

Comparison of Biodiversity Conservation in Cameroon and the Philippines

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Abstract

This paper discusses the benefits, threats to, and methods to conserve biodiversity. Through case studies of Cameroon and the Philippines, it examines specific issues faced by these countries and the approaches they are taking to overcome them. The paper concludes by comparing and contrasting the two countries, finding that they are in fact extremely similar, though they differ in the specific types of challenges faced and levels of success in conquering them.

Literature Review

Biodiversity, in its simplest form, is the variety of life on Earth. It can refer to the number of species within an area or the world as a whole, the genetic variability within an individual species, or the number of different habitats that occur within an ecosystem or landscape (California Biodiversity Council, 2008). However, due to the negative effects of expanding human populations, the loss of this variety is a problem worldwide and the conservation of biodiversity has become a major global concern.

Biodiversity provides a wide range of benefits to humans. Many medicinal drugs were originally derived from various plants, fungi, and bacteria, including aspirin and penicillin. In fact, despite the drug industry's desire to move toward using synthetic compounds to design new products, about 26% of all recently approved drugs come from nature-derived substances (National University of Singapore, 2011). There are also benefits to agriculture associated with high levels of biodiversity, including resistance to disease, nitrogen fixation, increasing crop yields due to genetic resources, biological pest control, and more efficient pollination (Pimentel

and Wilson, 1997). In addition, there are various ecosystem services important both to humans and the environment as a whole linked to high biodiversity, including organic waste recycling, soil formation, flood control, carbon dioxide sequestration, and bioremediation of chemical pollution (Pimentel and Wilson, 1997 and Ceballos, *et al.*, 2010).

Studies have shown a clear link between biodiversity and carbon sequestration. All growing vegetation removes carbon dioxide from the atmosphere and releases oxygen in exchange. The carbon is kept within the plant and used in order to form new tissue (Pimentel and Wilson, 1997). Carbon dioxide is the most prominent of the greenhouse gasses that drive global climate change. Carbon sequestration can help slow climate change, preventing \$90 billion every year in shoreline damage from melting ice caps (Pimentel and Wilson, 1997).

Biodiversity performs another important function—that of bioremediation, or clean up, of toxins in the environment. According to a study published in *Applied Microbiology and Biotechnology*, phytoremediation, or the use of plants to extract, degrade, or immobilize contaminants, is better for the environment, more publically accepted, and circumvents the need to excavate a polluted area (Matsumoto, *et al.*, 2009). The family Cucurbitaceae is particularly efficient at remediating the pesticides dieldrin and endrin, which, although they have been banned for many years, can still be found in certain environments (Matsumoto, *et al.*, 2009). It has been found that plants in Cucurbitaceae can absorb other pollutants as well, including PCBs and DDT (Matsumoto, *et al.*, 2009). Without the wide variety of plants and bacteria that exist, bioremediation would not be possible. There may still be other organisms out there that would be even more adept at cleaning up contaminated soil.

Biodiversity levels are not evenly distributed across the globe. Instead, there are certain “hotspots” that contain disproportionate numbers of species as compared to other areas in the world (Conservation International, 2013). These hotspots include everything from the western coastal rainforests of Africa to the Himalayas to the West Coast of the United States. Most of the world’s hotspots are found near the equator in wet and humid climates, due to the fact that these ecosystems were not disturbed by glaciation and other factors and therefore the organisms that live there have had thousands or even millions of years to speciate. Unfortunately, these are often also some of the most threatened ecosystems in the world (Conservation International, 2013).

While species evolution and extinction are both natural processes, the rate of species extinction is currently thousands of times higher than the natural or background rate (Ceballos, *et al.*, 2010). Many species of plants, animals, fungi, and bacteria face threats due to habitat loss and fragmentation, pollution, poaching, spread of invasive species, poor land management practices, and climate change (Leimu, 2010 and Adenle, 2012). Habitat loss and fragmentation can be due to a variety of factors, including both commercial and civilian logging, agriculture, and urbanization. When this happens, it is very difficult for species to migrate or shift their range to a new area when their own habitat becomes unsuitable. As the planet’s climate changes and ecosystems change with it, this issue is becoming even more urgent (Brooker, 2011). Climate change is expected to intensify the problem of biodiversity loss, especially in areas that currently have large numbers of endangered species (Giam, *et al.*, 2010). In addition, many hotspots are located in less wealthy countries that have few laws in place to protect threatened ecosystems and species and often fewer resources for enforcement when the laws do exist (Conservation International, 2013 and Giam, *et al.*, 2010). Poverty can also lead to overexploitation of

resources by individual citizens (Giam, *et al.*, 2010), although it is certainly true that citizens of wealthy countries often consume an even more disproportionate amount of resources.

Scientists are calling for more species risk assessment and research in order to reverse or at least stall the process of species and population extinction (Giam, *et al.*, 2010). Studies indicate that countries with the greatest financial need should be prioritized for biodiversity conservation efforts and funding. These countries are usually developing countries concentrated around the equator, which also contain a large proportion of the world's hotspots (Conservation International, 2013). Currently, 90% of available funding is spent on wealthier countries (Giam, *et al.*, 2010). Economic incentives such as conservation trust funds are one method that has been suggested to encourage conservation efforts and have been successful in past endeavors. It has also been suggested that a "carrot-or-stick" policy be used on countries with poor governance and high levels of corruption; for example, only countries with strong habitat protection and management could apply for international aid (Giam, *et al.*, 2010). In addition, community conservation outreach and fostering care for land at a local level can help encourage sustainable land management and biodiversity protection (Giam, *et al.*, 2010).

Sustainable land management practices in logging and agriculture must be put in place in both the developed and developing world in order to preserve habitat while still allowing people to make a living. Another method that is often suggested is the creation of protected areas. Although this can help to conserve species habitat, studies show that protected areas alone are not enough to slow or halt the decline of species populations (Hayward, 2011). Due to the habitat fragmentation discussed previously, many species can no longer migrate or shift their ranges in response to changing climate, which was how they coped with past climate changes in ecological history. Some scientists have suggested physically relocating species as a way to deal with the

threat of climate change (Brooker, *et al.*, 2011), though many are skeptical of this method's success. Conserving water resources and reducing pollution are critical to protecting biodiversity as well, which has the added benefit of improving human health and sanitation. (Pimentel and Wilson, 1997). Over 80% of the world's population does not have access to safe water supplies and 65% of global river discharge is considered under at least moderate threat due to human activities (Vorosmarty, 2010). By reducing water use and pollutant discharge and improving aquatic habitat management practices, the world's water resources could be improved both for human drinking water and animal and plant habitat.

The principles, issues, and practices of biodiversity conservation can be found all over the world. This paper looks at two countries, Cameroon and the Philippines, in order to illustrate similarities and differences between them.

Cameroon Case Study

Cameroon lies on the west coast of Africa, in a very important biodiversity hotspot that extends along the west African coast from Guinea to Cameroon and spanning nine countries in between (Conservation International, 2013). The hotspot is one of the most fragmented in the world, retaining only 15% of its original forest cover (Conservation International, 2013). The hotspot also supports a quarter of Africa's large mammals (Norris, 2010). Cameroon itself is home to 15.4 million people and 24 million hectares of rainforest, which contain some of the highest biodiversity levels in Africa (Rainforest Foundation UK, 2011). 39.9% of the population of the country lives below the poverty line (World Bank, 2013).

Though little is understood about many of the species found in the country's rainforests, they face extreme threats from logging. Some studies suggest that in the 20th century, 80% of the

rainforests in Cameroon were converted to an agriculture-forest mosaic (Norris, 2010). These modified fragments of forest provide fuel and food for millions of people and are also the country's best hope for biodiversity conservation (Norris, 2010). Though the government attempts to manage the forests through the use of licensing large scale industrial logging concessions, this has been largely unsuccessful, as it did not address the widespread poverty faced by the people in the region. The people obtain fuel and food from the forest and clear it for agriculture; in fact, illegal logging by civilians is the largest threat to the rainforests (Norris, 2010).

Deforestation is causing soil erosion, desertification, and reduced quality of pastureland, all of which also affect biodiversity (Mongabay, 2006). Large foreign logging companies face few penalties if they violate logging regulations. About eight percent of Cameroon's forests are protected on paper, but the government can do very little to enforce these laws (Mongabay, 2006). The palm oil and cocoa industries also pose a grave threat to the remaining forest cover in the country (WWF, 2012).

Additional threats include poaching, overhunting, and overfishing, aided by rampant corruption in the government. Trophy hunting has caused severe declines in large carnivore populations since the 1970s (Croes, 2011). The country has a thriving bushmeat trade even in protected areas and the government can do little to control this (Peh, 2008). Though Cameroon enjoys relative political stability compared to some other West African countries, the law enforcement personnel in protected areas are often underpaid and so end up colluding with poachers in order to supplement their income (Peh, 2008).

Though these problems may seem overwhelming, there are already efforts to overcome them. One study, "Understanding and Integrating Local Perceptions of Trees and Forests into

Incentives for Sustainable Landscape Management,” suggests the implementation of complex and diverse agroforestry practices (Pfund, et al., 2011). It found that despite local recognition of the importance of forest services and products, forest cover continues to decrease. Though an agroforestry project may start off with many different crops, over time, the tendency is often to move toward a monoculture, due to higher financial returns. The study concludes that incentives such as payments for ecological services rendered from diverse forest cover must be offered to local people to maintain tree cover in rural areas (Pfund, et al., 2011). Another study suggests that increasing conservation and protection efforts for ecotones, or regions of transitions between two biological communities, may help increase biodiversity, as this tends to be naturally higher in these areas (Smith, et al., 1997).

Community forestry has been suggested as a way to not only stop illegal logging, but to mitigate carbon emissions as well (Murdiyarso and Skutsch, 2006). This practice allows villagers to get legal rights to profit from the forest, as long as their harvesting of biomass for food and fuel is kept at a sustainable level. Communities self-regulate their use of this resource. In general, under community forestry programs, biodiversity improves, natural regeneration takes place, and animals that had previously been driven away will sometimes return (Murdiyarso and Skutsch, 2006). This has already been implemented with fair success in Cameroon (Murdiyarso and Skutsch, 2006).

Philippines Case Study

The Philippines are the world’s second largest archipelago, located on the edge of the Ring of Fire between China and Malaysia. The densely populated islands are home to over 105

million people and 7.2 million hectares of rainforest (Fian, 2013). About 26.5% of the country's population lives below the poverty line (World Bank, 2013). The Philippines have over 20,000 species of endemic plants and animals, justifying their designation as one of the world's 17 "mega diverse" hotspots (Conservation International, 2013). The nation is also considered the "center of the center of marine shore fish biodiversity" (Carpenter and Springer, 2005).

Unfortunately, approximately 95% of the country's forests have already been cut down for timber and biofuel and to clear the way for mining and oil palm cultivation, though about 14% of the original vegetation still exists as degraded secondary growth forests (Conservation International, 2013). The islands have a large population of trees in the Dipterocarpaceae family, which are highly prized for their beautiful wood (Conservation International, 2013). Various islands also contain rich deposits of nickel, gold and copper, which are of course highly desired by the mining industry (Fian, 2010 and Kritz, 2013). As in many countries throughout the world, logging and mining companies have destroyed old growth forests, and then second growth forests that may have still preserved biodiversity are cleared for commercial and civilian agriculture. This deadly combination has endangered many of their most famous endemic species, such as the Philippine cockatoo, the tamaraw, and the Philippine eagle, a national symbol (Arkive, 2013 and DENR-FASPO, 2011). Illegal commercial logging operations have been known to float their logs downriver to sawmills at night and some mountains are riddled with civilian mining tunnels (Hance, 2012). Their coral reefs are endangered by bad fishing practices, such as the use of dynamite and poison, which have drastically reduced fisheries productivity (Posa, *et al.* 2013).

The loss of the country's rainforests has been devastating for its people, especially the poor. The rainforests protected headwaters of rivers and lakes; now that they are all but gone,

rampant flooding has caused horrible losses of life during the typhoons to which the region is prone (Hance, 2012). Yet it is also true that in many cases, illegal logging is the only way for poor people to feed their families (Fisher, 2013).

Despite, or perhaps because of, all of these problems, both public and governmental opinions of natural resource management have shifted in recent years. In 2011, President Benigno Aquino III signed Executive Order No. 23, which banned cutting and harvesting of timber in all remaining old growth forests and requiring that sawmills must show certification that their timber was sustainably sourced. He also created an anti-illegal logging task force to enforce this new order (Aquino, 2011). Unfortunately, due in part to widespread corruption within the government, this order and task force has met with mixed results (Hance, 2012). President Aquino's administration has also issued a ban on open-pit mining on some islands, which has caused large companies like Sagittarius Mines, Inc. and Lepanto, Inc. to suspend their bids for new mining operations until at least 2016 (Kritz, 2013).

There are many conservationists who say that the Philippines are a lost cause when it comes to biodiversity conservation, due to how little remains of the original forest. However, other people say this is not the case. According to the paper "Hope For Threatened Tropical Biodiversity: Lessons from the Philippines," published in *BioScience*, the country has made great strides in conservation in the last few decades with the implementation of laws such as the ones listed above, creation of protected areas, and conservation programs for endangered species (Posa, *et al.*, 2008). One of these programs, aimed at protecting the Philippine cockatoo, is run through the Katala Foundation. It raises public awareness, restricts trade of these birds, and does research on the ecological requirements of the species. It also recruits former poachers to be game wardens to help prevent illegal capture for the exotic pet trade. The paper goes on to

conclude that while many challenges still exist, biodiversity conservation in the Philippines is not a lost cause and deserves greater investment (Posa, *et al.*, 2008).

Another solution to conservation problems is one that has already been implemented with fair success in the south. A Landcare Program facilitates the exchange of social capital, or “relationships of trust, communication, and cooperation that facilitate collective action in a community” (Cramb, 2006). This particular program is focused on soil conservation, educating farmers on management techniques like creating contour barriers to prevent erosion and facilitating exchange of information and assistance between them. The study “The Role of Social Capital in the Promotion of Conservation Farming...” shows that farmers who are part of a Landcare Program are much more likely to implement soil conservation practices on their own land than those who are not (Cramb, 2006). This type of program could easily be expanded to include other conservation issues, which could help preserve biodiversity all over the Philippines.

Comparison

Cameroon and the Philippines face similar challenges in biodiversity conservation. Both countries must deal with highly degraded ecosystems and the flooding, erosion, and reduced productivity that come with them, although Cameroon has more of its original forest left. While the Philippines’ poverty rate is lower than Cameroon’s, both have large proportions of their population living below the poverty line, whose only way to support their families is to live off what is left of the forest or clear it entirely, even if doing so means illegal logging. Both deal with high levels of corruption in the government, making it difficult for them to enforce conservation regulations.

They both face problems with illegal logging; however, illegal commercial logging is much more of a problem in the Philippines. In Cameroon, the problem tends to come more from the combined effects of small farmers clearing space for their crops. There are more efforts in Cameroon to implement community forestry and agroforestry practices to help increase biodiversity and alleviate the poverty of its people.

The government of the Philippines has much more of an environmental focus than Cameroon. They have more laws in place to regulate logging and mining activities. While both countries have high levels of governmental corruption, the Philippines has had more success than Cameroon in cracking down on poaching and illegal logging, though they certainly still have a long way to go.

Conclusion

Biodiversity has a wide variety of benefits to humans and to the environment. The diversity of plants, animals, fungi, bacteria, and protists allows them to fill numerous niches and perform countless services that improve the environment and the quality of human life. Unfortunately, due to increasing human populations and thus their ever-increasing demand for resources, biodiversity all over the world is threatened, making conservation a global concern. Although there is no one approach that will solve the problem, through a combination of financial, political, scientific, and local practices it may be possible to slow down or even halt species loss. In the case of both Cameroon and the Philippines, more research is needed to understand not only the plants and animals that live there, but also the relationships and interactions between people and their environment. Only then can truly effective solutions be

found to increase the standard of living of the people as well as preserve, protect, and perhaps even increase biodiversity.

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