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Final Research Paper

A Game of Choice: the Economy or the Environment?

The Great Barrier Reef of Australia is known as one of the seven natural wonders of the world. It stretches along 3,000 kilometers of the continent’s northeastern coast, covering an area in total of about 344,400 kilometers squared, and is so immense that the reef is visible from space (“Facts about,” n.d.). Most of all though, the reef is renowned for the diversity held within it, housing a “breathtaking array of marine creatures” and allowing it to cover a “unique range of ecological communities, habitats, and species” (“Facts about,” n.d.).

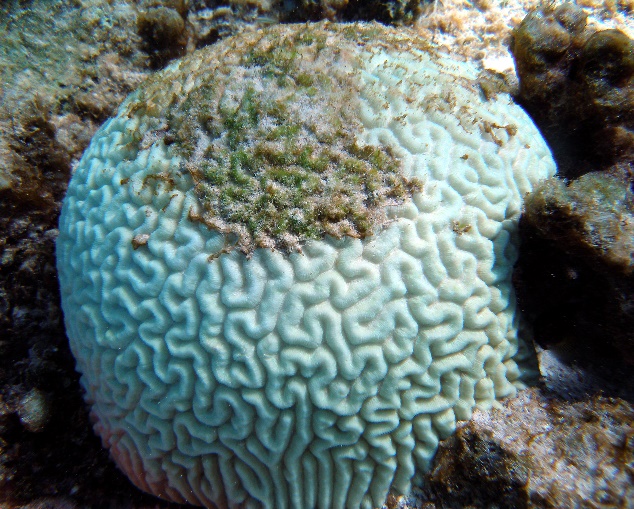
However, the Great Barrier Reef is plagued by a number of human-wrought maladies. Rising carbon dioxide, CO2, emissions have indirectly contributed to the degradation of coral reefs, in that “nearly a third of anthropogenic carbon added to the atmosphere” is taken in by the ocean to form what is known as a carbon sink (Doney, Fabry, Feely, & Kleypas, 2009). While the decrease of the amount of CO in the air seems beneficial, consequently the increase in the amount of CO­2 in the ocean leads to coral reef degradation by bleaching instead (through bleaching). Coral bleaching is the act of ejecting the algae that give the coral their color as a response to the stress of warming temperatures, with death usually to follow (which usually results in death) (Glick, 1999). Depicted in Figure 1 is an example of how coral bleaching appears. The photograph shows the stark difference between the bleached coral, areas of white color, and unbleached, healthy areas of a brain corals, areas of green and brown color(This photograph of a brain coral shows the stark difference between the white bleached area and the green and brown healthy, unbleached area). The coral bleaching is an enormous problem, because inevitably the increase in temperature of the ocean will persist unless something is done to reduce carbon ocean sinks, meaning that the death of coral reef in the Great Barrier Reef will also continue.

Figure 1: Coral bleaching effects

(NOAA, n.d.).

Inevitably, the sinking of carbon into the ocean causes the pH to decrease, meaning that the acidity of the ocean is increasing (Anthony, Kline, Diaz-Pulido, Dove, & Hoegh-Guldberg, 2008). Furthermore, the drop in pH leads lowers the ability of coral to attain the necessary compound, carbonate, that allows them to maintain and expand themselves ??? (Hoegh-Guldberg et al., 2007). What happens is that the carbon dioxide that dissolves into the ocean reacts with water, H2O, leading to the formation of the carbonic acid, H2CO3. However, acids dissociate, as in they break apart, leading to the formation of hydrogen ions, H+. In addition to lowering the acidity of ocean water, the ion combines with the carbonate in the water, depleting the concentration of the compound; as a consequence, the coral cannot repair themselves from damage( “compound, resulting in the coral being unable to heal it’s injuries.”) (Hoegh-Guldberg et al., 2007).

Coral bleaching and inability for coral to rebuild themselves (“...and the inability of coral to heal themselves”) becomes a deadly combination that leads to the destruction of the coral reef. Studies have also shown that the calcification rates for the Great Barrier Reef have shown a drastic decline, with the data “[suggesting] that such a severe and sudden decline in calcification is unprecedented in at least the past 400 years” (De’ath, Lough, & Fabricius, 2009). This information demonstrates that with the fast increasing pH and warming waters, the coral reef has been degrading at an alarmingly fast rate. (“…demsontrates that the quickly rising pH levels combined with the warming waters is causing the majestic coral reefs to degrade at an alarmingly fast rate.”)

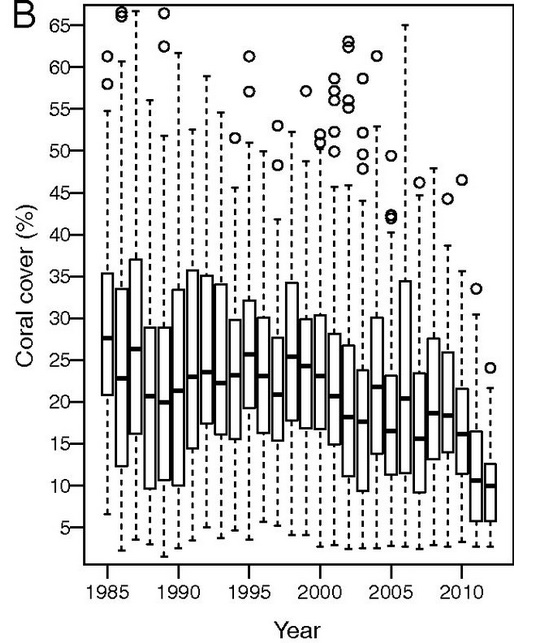
The effects of the degradation of the Great Barrier Reef are already very prominent. As of 2012, there has already been “a loss of 50.7% of initial coral cover” within just a period of 27 years (De’ath, Fabricius, Sweatman, & Puotinen, 2012). This statistic demonstrates (just used demonstrates 2 sentences ish ago. Maybe use shows instead or reword?) the amount of devastation already wrought upon the coral reef, with only more to follow if action is not taken. Represented in Figure 2 is a box plot that provides a visual representation of the decline in coral cover in the Great Barrier Reef over the span of the last 30 or so years. This decrease is represented by the linear decline of the boxes as time passes. In addition to simply the loss of the coral reef itself (“…to just the losses of the coral reefs themselves,”), there is also “habitat loss of the tens of thousands of species” that are dependent on the Great Barrier Reef for home ( Awk “that depend on the Great Barrier Reef and call it their home.”) (De’ath, Fabricius, Sweatman, & Puotinen, 2012). As a result, destruction of the coral reef ecosystem is also a severe blow to the diversity that it supports. (“As a result, the destruction of the coral reef ecosystem is also a severe blow to the lives of a diverse collection of species that is supported by the coral reefs.”)

Figure 2: Box plot graph that shows the decline in coral cover over the last 30 years or so. The important places to look are the boxed areas of the graph that represent the median of data, an average taken from the range of data collected, which is represented by the lines extending from the boxes. Circles above the lines represent outliers, which are data far out of the average range and can be discounted (De’ath, Fabricius, Sweatman, & Puotinen, 2012).

Furthermore, destruction of the Great Barrier Reef is also the loss of a great social and economic resource. The coral reef is of great importance to the health of the Queensland, the Australian state that borders the Great Barrier Reef, which depends on the reef’s existence. Australia, the country as a whole, appears to strive for protection of the Great Barrier Reef, seeing as to how the reef brings in extensive amounts of income annually through tourism and the fishing industry.(“Australia strives to protect the Great Barrier Reef as it provides the country with an extensive income annually through the fishing industry and tourism.”) The government of Australia has implemented measures to regulate the amount of CO2 emissions by(through) )expansion of a coal port, the country proves itself to not understand just how important the existence of the Great Barrier Reef is.(Yet, the recent approval of dredge spoil dumping near the coral reefs for the expansion of a coral port proves the countries lack of understanding of how important the Great Barier Reef is.”) It seems like a decision to prioritize economic growth over the health of the ecosystem. The Great Barrier Reef is of significant importance in an economic sense though(“holds an important economic role as well however”), reeling in large amounts of revenue for the Australian economy every year through the fishing industry and the tourism the reef brings. What must happen then is prioritization of environmental protection, preservation of the coral reef(“to preserve the coral reef”), over economic growth by(of) the Australian government, especially because the Great Barrier Reef brings(can bring) commercial benefits of its own.

Degradation(Destruction) too much “degradation” use. of the Great Barrier Reef results in significant economic consequences because the reef has proven itself capable of generating profit. The idea that destruction of the coral reef also leads to economic repercussions holds specifically (is particularly) true for the fishing industry, as well as the communities that depend on the reefs for revenue. Every year, the Great Barrier Reefs draws in significant amounts of revenue through fishing. In 2006 alone, the reefs “contributed $139 million to the Australian economy” through commercial fishing (*Outlook Report*, 2009). Furthermore, recreational fishing and boating brought in an additional $122 million in the same time period this is a little awk ishh. (Stoeckl et al., 2011). Together, the values add up into to a substantial sum that is contributed to the economy in Australia as well as to support the Queensland community(“community of Queensland”). The success of this industry however depends on the existence of the Great Barrier Reef, which supports the fish that are caught. Sustainable conservation of the reef, in that doing so would allow the fishing industry to continue providing revenue but also allow the survival of the ecosystem of the area, becomes very appealing when looking at how much would be lost with the devastation of the coral reefs. The protection of the Great Barrier Reef provides a path for maintaining the environment while still allowing the economy to grow. In protecting the fishing industry, Australia would be prioritizing environmental health but with the additional benefit of still supporting its economy.(“In proecting the fishing industry, Australia would not only be prioritizing environmental health, but also sustain their own economic health as well.”)

Tourism is an even greater contributor to the influx of revenue brought on by the Great Barrier Reef. Just in 2006, the tourism industry reaped an estimated $5.117 billion for Australia (*Outlook Report*, 2009). Loss of the Great Barrier Reef would leave a noticeable indent on the amount of profit generated. The degradation of the coral reef would “lessen its appeal as a destination,” dropping(“and drop”) the number of visitors to the area as well as the amount of profit earned(“revenue generated from these visitors”) (Amelung & Nicholls, 2014). This would be due to the bleached color of the coral, as well as the diminished amount left as degradation of the Great Barrier Reef carries on. Continued destruction of the Great Barrier Reef would only make it even less attractive than it is currently, implying that the downward trend in tourism would continue. In this case, protection of the coral reef would be a positive move on (from) an economic standpoint.

Furthermore, the Great Barrier Reef helps provide work (jobs) to many people along the Queensland coast. The total, adding up the number of jobs in the fishing industry and the tourism industry, is “over 54,000 full-time positions” (*Outlook Report*,2009). Industries surrounding the Great Barrier Reef support a significant number of people by providing to them jobs through the industries the reef supports. In sustaining the coral reef, the jobs of many people will also be maintained. Protection of the coral reef is also protection of the industries that depend on the reef’s existence, as well as the people that work in those industries. Choosing to prioritize environmental health inevitably still provides(will provide) its own economic benefits.

Much is to be done, however, [commas] if human beings want to save the coral reefs of the Great Barrier (“Great Barrier Reefs”). To do so however requires attack at the root(“requires an attack to the root”) of the issue: rising carbon emissions. One viable option would be the implementation of economic controls on carbon, which would put a price on the emission of the greenhouse gas. Australia has already implemented a carbon tax system, though is now “[ending] the carbon pricing mechanism and [bringing] the Australian carbon price into line with the carbon price prevailing under… [an] emission trading system” (Australian Government, 2013). The carbon tax system involves taxing the overall amount of emissions, while the cap-and-trade, which Australia has now chosen to switch to, sets limits on how much carbon can be emitted, with each limits able to be traded so that the company has the amount that is requires for its company.

Despite these moves to protect the Great Barrier Reef however, in light of recent events, Australia has not shown that it understands how integral the coral reef truly is. Just last month the Australian government signed off the movement to dump dredge spoils from the expansion of a coal port, consisting of sediment and mud, in the Great Barrier Reef (Green, 2014). What is also significant about the passing of the decision is how “final approval came from the Great Barrier Reef Marine Park Authority,” the people that manage the coral reef (McKirdy, 2014). The Chairman of the group, Dr. Russell Reichelt went as far as trying(“as to try”) to defend the decision, claiming it was “important to note the seafloor of the approved disposal area… does not contain coral reefs,” as if choosing an emptier area made the dredge dumping any less harmful, even if the sediment could travel to where the corals are. The decision demonstrates a movement towards prioritization of economic growth over the health of the Great Barrier Reef. In approving the action, Australia also proves lack of recognition of how much the coral reef brings to the table in terms of its great number of benefits. Furthermore, coal, a solid fossil fuel, is known for emitting large amounts of CO2 when burned (EPA*,* 2013). The expansion of the coal port also poses environmental damage in the sense that the decision supports the use of a fossil fuel that emits enormous quantities of greenhouse gases. From this point of view, Australia also appears to be choosing economic growth over environmental health.

It is understandable that a country would want to expand its economy, as a larger economy would bring in more revenue. However, that economic growth comes at the cost of the environment does not feel as understandable[awk reword], especially when the Great Barrier Reef also contributes to the economy in its own ways(“is also a major contributor”). In protecting the coral reefs, Australia also gains the benefits that the Great Barrier Reef brings through the fishing and tourism industries that the reef supports, but instead the country chose an alternate path that prioritized economic growth. Australia may have performed good actions for the Great Barrier Reef in the past, such as by implementing economic controls on the carbon emissions of the country, but that does not provide a pass to perform a bad action. If Australia truly wants to maintain the coral reef and the economic support that the Great Barrier Reef brings, the country cannot follow the reasoning that one good decision allows a bad one. To strive to protect the Great Barrier Reef means to continue choosing to prioritize the health of the environment over economic benefit. As aforementioned as well, the coral reef brings its own support to the table that makes the reef a valuable asset.[awk and a bit repetitive idk. Feels kind of not needed.]

The issue of carbon emissions is a global one though, requiring not only the cooperation of Australia but also all the countries of the world, as the environmental issue is not limited to just one country. Each country emits some amount of carbon into the air no matter how large or small the quantity. Who can be held responsible for a crime of carbon emissions if the case is that all countries contribute towards the total amount of CO2?

The people of the world as a whole must begin to prioritize the protection of the environment of the planet that they inhabit. The decision for just some countries to make the positive move towards environmentalism is not enough, especially while others are still moving the other direction(contributing the harm of the environment). In the case of the Great Barrier Reef, this concept is extremely relevant because the issue of rising carbon emissions, the source of the reef’s degradation, can only be alleviated by lowering of emissions instead[takeout]. However, the decision to cut carbon emissions is not an action that can accomplished solely by Australia, because emission of carbon is collective of all countries. However, if all countries choose to prioritize the health of the planet over their individual economies though[takeout]. and reduce the amounts of carbon that each country emits, carbon emissions will fall. This destroys the source of the issue hurting the Great Barrier Reef, paving the path towards the recovery of the coral reef ecosystem.

The effort to save the Great Barrier Reef for degradation is ongoing, just as the issue of carbon emissions is ongoing.(Saving the Great Barrier Reef from degradation is an ongoing effort, just as the issue of carbon emission remain prevalent.) So long as the problem persists, so will the attempts to protect the coral reef. Australia, as well as the rest of the world, must begin to prioritize the environment over the economy if they desire to move towards protection of the Great Barrier Reef. The reef houses an enormous amount of biodiversity, all of which depend on the existence of the Great Barrier Reef to survive. Furthermore, protection of the Great Barrier Reef also draws out the economic benefits of the ecosystem. The fishing industry is supported by the fish inhabit the reef, pulling in a noteworthy quantity in profits annually. In addition, the tourism industry is supported by the attractiveness of the coral reef, drawing an even grander (use “greater” maybe. Grander sounds awk.) amount in revenue for the Australian government. The two industries combined also provide a considerable number of jobs for the coastline community. Yet, in spite of the benefits brought from the Great Barrier Reef, Australia has demonstrated a choice to support economic growth over environmental conservation through the decision to approve dredge spoil dumping near the coral reef. The choice is also controversial because the spoils are the result of expansion of a port for coal, a known emitter of CO2. While the country has made advances toward protection of the reef by implementing economic controls over carbon emissions, the amount of positive actions performed does not allow Australia to follow a negative action; in choosing to dump the spoils within the Great Barrier Reef, the country clearly expresses the prioritization of the economy. Australia however must recognize the benefits that protection of the coral reef will bring and begin to trump economic growth over the health of the Great Barrier Reef. In doing so, the Great Barrier Reef has a chance to recover from the damage done and perhaps thrive again.

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