like the United Nations, have made a positive impact on the

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Pauly, D., and J. L. Maclean. *In a Perfect Ocean: the State of Fisheries and Ecosystems in the North Atlantic Ocean*. Washington: Island, 2003. Print.

⁴¹"Who We Are." *Sea Shepherd*. SSCS, 2011. Web. 10 May 2011. <<http://www.seashepherd.org/who-we-are/>>.

⁴²"Who We Are." *Sea Shepherd*. SSCS, 2011. Web. 10 May 2011. <<http://www.seashepherd.org/who-we-are/>>.

⁴³"Who We Are." *Sea Shepherd*. SSCS, 2011. Web. 10 May 2011. <<http://www.seashepherd.org/who-we-are/>>.

issue by creating marine protected areas. IGOs do not play a significant role in dealing with the issue and are notorious for putting ideas on paper about how to resolve the issue without following through.

IGOs, like the United Nations, are putting minimal effort towards the actual protection of oceanic biodiversity. They have recognized the factual evidence that it is a global issue today. The United Nations have, however, pulled up short in taking physical action and in becoming a part of the solution. The United Nations has had several papers and articles published based on facts found in relation to loss of biodiversity and has an immense amount of external resource available through their website. The United Nations is supposed to be a leader in society, taking action and prompting other organizations to act. The United Nations should take a more prominent role in bringing biodiversity in the oceans back to the state it was in not too long ago.⁴⁴

Marine Biodiversity in Canada

Canada has the world's largest coastline and an ocean estate of 7.1 million hectares, the second largest in the world. Canada is home to some of the world's most productive bio-zones along its west coast. The upwelling of nutrients which occurs along the west coast of Canada provides a diverse array of marine life. An area on the west coast where this occurs is off southwestern Vancouver Island. This part of the ocean plays an important role in the life cycles of several important fish stocks like the Pacific salmon. Canada is most famous though for the

⁴⁴ Gordon, Don. "Deep-Sea Corals of Atlantic Canada." ::*Centre for Marine Biodiversity*::. Web. 10 May 2011. <<http://www.marinebiodiversity.ca/CoralWebsite/Homepagecorals.htm>>.

cod which used to dominate the east coast of Canada. This, however, is no longer the case as the cod were simply fished to near extinction.⁴⁵

Climate change is another factor in the loss of marine biodiversity in Canada. This is largely due to the cold climate which allows it to be strongly affected by warming trends in the global climate. Also, when climate change is coupled with habitat loss and over exploitation, the need for conservation effort begins to become very evident. The IPCC declared that the onset of climate change effects on ocean biodiversity is evident and has already begun to show its effects on the Canadian marine ecosystem. Climate change is already manifesting its effects in the form of changing life cycles, shifting habitat and development of new physical traits. The temperatures in Canada have shown increases of twice the global average, making Canada far more susceptible to the effects of global warming.⁴⁶

Canada, to the surprise of many, is home to coral reefs on both its East and West coasts. Very little was known about this deep sea coral until very recently. Deep sea coral can be found in depths anywhere between 200 to 1500 meters below the surface. These reefs are essential to the deep sea eco-system. Deep sea coral like Caribbean coral is also at risk of being eliminated from the oceans. This is likely to happen because of the effects bottom trawlers have on the coral which is found in depths off Canada's coast.⁴⁷

⁴⁵ "NEPTUNE Canada: Marine Life and Climate Change." *NEPTUNE Canada: Home*. Neptune Canada, 2011. Web. 10 May 2011. <<http://www.neptunecanada.ca>>.

⁴⁶ Soares, Mário. *The Ocean Our Future*. Cambridge, England: Cambridge UP, 1998. Print.

⁴⁷Gordon, Don. "Deep-Sea Corals of Atlantic Canada." ::*Centre for Marine Biodiversity*::. Web. 10 May 2011. <<http://www.marinebiodiversity.ca/CoralWebsite/Homepagecorals.htm>>.

The conservation of biodiversity in Canada is a shared responsibility between the Federal and Provincial governments. The approaches which are commonly taken to conserve marine life include a comprehensive management of the use of the oceans resources promoting the use of sustainable animals from the ocean and the use of public education to increase awareness and evoke action.⁴⁸

In 2004 Canada, along with other countries, established marine areas under the Convention of Biological Diversity. These marine areas are to be implemented in the year 2012. This is an attempt to reduce the current rate of biodiversity loss. As of today, Canada's oceans consist of only .5% protected areas and even some of that .5% is open to fishing. Canada also became the first country to pass an ecosystem-based management plan for its oceans when it passed the Oceans Act in 1997. Under this Act, Fisheries and Oceans Canada must create a transparent plan which limits conflict among users and increases sustainable use of resources in Canadian waters. Canada continues to be a frontrunner in the movement towards more sustainable use of oceans resources.

Solutions

The oceans face a myriad of challenges and the well-being of the ocean is at risk. The challenges that are faced by the oceans do have solutions which could aid in the process of increasing the sustainability within them. Some of the methods suggested include targeting smaller fish, increasing small fisheries, decreasing bycatch, creating more environmentally protected areas and, lastly, increasing knowledge of the problem. These solutions would all play a role in increasing the sustainable use of oceans and the life within.

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"NEPTUNE Canada: Marine Life and Climate Change." *NEPTUNE Canada: Home*. Neptune Canada, 2011. Web. 10 May 2011. <<http://www.neptunecanada.ca>>.

A simple method which will greatly benefit the well-being of the oceans is to tap into the smaller fish in the marine ecosystem. To make the issue relevant in the minds of most people it should be compared to the diet of terrestrial animals. Consider this, humans do not mainly eat lions, tigers and wolves, the large terrestrial animals, they often opt for much smaller animals such as chicken. This is the opposite of what happens in the oceans. Almost 100% of the fish consumed are large, and the small fish which have just as much or more protein are forgotten. This puts unneeded strain on larger fish stocks as they are the only fish being targeted by the industrial fishery. If a tuna sandwich could be replaced by sardines, anchovies or other species of small fish which are preyed upon by tuna, it will be much easier to sustain the oceans' fish stocks. Despite the positives, this solution also has negative aspects. It is highly unlikely that a large enough portion of the world population will abandon current appetites. If one is used to eating tuna, salmon or sailfish one will not stop eating them without drastic persuasion. Although, theoretically, if this solution is put into action, it is likely that the sustainability within the oceans will increase.⁴⁹

The destruction of coral and habitat vital to the reproduction of fish is due to the industrial fishery. Commercial fishing is considered as the main source for marine goods. A recent study has shown that small scale fisheries actually account for the larger portion of global catches. Yet the advantage is still given to the industrial fisheries because more funding is provided to them. Unfortunately, the methods of fishing that the industrial fisheries use are very unsustainable. An example of one of the wasteful fishing methods practiced by the fishery is bottom trawling, which was touched on earlier in the paper. If small scale fisheries were

⁴⁹ Sylvia Earle TED award winning speech [video]. (2008). Retrieved March 8, 2011 from <http://www.youtube.com/watch?v=43DuLcBFxoY>

given the advantage over industrial ones, there would be an increase in sustainable fishing, and fewer wasteful fishing methods would be practiced. This would eventually lead to greater sustainability of biodiversity within the oceans. If the commercial fishery continues to grow, it will begin to shut down small coastal fisheries as they begin moving closer to coastal economies. The problem with trying to implement this solution is that people feel more comfortable buying their fish from trusted commercial sources. If coastal communities are given control, it is possible their small fishing industry will grow into larger ones. This means that they would likely adopt less sustainable fishing methods. This solution seems like it would be a good quick fix but in the long term there is a risk that the issue could arise again. Although a logical solution, if implemented, it would likely cause further degradation to the oceans biodiversity.⁵⁰

Many fishing methods, like long-lining have bycatch. Bycatch is when you intend to catch one species of fish and you end up catching, and sometimes killing, several other species by accident. This can be stopped by creating more efficient methods of catching only the intended fish, thus avoiding the depletion of endangered species like turtles and sharks. If a method like a repellent is created, bycatch could be reduced dramatically. This could help make fishing methods more sustainable. This solution would come at the expense of the large fishing industry. This seems like a hard sell. The fishermen aren't going to implement this solution if it comes as an expense to them. The only way which this solution could be viable is if the government funds the scientific development of such repellents as well as the mass production of the finished product. The government would also have to provide each fishing vessel with

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Sample, Ian. "Deep-sea Trawling Is Destroying Coral Reefs and Pristine Marine Habitats | Environment | Guardian.co.uk." *Latest News, Comment and Reviews from the Guardian | Guardian.co.uk*. 18 Feb. 2010. Web. 10 May 2011. <<http://www.guardian.co.uk/environment/2010/feb/18/deep-sea-trawling-coral-reefs>>.

the repellent. The expense which this poses to governments involved with the implementation of this solution would be excessive. These governments would be hesitant to spend the sums of money which would be needed even when the money would benefit the sustainability of the oceans.⁵¹

The benefits of creating more environmentally protected areas is obvious. It will provide benefits by restricting the area fishing vessels are allowed to fish. It can also be used to save specific areas that are at risk, or areas with large amounts of marine life which need to be preserved. This solution holds promise only if the waters within the protected areas are monitored. This is because fishing vessels will not hesitate to fish the waters within unmonitored protected areas. This issue can be effective but its effectiveness is conditional on the ability to monitor the waters which are being protected.

Many people believe firmly in the notion that knowledge is the key. In this case, these people are right, knowledge is the key to solving all of the problems which are faced by the oceans. People don't know from where they are getting their food. They see it as dinner and don't ask questions. If they knew about the methods which are used to put that dinner on their plate, they would think twice about purchasing it the next time they are at the supermarket. The more people know about the issues being faced by the oceans the faster they will deal with it. There are no negatives to this solution. It will only assist the other solutions when they are put in place. It is also evident that the only way these other solutions can become successful is

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Unknown, Author. "Bycatch | Greenpeace International." *Greenpeace USA | Greenpeace USA*. Greenpeace. Web. 10 May 2011. <<http://www.greenpeace.org/international/en/campaigns/oceans/bycatch/>>.

through knowledge. Knowledge is the key. Because of the advocate teachings of people like Sylvia Earle, the degradation of the oceans biodiversity will hopefully show signs of receding.⁵²

Science and technology are often seen as leading causes in the deterioration and exploitation of the oceans. Technology is the means people use to consume beyond their needs. Going beyond needs causes the unsustainable use of resources. In order to resolve the effects of technology on this problem, it is in all consumers best interest to try and focus on translating the potential of the oceans to satisfy only basic needs. Technology can also be used to show us the effects of what is being done to the oceans, as it is a difficult task to monitor the damage that has been done to the oceans' ecosystem. It is logical to turn something which has been so prevalent in the demise of the oceans, into something which can be used to benefit them. This seems to be a fairly logical solution, as it also contributes to the advocacy solution as it adds to information which can demonstrate what is happening to the oceans.

It is evident after analyzing the solutions, that increasing public knowledge of the issue is the best way to solve it. This is because the more people know about something the more likely they are to act in its benefit. When people are on the edge and don't really know the full extent of a problem, it is common for them to simply do nothing. This solution has no negatives, and will likely benefit the biodiversity within the oceans in a quick and effective manner. This solution will also positively affect each and every other solution put in place. This is because people will support any plan which could benefit the issue if they understand about the problem and the effects it will have. In conclusion, to prolong the existence of the human

⁵² Sylvia Earle TED award winning speech [video]. (2008). Retrieved March 8, 2011 from <http://www.youtube.com/watch?v=43DuLcBFxoY>

race the ocean must be saved first and to do so, knowledge of the rapid degradation of the oceans biodiversity needs to be spread.

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Appendices

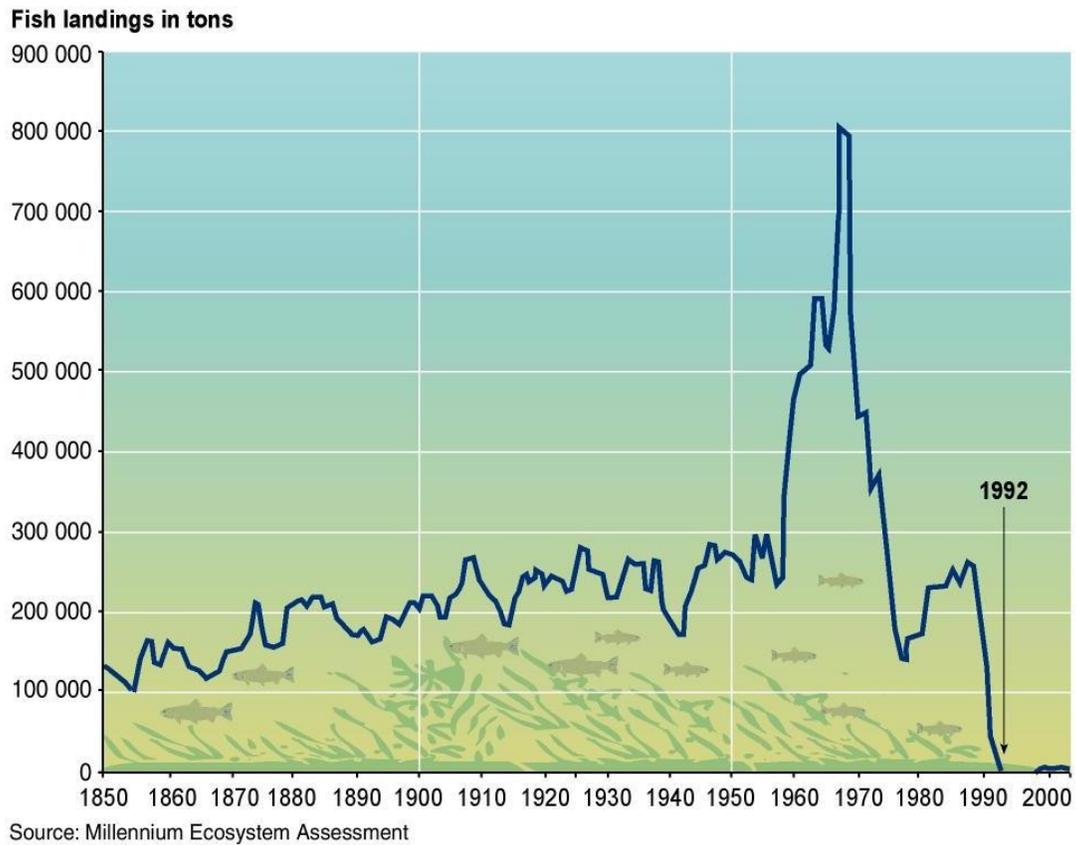
Appendix I

(Shark Finning)



These are the remains of a shark which has been finned,
and discarded

Appendices II
(Rapid decline in fish stocks, due to over-fishing)



Shows the rapid decline in annual catches due to the effects of over-fishing, and because of the unsustainable methods used to conduct the overfishing

Appendix III

(Coastal economies affected by a loss in marine biodiversity)



These are coastal areas of the world, which have visibly seen the effects of fishing methods which are not beneficial to the biodiversity present in them