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Conditionality Contaminates Conservation: A Cross-National Investigation of Structural Adjustment and Land Protection in Less-Developed Nations

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Conditionality Contaminates Conservation: A Cross-National Investigation of Structural Adjustment and Land Protection in Less-Developed Nations

by

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TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

The destruction that human beings have caused the natural environment is so catastrophic that it has been labeled the "Sixth Extinction." Conservation and the preservation of species and ecosystems is one way we can prevent biodiversity loss and preserve the biodiversity that enables our planet to flourish. As threats to biodiversity mount, it is imperative that social scientists explore the macro-level processes that affect conservation areas and policies. This study explores the influence of structural adjustment policies on the ability of less-developed nations to designate land for conservation. I use ordinary least squares (OLS) regression to examine the influence of structural adjustment policies on levels of terrestrial protected areas in less-developed nations. I use a sample of 55 less-developed nations for which there are data available for all variables relevant to this analysis. The results of the analyses confirm my hypothesis that nations undergoing IMF structural adjustment loans have a smaller percentage of land devoted to terrestrial protected areas than nations not undergoing International Monetary Fund structural adjustment loans. I attribute this finding to the neoliberal measures imposed by structural adjustment loans that encourage privatization and deregulation, ultimately impairing less-developed nations' abilities to make conservation a priority.

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Introduction

Environmental problems have recently emerged at the forefront of sociological research as complex issues that involve many different societal and sociological causes. In recent years, the public and academia alike have begun to recognize the severity of environmental issues as it becomes more and more clear that a plethora of different environmental crises threaten the world that we live in and the survival of the human species (Myers 2009). One environmental issue that has recently been explored through a sociological lens is biodiversity loss and the ways in which humans contribute to biodiversity loss (McKinney et al. 2009; Shandra et al. 2009; Shandra et al. 2010).

The destruction that human activities have caused the natural environment has become so catastrophic that it has been labeled the "Sixth Extinction" (Kolbert 2014). There have been five mass extinctions in the planet's history, where extinctions are classified as periods that have been marked by a significant loss of biodiversity (Kolbert 2014). These periods are the Ordovician mass extinction 439 million years ago, the Late Devonian mass extinction 364 million years ago, the Permian-Triassic mass extinction- otherwise known as "the Great Dying"- 251 million years ago, the End Triassic mass extinction 199-214 million years ago, and the Cretaceous-Tertiary mass extinction 65 million years ago (Wake and Vredenburg 2008). Scientists argue that we are currently in the process of the "Sixth Mass Extinction" and that this mass extinction period is caused

by human activities and alterations to the environment. In fact, some scientists have proposed labeling the current era the "Athropocene" because of the profound ways that humans are changing our planet (Steffen et al. 2011). Thus, human beings' involvement in the current environmental catastrophe makes biodiversity loss an issue with strong sociological underpinnings (Wake and Vredenburg 2008).

Throughout the course of history as it became more and more clear that biodiversity loss posed great threats to our planet, strategies emerged to combat biodiversity loss. Of these strategies to confront the threats to biodiversity, conservation is by far the most popular and the most practiced (Convention on Biological Diversity 2015). People around the world have recognized the value of biodiversity for hundreds of centuries and have implemented practices to conserve it (Dobson 1996). National parks were established in Europe in as early as the 16th century and protected areas were even established in India in the 4th century B.C. (Dobson 1996). The United States also has a long history of practicing conservation (Wildlife Conservation Society 2015). The United States created Yellowstone National Park in 1872 and has continued to designate many areas as national parks since then (Wildlife Conservation Society 2015). The U.S. also passed the Endangered Species Act of 1973 to protect endangered species and the habitats they depend on (United States Congress 1973). While many nations have a rich history of conservation and identifying the importance of biodiversity, many other nations in the world have only recently set aside protected land areas for biodiversity (Dobson 1996).

Indeed, debates about biodiversity and its protection have been going on for decades. While conservation is a widely recognized strategy to combat biodiversity loss

implemented around the world for centuries, other fields of study take different approaches to biodiversity loss. One economist by the name of Julian Simon argued that while species should be preserved, the rate of species extinction is actually unknown (Myers and Simon 1994). Simon also argues that it is impossible to determine what species that have already been extinguished could have offered us and that, "…it seems hard to even imagine that we would be enormously better off with the persistence of any such imagined species" (Myers and Simon 1994). Ecologists and environmentalists have been arguing the opposite - that we are in the midst of a mass extinction - for decades. They take a different tone than Simon, contending that the extensive species extinctions have grave implications for our planet (Myers 1988).

Today, countless organizations continue to fight for land protection for the rights of animals, plants, and organisms and the natural ecosystems they need to survive. Several large organizations such as Conservation International, World Wildlife Fund, The Nature Conservancy and Greenpeace advocate conservation and preservation as the most important strategy to protecting the environment and curbing biodiversity loss (Conservation International 2015b; WWF 2015; The Nature Conservancy 2015a; Greenpeace 2015). With about one third of known species on our planet facing the threat of extinction, conservation continues to be an important strategy to preserve resources and species for future generations (National Wildlife Federation 2015).

Despite the potential importance of conservation strategies for preserving biodiversity and natural ecosystems, many developing nations may face limitations to protecting land. This issue is especially relevant to consider for less-developed nations, as many poor nations contain key biodiversity hotspots (Conservation International

2015a; Critical Ecosystem Partnership Fund 2014). Biodiversity hotspots are defined as regions that contain outstanding concentrations of native species that are also losing an exceptional amount of their habitats (Myers et al. 2000). Using these criteria, Myers et al. conducted an analysis of 25 biodiversity hotspots and found that, "sixteen hotspots are in the tropics, which largely means developing countries where threats are greatest and conservation resources are scarcest" (Myers et al. 2000:855). Prior political-economic examinations demonstrate that factors related to economic dependency, especially structural adjustment or debt, often limit the capacity of developing states to enact environmental protections (Shandra et al. 2010; McKinney et al. 2009). These political-economic factors are especially relevant to consider in the context of land protection, as many poor, developing nations are located in tropical areas and represent key biodiversity hotspots.

This research will therefore contribute to sociological research investigating the impacts of austerity measures on environmental outcomes. By examining trends in conservation, I am addressing how neoliberal development strategies impact initiatives to protect the environment in developing nations. As conservation represents the key strategy to protecting biodiversity and natural environments, rigorous cross-national investigation is needed to understand what factors explain why some nations have more land under formal protection than others.

I will begin by discussing why it is essential that scholars and the public alike understand the current crisis of biodiversity loss and the value that biodiversity holds for the future of the human species. I will then turn to a discussion of two different theoretical frameworks and their explanations of the causes of and implications for

biodiversity loss and why conservation is essential. I then present my sample, methods, and measured used, followed by an examination of the results. Finally, I conclude by interpreting the relevance of my findings for global policy and providing suggestions for further research.

The Importance of Biodiversity

It is imperative that we study and monitor biodiversity because biodiversity loss has a number of negative effects on all aspects of human life and on natural ecosystems on Earth (Shandra et al. 2010; Chivian and Bernstein 2010). Ecosystems and the natural environment provide a wide variety of nutrients and food that humans need to survive and without these essential nutrients, human health is directly negatively impacted (WHO 2014). Moreover, preserving biodiversity may ensure proper food and nutrient access for future human generations. Having a diverse array of species is specifically important, as the loss of species and reduction of biodiversity in habitats reduces the nutrients that are available to us and negatively impacts global nutrition (WHO 2014).

In addition to providing food for humans to survive, ecosystems provide many other services for both human beings and the rest of the planet (WHO 2014). These services include providing fuels and energy, regulating services like creating oxygen and purifying water, cultural services that provide aesthetic and spiritual qualities, and supporting services, which aid other ecosystem services (Chivian and Bernstein 2010). The interaction of these ecosystems and natural resources is so complex that it will be impossible for humans to replace them in any way that is not natural, even if we had an unlimited budget to do so (Chivian and Bernstein 2010).

Plant ecosystems are particularly important to conserve when thinking about biodiversity loss and conservation. To put it simply, human life on Earth would not be possible without the existence of ecosystems and the functions that vascular plants perform (Aber and Melillo 2001). Photosynthesis is the process that creates the oxygen that the human species needs to survive. It involves plants using energy from sunlight to convert carbon dioxide and water to produce glucose and oxygen as a byproduct (Aber and Melillo 2001). Beyond converting carbon dioxide into oxygen for humans to breathe, vascular plants produce the glucose and organic materials that become a main food source for animals (Aber and Melillo 2001). The energy that is released through the process of photosynthesis, "…provides essentially all of the energy available to plants, animals, and microbes" (Aber and Melillo 2001:95). It is because of the photosynthesis process that humans and innumerable other life forms on Earth have oxygen to breathe and food to eat to survive (Aber and Melillo 2001).

Medicine is another area that will be severely negatively impacted by biodiversity loss. Nature has been providing remedies and cures for human diseases for as long as humans have been alive (Chivian and Bernstein 2010). A variety of plants and organisms have provided breakthroughs in human medicine, such as morphine from the Opium Poppy, aspirin from the White Willow Tree, cancer-inhibiting chemicals found in the Pacific Yew, stress-fighting chemicals found in Ashwagandha, and many more (Chivian and Bernstein 2010; The New York Botanical Garden 2014). Important medicines are also found in animals, such as AZT used to treat HIV/AIDS and ACE inhibitors, which are used to treat high blood pressure (Chivian and Bernstein 2010). Plants provide many medicinal benefits, as a quarter of all distributed prescriptions in the United States

contain ingredients obtained from higher plant species (Farnsworth and Morris 1976). Extracts from plants are used to treat human diseases and it is estimated by the World Health Organization that 3.5-4 billion people in the world rely on plants as sources of primary health care needs (WHO 2007).

Medicinal plants play a large role in the lifestyle and medical practices in less-developed and developing countries. In an extensive report entitled "WHO Monographs on Selected Medicinal Plants", the World Health Organization identifies and describes a variety of medicinal plants from all over the world (WHO 2007). While not all of the selected plants have health benefits that can be deemed "medicinal" because there is no use supported by clinical data, many of these plants are used in traditional medicine (WHO 2007). Moreover, many of the plants have been tested using experimental pharmacology in animals (WHO 2007). Our modern medicinal world also relies on biodiversity. Recently, a team of researchers discovered a new antibiotic called teixobactin from soil fungi (Johnson 2015). The continual discovery of new antibiotics and medicines would not be possible without the availability of biodiversity on our Earth.

Beyond scientific or health arguments to preserve biodiversity, millions of people around the world have spiritual connections to the environment. The term "spiritual ecology" can be used to describe a religious, personal, or other connection between people or groups and the environment (Sponsel 2012). Specifically, many proponents of the concept of spiritual ecology believe that the ecological crisis that is threatening our world today is due to a human alienation and disconnection from the environment and the idea that the environment is something that can be commoditized and quantified for economic benefit (Sponsel 2012). This view argues that the greed, materialism, and

consumerism that many societies are obsessed with is "…suicidal for the human species" (Sponsel 2012:xvi). While the idea of development is often translated into dollars and cents in economic terms, spiritual ecology focuses on the spiritual development of human beings and their connections with their natural environment (Sponsel 2012). A large component of the natural environment and the realm of spiritual ecology is trees and plants, as they both provide many essential biological functions for a variety of species in nature, as well as spiritual functions for humans and their natural environment.

Many religions such as Animism, Buddhism, and Hinduism emphasize the bonds between nature, humanity, and the supernatural and view trees as sacred (Sponsel 2012). Cultures around the world also view trees as sacred and as having special significance in rituals and shrines. Countless indigenous cultures and peoples believe in the interconnectedness of humans, nature, and the supernatural world and that it is important for humans to respect and maintain harmony with nature (Sponsel 2012). Indigenous peoples who value the environment are not confined to one region but rather exist all over the globe in Venezuela, Indonesia, Mexico, and Colombia, among others (Sponsel 2012). In addition to having spiritual significance, trees are home to many different animals, insects, fungi, mosses, and countless other species (Sponsel 2012). Destroying one tree could have a massive impact on countless other species who depend on this tree for the resources it provides and could disrupt the balances that exist between other species and the tree (Sponsel 2012). Protecting trees and other plants is not only an important strategy for preserving spiritual beliefs, but also for preserving entire ecosystems that depend on one another.

Along with spiritual connections to nature, environmentalists have also hypothesized that human beings have emotional connections to the environment and an affection for nature that compels us to want to preserve the environment (Kellert 2012). This hypothesized emotional relationship between humans and other living organisms has been termed "biophilia" and posits that these emotional ties link humans with the natural world (Wilson 1993). Kellert explains that the concept of biophilia, "…powerfully asserts that much of the human search for a coherent and fulfilling existence is intimately dependent upon our relationship to nature" (Kellert 1993). The emotional bonds that people form with the environment may even affect one's mental and physical health (Kellert 2012).

In addition to the spiritual, religious, and health services that the environment provides, there are economic reasons to preserve biodiversity and conserve ecosystems. Part of the reason that implementing and prioritizing conservation is so important is because many humans believe that the environment is expendable and replaceable. Additionally, everything in our world comes down to money-how much will something cost, will investments pay off, and constantly analyzing the risks and benefits. Recently, a researcher at the University of Calcutta worked to place an economic value on the countless services that the environment provides and that we take for granted. He has estimated that, "…a tree living for 50 years generates $31,250 worth of oxygen, $62,000 of air pollution control, $31,250 of soil erosion control and soil fertilizer, $37,500 of water, and $31,250 of shelter for animals" and the total monetary valuation of services amounts to $193,250 (Bennett 1996:468; Sponsel 2012:3). Although a tree or a forest is

much more than merely a sum of numbers and dollars, an economic assessment can help persuade those who do not see value in the environment to reconsider their thinking.

It is also important to consider the economic benefits of conserving and preserving plant biodiversity for current and future generations. Although some scholars have been able to place a dollar value on some tree species at present, it is difficult to project this into the future. Species that we know exist in the present moment may not be useful until a later date, which makes it difficult to assign them a monetary valuation. This concept is known as "option value", which is the value we can place on the possibility that a species that is useless now will be useful in the future (Fisher and Hanemann 1986; IUCN 1998). The process of calculating option value, however, can be extremely complicated, and steps involve: identifying a species, guessing what use that species may possess, placing a dollar valuation on the species, and predicting the probability that this species will be useful in the future (Norton 1988:202). Additionally, species may depend on other species within their ecosystems to survive, so interdependencies among species in a particular ecosystem must also be accounted for (Norton 1988). While some economists and the conservationists may seem at odds with one another, as discussed previously, others have recently come together to address the importance of the destruction of our natural environment (Costanza et al. 1997). During the 1980s, experts from both fields recognized the need to preserve ecosystems and the idea of ecological economics emerged. The emerging discipline of ecological economics and placing a monetary value on parts of the environment help advocate for conservation and preserving biodiversity that could be economically valuable at a later point in time.

Conservation: Responding to Biodiversity Loss

Scholars, environmentalists, and conservation biologists have asserted the importance of biodiversity and its essential functions for human life. The many benefits of biodiversity described above are merely a few of countless reasons why biodiversity loss has devastating effects for peoples all over the world in economic, health, and ethical contexts. In response to the insurmountable evidence of human involvement in biodiversity loss, organizations and individuals have come together to address this crisis. The immediate and obvious response to biodiversity loss is conservation and to take action to prevent species loss. Of the many ways that organizations take a stand against biodiversity loss, one of the most prominent responses to biodiversity loss is in situ conservation[1].

Many organizations have emerged to combat the biodiversity loss that threatens our planet (WWF 2015; Conservation International 2015b; Greenpeace 2015; The Nature Conservancy 2015a). One of the most important goals in addition to spreading awareness about biodiversity loss is conserving habitats (WWF 2015; Conservation International 2015b; Greenpeace 2015; The Nature Conservancy 2015a). According to the WWF, "habitat loss is probably the greatest threat to the variety of life on this planet today" (WWF 2015). In fact, habitat destruction affects 86% of all threatened birds, 88% of threatened amphibians, and 86% of threatened mammals assessed by the IUCN (IUCN 2010). The destruction of habitats is caused in part by the demolition of tropical moist forests, which in turn causes vast numbers of species to become extinct because these

[1] In situ conservation is the conservation of species diversity within natural habitats while ex situ conservation involves conserving species outside of their natural habitats, such as in seed banks (BGCI 2015; Hamilton 1994). Conservation biologists have identified a number of potential problems with ex situ conservation, as this method can never simulate natural selection and can lead to unpredictable genetic change (Ashton 1988:274). In situ conservation maintains the ecological processes within which species are embedded, allowing species to live in their natural habitats and interdependence among species to continue (Ashton 1988).

species are forcefully removed from their natural habitats (Ehrlich 1988; Myers 1988; Panel on Biodiversity Research Priorities 1992).

Habitat destruction is so extreme that it has led to species extinction rates that are up to 1,000 times the normal extinction rate. Worse, species are losing their habitats and thus their ability to survive because of the growing desires of humans. The extinction rates and the appropriately named "sixth extinction" are due to the pressures that human beings put on the natural environment (IUCN 2010; Kolbert 2014; WWF 2015). One active area where human beings are directly responsible for biodiversity loss is the destruction of forests. Humans play an enormous role in deforestation, as they are largely responsible for clearing forests and felling trees (Ehrhardt-Martinez 1998). Moreover, it has been noted that although deforestation is a natural process, the extent and rate at which it occurs today is far more drastic than ever before (Ehrhardt-Martinez 1998).

Protected areas provide an answer to the habitat loss and destruction that humans cause our planet. Protected areas can be seen as the "cornerstone of biodiversity conservation; they maintain key habitats, provide refugia, allow for species migration and movement, and ensure the maintenance of natural processes across the landscape" (Convention on Biological Diversity 2015). It is estimated that protected areas provide livelihoods for 1.1 billion people on the planet and are a main way for billions of people to access clean water (Convention on Biological Diversity 2015). Additionally, protected areas are argued to be one of the best tools for conservation and serve as essential sites for research, education, and the sustainable use of natural resources (IUCN 1998). They are also home to some of the Earth's most incredible natural landscapes and provide an aesthetic value that is incalculable (IUCN 1998). The extent of the current biodiversity

crisis is so threatening that an entire field of science has emerged to combat it. Conservation biology "addresses the biology of species, communities, and ecosystems that are perturbed, either directly or indirectly, by human activities or other agents" (Soulé 1985:727). The goals of this discipline are to provide tools to preserve biodiversity and to bring multiple aspects of biology together with one common goal: conservation (Soulé and Wilcox 1980).

In addition to conserving biodiversity because of the many benefits it provides for human life, there are also reasons to protect biodiversity because of the benefits we may not yet be aware of. Scientists are largely unaware of how many species exist on our planet and estimate that there are somewhere between 1.5 and 30 million species of plants and animals on Earth (Dobson 1996). We know that between 1.5 and 1.8 million species have been identified but it is impossible to estimate how many species there are in total when so many areas like deep ocean floors and other habitats remain unexplored (Dobson 1996). In fact, while many medicinal properties of plant, animal, and microbe species have been identified, recent studies reveal that about 86% of all terrestrial species and 91% of all marine species have not yet been discovered or catalogued (United Nations 2011). A team of international scientists predicts that, "thousands of rare flowering plant species are likely to become extinct before humans discover them" (Harrell 2010). Experts in the field of biodiversity also assert that many species become extinct and disappear before humans are aware of them and what contributions they could potentially make to improve human life (United Nations 2011). Preserving biodiversity and preventing biodiversity loss through conservation could have enormously positive impacts for the human species as a whole. Losing biodiversity means that we are

eliminating species that could dramatically improve our quality of life and overall well-being.

Looking at the causes of biodiversity loss from a sociological perspective also entails looking at the consequences of biodiversity loss and conservation from a sociological perspective. While conservation and preserving biodiversity are paramount for the continued harmony between human beings and our natural environment, it is critical to note the harmful side effects that have historically accompanied conservation. Often when the preservation of the environment and of biodiversity of other species on our planet take precedence, important members of our own human species are neglected. Frequently, vulnerable populations are not included in the processes of designating conservation areas. In fact, the burdens that result from conservation are borne largely by poor and local people (Amend and Amend 1995; Cernea and Schmidt-Soltau 2006). Patricia Feeney notes in a case study in *Accountable Aid* that the European Commission, "…failed adequately to address the needs and rights of local populations" (Feeney 1998:88). This specific case study refers to the displacement of no less than 130,000 local people from forests in Uganda as a result of conservation efforts from the European Commission's Natural Forest Management and Conservation Project (Feeney 1998). Moreover, the way in which local populations were forced off their land in the case of the Kibale Forest Reserve and Game Corridor has been documented as unfair and horrific, with reports of human rights violations and deaths during the process. Tens of thousands were left without their land and their livelihoods, left to beg in the streets (Feeney 1998).

This particular example of the displacement of vulnerable peoples during the process of conservation is unfortunately one of many. A commitment to conservation and

the protection of biodiversity to ensure the future of some species should not result in displacement and hardships for others. Conservation and the protection of biodiversity should remain a chief concern for our generation and the entire human species, but not at the cost of the poor and those who are least capable to deal with the effects. The historical examples of the dislocation of the poor and vulnerable require that we explore conservation through a sociological lens, taking all people and societies into consideration.

Development and Conservation

I turn to a discussion of potential developmental factors that might explain patterns in conservation across countries. Patterns in conservation may vary across nations due to financial resources available to support conservation initiatives, the role and influence of government, the level of democracy in a nation, and other factors discussed in the following section. There are two primary theoretical frameworks in global sociology that explain macro-level patterns and trends in development: modernization theory and world systems/dependency theory. While these perspectives represent approaches to understanding global inequality, each of these theories also addresses environmental issues.

Modernization and critical dependency/world-systems perspectives are at odds with one another, as modernization theory argues that economic growth will lead to development and environmental protection, and world-systems/dependency theory argues that global hierarchies in the world-economy lead to persistent underdevelopment and environmental harm in periphery nations (Rostow 1959; Frank 1967; Chase-Dunn and Grimes 1995; Wallerstein 2004). While each might predict that poorer nations have the

least amount of conservation, the mechanisms emphasized by each differ. Overall, a modernization theorist would see achieving conservation as a product of development that is possible for all nations, while a world-systems theorist would take the opposite approach. A discussion of each theory provides a macro-structural approach to explaining conservation and biodiversity loss and looks at what larger mechanisms are at work.

Modernization Theory

Modernization theory defines economic growth in terms of development and posits that achieving economic growth occurs by following a Western model of capitalist development (Rostow 1959). Modernization theory also promotes abandoning traditional cultures in favor of industrialization and consumption (Sheppard 2009). The modernization perspective argues that all nations are on spectrum ranging from "traditional" societies to "high mass-consumption" societies and that there is a set path that a "traditional" society can take to become "modern." The five stages of societies are: traditional societies, the preconditions for take-off, the take-off, the drive to maturity, and the age of high mass-consumption (Rostow 1959).

The traditional society is one reliant on subsistence farming and whose production functions are basic. There is no overconsumption or surplus value because the technology necessary for development has not yet come to these societies (Rostow 1959). The next stage on the spectrum is the pre-conditions for take-off, characterized by nations that are in the process of transition. Economic progress and growth are necessary conditions for the take-off, and this is the stage where nations "buy in" to the ideas of development. The take-off is the next stage, when agriculture becomes more commercial and nations begin to exploit unused natural resources to make a profit (Rostow 1959). A case study of Tzeltal

communities in Mexico exemplifies this stage. In this community, members with knowledge of medicinal plants are turning this knowledge into a commodity. Information that was once commonly shared among members is now something to be bought and sold, potentially endangering personal health for those who cannot afford to obtain important knowledge about medicinal plants (Casagrande 2005).

The drive to maturity stage on the modernization spectrum is next. In this stage, nations choose to specialize their production and their economies find a niche in the international economy. The final stage is the age of high mass-consumption, characterized by a shift from producing for survival to producing for consumption (Rostow 1959). Social and environmental welfare is taken into consideration only in this last stage, where societies move beyond technical maturity and begin to account for the well-being of their people (Rostow 1959).

The stages of modernization and development that Rostow describes can also be applied to issues related to the environment and conservation. Under modernization thinking, countries begin to prioritize social and environmental welfare and implement policies that benefit people and environments only in the final stages of modernization (Rostow 1959). This application of modernization theory to the environment is also reflected in the "environmental Kuznets curve" (EKC). The EKC has been used to explain the relationship between environmental degradation and economic growth or development. The Kuznets curve was conceptualized by Simon Kuznets in 1955 when he determined an inverted U-shaped relationship between income and inequality (Kuznets 1955). This theory has since been applied to environmental issues, theorizing that there is a similar inverted U-shaped pattern between environmental degradation and economic development (Dasgupta

et al. 2002). According to the EKC, as nations develop, environmental degradation should increase as nations produce goods and become high consumers. But, after a certain point, development should lead to the adaption of greener technologies and policies that reduce environmental degradation (Ehrhardt-Martinez et al. 2002).

Thus, according to modernization theory and application of the EKC, curbing biodiversity and ecosystem loss and promoting conservation is a natural outcome of increased economic development (Dasgupta et al. 2002; Ehrhardt-Martinez et al. 2002). Applying the EKC to a perspective on conservation should indicate that although countries may deforest their lands to create economic growth, eventually they will have the means and funds to support conservation and the preservation of forests. From a modernization perspective, there are several factors that likely explain patterns of conservation across developing nations. I focus on GDP per capita, participation in education, access to the Internet, and democracy as indicators of development and modernization that promote increased conservation.

Education and access to information are potentially important factors that lead to enhanced conservation. More educated and informed people tend to have increased concern and understanding of the threats that exist to wildlife and environments in addition to increased self-efficacy. The results of a study of 305 managers in Guangzhou and Beijing, China indicate that managers that were more informed about the environment and environmental issues were more likely to work to minimize environmental impacts through their positions (Fryxell and Lo 2003). This study provides evidence that access to information about the environment and environmental

issues is related to environmental values and environmentally conscious behaviors (Fryxell and Lo 2003).

Science and the knowledge we possess about the environment also shape how we perceive the environment and what choices we make in relation to it (Bocking 2004). Bocking argues that science helps create environmental priorities and, "…science is therefore implicated in our environmental values" (Bocking 2004:48). Access to current scientific information and education are important in shaping one's attitudes towards and knowledge about the environment, and therefore support for environmental initiatives to protect the environment. Thus, I predict that nations with more participation in secondary education and greater access to the Internet will have more land area under conservation.

From an economic standpoint, conserving wildlife and designating land as terrestrial protected areas costs money. Many organizations and staff members are required to maintain and safeguard national parks and designated protected areas in locations across the world. Countries often face serious budget constraints and do not have all the funding required to adequately maintain and staff wildlife conservation efforts (National Wildlife Federation 2015). In fact, according to the National Wildlife Federation, one of America's largest conservation organizations, "…the needs of wildlife conservation efforts far outstrip the financial resources currently available…" (NWF 2015).

The poorest states are likely those that are least able to engage in activities that will preserve land area for conservation. Recent estimates from 2011 show that 17 percent of people in the developing world, or approximately just over 1 billion, live on less than $1.25 per day (World Bank 2014b). Further, low-income countries as defined

by the World Bank are those with a GNI per capita of $1,045 or less (World Bank 2015b). Governments in poor and developing countries face great poverty and health concerns from their populations, forcing them to make hard decisions about where to allocate funds. With food, health, and survival as a main concern for such a large percentage of people in our world, I expect developing countries to be less able to allocate funds toward conservation and the preservation of land. According to modernization theory, as a nation's GDP per capita increases, a nation should have more funds to dedicate to conservation. Thus, I hypothesize that those nations with a higher GDP per capita will have higher percentages of terrestrial protected areas because they have more resources to fund conservation compared to nations with lower GDP per capita.

In addition to education, information, and economic development, there is a vast literature that investigates the relationship between democracy and the environment (Li and Reuveny 2006; Payne 1995; Midlarsky 1998). While some assessments of relationships between democracy and the environment in this array of literature have been inconclusive, protected land area has been found to have a positive relationship with democracy in previous research (Midlarsky 1998). There are many logical arguments that explain why a more democratic nation would be more likely to advocate for the preservation and conservation of the environment, which rest on the foundations and principles of democratic societies themselves.

In democratic nations, people have the right to voice their opinions and share information about the environment with one another (Payne 1995). People in democratic nations also have the ability to lobby their governments and hold governments

accountable. Additionally, in democracies, individual rights are secured by the state, so citizens are more likely to voice their opinions about environmental problems because they know that they will not be prosecuted for it. Non-democratic societies, on the other hand, are more repressive and more likely to punish individuals who speak out against the government (Payne 1995).

The availability and flow of information in democratic states also make these societies more likely to be held accountable for the well being of the environment. When citizens have access to information, they are more likely to become educated on problems and take actions to solve them (Payne 1995). When information is withheld from citizens, as is often the case in non-democratic societies, environmental problems can lead to disasters. This is exemplified in the case of the 1986 Chernobyl nuclear disaster, when the Russian government withheld information about the incident so the government could not be held accountable (Payne 1995). Democratic societies are well-equipped to empower citizens with information about the environment and in turn, these citizens are more likely to demand better practices from governments, corporations, and businesses (Payne 1995).

According to modernization theory, as nations develop economically and socially, they should also develop policies that protect the environment and biodiversity. Given this rationale, modernization theory posits that all nations are on the path to greater conservation because all nations are moving on a path or through the stages of modernization. However, there is another branch of theory that argues the opposite – that not all nations are developing and some nations will always be prevented from protecting their environments. I turn to a discussion of world-systems/dependency theory to

highlight these arguments and give a contrasting approach to explaining cross-national trends in conservation according to a more critical theoretical framework.

World-Systems/Dependency Theory

While modernization theory and the concept of the EKC argue that economic development is the solution to environmental problems and improved conservation, world-systems theory takes a critical perspective on the relationship between economic growth and the environment. World-systems/dependency theory arose in the 1960s and 1970s as a reaction to the failed promises of modernization theory. In fact, dependency theories argue against modernization's categorical "stages" and states that history provides a different explanation for underdevelopment (Frank 1967).

World-systems theory is a historically oriented perspective that examines the fundamentally unequal relationships that exist between developed and less-developed nations. It argues that the root of the unequal world-system that exists today lies in the foundations of capitalism and imperialism that date back hundreds of years (Isbister 1991; Chase-Dunn and Grimes 1995; Wallerstein 2004). A historical insight into countries' economic development is critical in assessing their current economic status. Andre Gunder Frank, one of the principal founders of dependency theory, argues that developed nations may have once been undeveloped, but were never underdeveloped in the way that less-developed countries were because of colonialism and imperialism (Frank 1967, Isbister 1991). Frank argues, "…our ignorance of the underdeveloped countries' history leads us to assume that their past and indeed their present resembles earlier stages of the history of now-developed countries" (Frank 1967:4). The modern world-system is a power hierarchy where core, or wealthy and powerful nations, dominate periphery, or weak and poor

nations (Chase-Dunn and Grimes 1995). The core/periphery hierarchy is reinforced through various mechanisms such as unequal exchange, patterns in foreign investment, and levels and management of debt.

A central tenet of world-systems theory is the examination of unequal trade relationships that exist between core and periphery nations, as periphery nations produce low value goods and core nations produce high value goods (Emmaunel 1972; Amin 1974). This exchange of high value goods for low value goods creates a surplus profit from the exchange that accumulates in the core (Austin 2010). This phenomenon has been labeled "unequal exchange" because of the differences that exist both in wages and labor power between core and periphery nations, with core nations retaining the capital accumulation as a result (Austin 2010). Unequal trade relationships evolved from colonial and imperial times, when European nations extracted natural resources from periphery nations and used the profits to fund their own industrialization and development (Austin 2010; Isbister 1991).

The concept of unequal exchange can also be applied to the environment to explain that the low-value, low-skill production that characterizes the economies of periphery nations also tends to entail higher environmental demands. Just as foreign industries hunt for sites of cheap labor, they also "race to the bottom" of the world-system to establish production or extraction sites in poor nations with the least amount of regulation or environmental protection (Frey 2003). In this way, poor nations may not just have a lack of financial resources to promote conservation, but also may be unable to enforce such policies in an effort to attract foreign industry or development.

Overall, critical development scholars argue that not all nations are on a path to greater development, but are stuck in conditions of underdevelopment. This perspective argues that not all nations are going to be able to achieve greater conservation – the consumption of resources must come from somewhere, and degradation will remain concentrated in the poorest nations. Thus, while poor nations are still argued to have lower levels of conservation from this perspective, the mechanisms and overall expected trajectory of this is very different across these approaches.

World-systems theory also highlights the role of debt and structural adjustment in shaping developmental outcomes. Many developing nations accrued high levels of debt throughout the late 20th century. Lending was argued to jump-start or catalyze development by core governments and international organizations, such as the IMF. However, continued underdevelopment in poor nations led to a major debt crisis by the 1980s, with Third World debts accumulating a total $1 trillion in debt by 1986 (McMichael 2012). As a response, structural adjustment or conditionality requirements were adopted in many developing nations.

Structural adjustment policies represent austerity measures that are rooted in neoliberal approaches to development (McMichael 2012). The inability of poor nations to make payments on their debts led to structural interventions from international financial institutions like the IMF (McMichael 2012). With these interventions, in order to qualify for loan rescheduling and other provisions, nations had to agree to certain terms that liberalize their economies in the efforts to promote economic growth and the ability to make loan repayments.

Structural adjustment loans were the answer to the "debt crisis," a solution for the mounting debt in Third World nations (McMichael 2012). Because Third World nations were so desperate to pay off their debt and loans from major lenders, they were left with no other option than succumb to the terms required by these structural adjustment loans. This put the institutions such as the IMF in the "driver's seat", with the IMF assuming a "supervisory status" to implement these policies, which involved a "comprehensive restructuring of production priorities and government programs in a debtor country" (McMichael 2012:116). Neoliberalism became the leading ideology during this time, and the IMF and other related agencies "…became the new missionary institutions, through which these ideas were pushed on the reluctant poor countries that often badly needed their loans and grants" (Stiglitz 2003:13). They are the policies that embody the neo-liberal ideology that drives globalization (WHO 2015).

There are many provisions to receiving structural adjustment loans, which prioritize economic development over everything else (McMichael 2012). Some of the provisions required to receive structural adjustment loans are reducing public spending, intensifying exports, reducing wages and export prices, devaluing currency, and privatizing state enterprises (McMichael 2012; WHO 2015). Essentially, these policies lead to a "shrinking of the state" (McMichael 2012:121).

There is an extensive and growing body of research on the harmful effects of structural adjustment policies and other debt restructuring initiatives provided by institutions such as the International Monetary Fund on outcomes such as child mortality, deforestation, maternal mortality, and urban slums among a host of other key development issues (Shandra et al. 2011; Pandolfelli et al. 2014; Shandra et al. 2010). Of

particular relevance to this study, prior research demonstrates a link between structural adjustment and biodiversity loss in developing nations (Shandra et al. 2010). Thus it is also important to consider how these policies may affect potential opportunities for land conservation.

Some of the specific ways that structural adjustment or conditionality measures might impact strategies for conservation include the reduction of state capacity or funding and the privatization of state enterprises. There are a number of reasons why conservation depends on the power of the state and why a retrenchment of the state could have disastrous consequences for the environment. First and foremost, national parks depend largely on government funds for resources, staffing, and day-to-day operations (NWF 2015). Funding from national budgets provide the necessary resources for parks to operate and manage natural resources (NWF 2015). Since national parks are funded and looked after by the governments in their respective countries, they can be seriously affected by structural adjustment policies and the mandates to appropriate land for other purposes. Specifically, structural adjustment policies can increase pressure on nations to use land for economic growth by decreasing the capacity of developmental planning of the state and privileging the corporate sector (McMichael 2012:122). This shift in the control and use of land may divert land away from conservation and protecting biodiversity loss. When structural adjustment policies leave states with less or diminished power, their ability to protect and set aside land for national parks can be seriously impaired.

The provisions of structural adjustment loans that call for a shrinking of the state and an increase in export intensification (McMichael 2012) could adversely affect

conservation rates in additional ways. If states are required to dedicate more effort to producing and exporting raw materials to drive profits, they will be more in favor of destroying valuable forests and habitats that are home to millions of species instead of protecting them. A shrinking of the power of the state could also mean that there is less enforcement of areas designated for conservation. Providing adequate staffing to oversee conservation areas could be seen as an unnecessary expenditure when funds need to be spent on achieving economic gains. Privatization also decreases "public capacity in developmental planning and implementation, thereby privileging the corporate sector" (McMichael 2012:122). The decline of the power of government and of the people within a state gives them less power over what happens within their nation, including making and enforcing protections in terrestrial areas.

Instead of liberalizing nations' economies and promoting structural adjustment policies, a world-systems scholar might favor other strategies to encourage development and conservation. A strengthening of the state and government spending may be one solution to the issue of biodiversity loss and conservation. One way state spending or influence has been measured is gross capital formation, or domestic investment (Jorgenson et al. 2007). Domestic investments are more likely to be invested back into a nation, which can stimulate that nation's economy and be invested in improving social services (Jorgenson et al. 2007; Kentor and Boswell 2003). Additionally, domestic investment can lead to "…increased local accountability for more environmentally friendly production processes…" (Jorgenson et al. 2007:376). Overall, nations with more domestic investment than foreign debt should have more control over where money gets invested and how the impacts of these investments affect their social and environmental

spheres. I expect a positive correlation between gross capital formation and protected land areas, as nations that are in control of investing capital into their own economies may prioritize environmental and social sectors and be more concerned with conservation.

Overall, the extreme levels of biodiversity loss demand that conservation rates be examined more closely. Biodiversity is important to our species for health, economic, spiritual, and ethical reasons, among many others. The innumerable services that ecosystems and millions of species provide sustain all life on Earth and we need to identify the potential interventions that can curb severe rates of biodiversity loss. Conservation protects species and ecosystems from extinction and needs to be explored from a sociological perspective. Modernization theory and world-systems theory take a macro-level approach in determining what factors may account for varying conservation rates across nations and what factors may affect nations' abilities to dedicate land to conservation.

Following this section, I analyze the approaches that different theoretical perspectives take to explain variations in conservation rates across nations. Modernization theorists would argue that poor nations should have lower conservation rates but that as these nations develop economically, their conservation rates should increase. Thus modernization theory points to variables like GDP, education, and democracy to explain conservation rates. World-systems theorists would argue that poor nations should have lower conservation rates but that these low conservation rates are caused by underdevelopment inflicted upon them by global institutions and core powers. World-systems theory would turn to variables like IMF structural adjustment policies,

external debt stocks, and gross capital formation to explain conservation rates and suggest possible solutions for increasing rates of terrestrial protected areas. In particular, I devote special attention to structural adjustment policies because of the existing literature that links these policies to negative social and environmental outcomes, including biodiversity loss (Shandra et al. 2010; Shandra et al. 2011; McKinney et al. 2009). By examining conservation rates through a cross-national, macro-level approach, I hope to address the underlying socio-structural causes of conservation rates and increasing rates of biodiversity loss.

Data and Methods

Sample

My sample includes 55 less-developed countries, displayed in Table 1. Less-developed nations are home to many of the world's biodiversity hotspots, as defined and mapped by Conservation International and the Critical Ecosystem Partnership Fund (CEPF 2014). Additionally, less-developed nations are more likely to receive structural adjustment loans because they are not financially capable of making payments on foreign debt (McMichael 2012). Thus, less-developed nations are the countries of interest in my study because they are the areas where conservation is arguably most needed, but also are the nations facing structural adjustment measures. The sample size for my study is notably small due to a few key reasons. First, only nations that have a GNI per capita of $12,475 or less are of interest in this study, as it concerns developing nations that are likely to receive structural adjustment loans. These income categories are defined and categorized by the World Bank's Country and Lending Groups (World Bank 2015a). As more variables were introduced as controls into my models, the sample size was lowered

to 55. Thus the 55 nations are all classified by the World Bank as having a GNI per capita of $12,475 or less and have data available for all other variables in every model of my regression analysis (World Bank 2015a).

Table 1: Nations (N=55) Included in the Analysis

Afghanistan	Colombia	India	Mongolia	Senegal
Angola	Dominica	Indonesia	Morocco	Serbia
Armenia	Dominican Republic	Jamaica	Mozambique	Sri Lanka
Bangladesh	Ecuador	Kyrgyz Republic	Nepal	Swaziland
Belize	Egypt, Arab Republic	Lao PDR	Nicaragua	Tajikistan
Bhutan	El Salvador	Lesotho	Niger	Tanzania
Bolivia	Eritrea	Macedonia, FYR	Nigeria	Tonga
Burkina Faso	Gambia, The	Malawi	Pakistan	Tunisia
Burundi	Guatemala	Mali	Paraguay	Ukraine
Chad	Guyana	Mauritania	Peru	Uzbekistan
China	Honduras	Moldova	Rwanda	Vanuatu

Analytic Strategy

I use ordinary least squares (OLS) regression to analyze the data and assess the cross-national predictors of land conservation. I utilize this method because it is the most widely used and a foundational statistical method. To the best of my knowledge, as the determinants of land conservation have not yet been examined in the cross-national literature, it is appropriate to use a straightforward analysis technique, such as OLS regression. Furthermore, this analytic strategy represents an excellent way to examine relationships between multiple independent variables and one dependent variable (Allison 1999). Additionally, OLS regression provides a way to isolate relationships between a key independent variable of interest, such as structural adjustment loans, while controlling for other variables in the model (Allison 1999). The models are constructed in

a stepwise fashion, using IMF Structural Adjustment and GDP per capita as a baseline model and adding in additional control variables as models progress in order to reduce potential problems with multicollinearity.

Dependent Variable

The dependent variable in this analysis is Terrestrial Protected Land Areas As A Percent Of Total Land Area. These areas are defined as totally or partially protected at least 1,000 hectares large that national authorities deem as one of the following categories: scientific reserves with limited public access, national parks, natural monuments, nature reserves or wildlife sanctuaries, protected landscapes, and areas managed mainly for sustainable use (World Bank 2014a). I located and downloaded this data from the World Bank's World Development Indicators databank. This variable is measured in the year 2012 to account for lag time that may occur between the implementation of structural adjustment policies and their real, observed effects. I hypothesize that the percent of terrestrial protected areas in a given country will be lower in countries that are undergoing structural adjustment loans.

Independent Variables

The key independent variable of interest in my study is IMF Structural Adjustment. This variable has been coded as a dummy variable, with countries that are under a structural adjustment agreement coded as 1 and countries that are not under structural adjustment coded as 0. The data is measured in 2010 and was obtained from the International Monetary Fund data repository. I hypothesize that according to world-systems/dependency theory, nations that are undergoing structural adjustment should

have less land designated as terrestrial protected areas than nations that are not undergoing structural adjustment.

Another key variable of interest in this study is GDP Per Capita. This variable is measured in Purchasing Power Parity rates in current international dollars for the year 2010. Purchasing Power Parity rates make it easier to understand what international dollars can be valued at in each country in the world and standardize the international dollar. I hypothesize that countries with lower GDP Per Capita will have lower amounts of terrestrial protected land areas. This variable and the values for the year 2010 were obtained from the World Bank's World Development Indicators databank online.

Secondary School Enrollment is included in this study as a measure of education. As discussed earlier, higher levels of education within a nation should be correlated with higher percentages of terrestrial protected areas. I hypothesize that nations with more educated populations will be more aware of environmental problems and threats to the environment than those that have lower levels of education. Additionally, increased levels of education may provide potential solutions and information about environmental problems that more educated people are already aware of. This variable is measured as the gross percentage of secondary school enrollment in a given nation. Gross enrollment refers to the total percentage of people, regardless of age, who are in secondary school (World Bank 2014c). This variable is compiled by the World Bank and can be obtained from the World Bank Databank for the year 2010.

A measure of Fixed Broadband Internet Users is used in this study to measure access to the Internet. This variable serves as a measure of access to flows of information. I hypothesize that the more access to Internet in a given nations, the better its people will

be informed about environmental issues and promote conservation efforts. This measure can also serve as an indicator of development, as nations that are more developed have better infrastructure, including availability of broadband Internet (World Bank 2014c). This variable is measured in terms of high-speed access to public Internet and downstream speeds of at least 256 kbit/s per 100,000 (World Bank 2014c). This data was obtained online from the World Bank Databank for the year 2010.

In addition to structural adjustment, I include External Debt Stocks as a measure of economic dependency. This variable is measured as, "…debt owed to nonresidents repayable in currency, goods, or services" and is measured as a percentage of a nation's total GNI (World Bank 2015b). This variable serves as a measure of economic dependency and can show how much of a nation's GNI is diverted into servicing foreign debts. I hypothesize that nations with higher external debt stocks will have lower percentages of terrestrial protected areas. I hypothesize that nations with larger external debt stocks as a percentage of their GNI will have less capital to devote to national parks and other conservation measures that ultimately prevent biodiversity loss.

Gross Capital Formation, or gross domestic investment, is included as an economic measure of state spending in this analysis. This variable measures the "…the level of domestic investment in fixed assets plus net changes in inventory levels" (World Bank 2015c; Jorgenson et al. 2007). I hypothesize that gross capital formation will be positively correlated with terrestrial protected areas because more gross capital formation may lead to more national investment in the environment and conservation.

The Level Of Democracy is also a key potential predictor of conservation. I use the Freedom House Democracy score to measure the level of democracy in a given

country. The data is collected using foreign and domestic news reports, academic analyses, NGOs, think tanks, individual professional contacts, and visits to the regions (Freedom House 2010). The scores and ratings for democracy in a given country are measured on a scale of 1 to 7, with 1 being the highest level of freedom and 7 being the lowest level of freedom. These ratings are then categorized into three categories "Free", for countries that receive an overall score of 1.0-2.5, "Partly Free" for countries that receive an overall score of 3.0-5.0, and "Not Free" for countries that receive an overall score of 5.5-7.0. I have reverse coded these scores, so on the scale used in my quantitative analysis, 1 represents "Not Free" and 7 represents "Free", thus the higher a country's score, the more free it is. This data was obtained online from the Freedom House and was measured in the year 2010.

Controlling for Latitude in this study is important, as a nation's latitude may affect the amount of biodiversity present and therefore the level of conservation (CEPF 2014; Myers et al. 2000). I measure latitude by taking the absolute value of nations' latitudes to measure distance from tropical zones. I hypothesize that nations in more tropical, biodiversity hotspots will have increased conservation of land area, due to national and international attention, as well as enhanced conservation strategies that promote ecotourism. This data was obtained from the CIA World Factbook.

I also include Forest Area Percentage to account for the total forests in a given nation. Conservation strategies focus on protecting forests, as forests are home eight out of ten species on Earth and almost 300 million people (WWF 2015). I hypothesize that nations with higher percentages of forest area will also have higher percentages of terrestrial protected areas, as forest protection is intimately linked to biodiversity protection and

conservation. This variable is measured as the forest area as a percent of the total land area in a given nation for the year 2010, and can be obtained from the World Bank Databank. [2]

[2] I tested multiple other variables that I chose not to include in my study because of a lack of statistical significance. Some of the variables I included in various models throughout my analysis process are: GDP per capita Growth, Agriculture (% of GDP), Tertiary School Enrollment, Population Growth, Rural Population, Deforestation, CPIA Policy Rating, CPIA Transparency Rating, Sub-Saharan Africa, Southeast Asia, and Latin America. Including these variables in models did not impact the statistical significance of factors reported here. While these variables did not detract anything from my study, their lack of statistical significance led to their exclusion from my study.

Table 2: Univariate Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Skewness
Terrestrial Protected Area	13.37	8.99	0.37	36.65	0.57
IMF Structural Adjustment	0.46	0.50	0	1	0.18
GDP Per Capita	5126	3278	711.30	11367	0.31
Secondary School Enrollment	64.43	26.27	13.83	104.53	-0.28
Fixed Broadband Internet	1.96	3.00	0.002	11.68	1.96
External Debt Stocks (% GNI)	45.42	28.08	2.06	110.70	0.64
Gross Capital Formation	25.15	9.50	9.30	61.7	1.28
FH Democracy Score	4.10	1.55	1	7	-0.31
Latitude	21.42	12.65	2	49	0.53
Forest Area Percent	27.95	21.53	0.07	84.62	0.59

Table 3: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Terrestrial Protected Area	1.000									
(2) IMF Structural Adjustment	-0.421	1.000								
(3) GDP Per Capita	0.236	-0.309	1.000							
(4) Secondary School Enrollment	0.029	-0.208	0.686	1.000						
(5) Fixed Broadband Internet	0.023	-0.073	0.700	0.546	1.000					
(6) External Debt Stocks (% GNI)	-0.389	0.391	-0.003	0.296	0.112	1.000				
(7) Gross Capital Formation	0.154	-0.130	0.003	0.054	0.019	0.074	1.000			
(8) FH Democracy Score	0.384	-0.024	0.352	0.314	0.326	-0.168	-0.072	1.000		
(9) Latitude	-0.410	0.182	0.158	0.367	0.391	0.091	0.127	-0.160	1.000	
(10) Forest Area Percent	0.494	-0.327	0.287	0.189	0.149	0.013	0.035	0.348	-0.403	1.000

Table 4: Fixed Regression Effects Predicting Terrestrial Protected Areas, 2012

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
IMF Structural Adjustment	-6.89*** *-.385* (2.35) [1.11]	-6.45*** *-.360* (2.39) [1.16]	-4.42* *-.247* (2.52) [1.35]	-7.53*** *.421* (2.19) [1.12]	-4.36* *-.244* (2.20) [1.21]	-4.15* *-.232* (2.33) [1.47]
GDP Per Capita	.000 *.117* (.000) [1.11]	.001* *.384* (.001) [2.92]	.000 *.158* (.000) [1.13]	-.000 *-.030* (.000) [1.27]	.000 *.128* (.000) [1.30]	.000 *.023* (.000) [1.49]
Secondary School Enrollment		-.078 *-.229* (.059) [1.92]				
Fixed Broadband Internet		-.439 *-.146* (.536) [2.09]				
External Debt Stocks (% GNI)			-.091** -.286 (.042) [1.20]			-.058 *-.182* (-.058) [1.76]
Gross Capital Formation			.098 *.104* (.116) [1.02]			
FH Democracy Score				2.23*** *.384* .720 [1.15]		1.48** *.255* (.712) [1.31]
Latitude					-.198** *-.279* (.092) [1.35]	-.093 *-.130* (.108) [2.00]
Forest Area Percent					.111* *.266* (.056) [1.45]	.103* *.247* (.057) [1.63]
Overall R^2	.1895	.2321	.2683	.3176	.3784	.4474

Notes: *** p< .01, ** p < .05, * p < .1 (two-tailed tests); unstandardized coefficients flagged for statistical significance; standardized coefficients reported in italics; standard error reported in in parentheses, VIF reported in brackets.

Results

Table 2 displays the univariate statistics for all variables included in this study, reporting the mean, standard deviation, minimum, maximum, and skewness for each variable. Of particular importance are the univariate statistics for my two key variables in this study, terrestrial protected areas and IMF Structural Adjustment. The mean for terrestrial protected areas is 13.37%, meaning that on average, the developing nations included in the study designate 13.37% of their entire land area as protected and to conservation. The country included in this study with the smallest percent of terrestrial protected area is Afghanistan at .37% and the country included in this study with the largest percent of terrestrial protected area is Belize at 36.7%. The mean for my IMF Structural Adjustment variable for countries included in this study is .46, which indicates that just under half of all nations included were under a structural adjustment agreement from the IMF in 2010. Because this variable is a dummy variable with 0 representing nations that did not receive structural adjustment loans and 1 representing nations that did receive structural adjustment loans, the minimum is 0 and the maximum is 1.

Table 3 represents the correlation matrix. As predicted, I find a strong, negative correlation between IMF structural adjustment and the percentage of terrestrial protected areas in a given nation. This finding is consistent with prior literature that also finds negative correlations between structural adjustment policies and other environmental issues, such as biodiversity loss and deforestation (Shandra et al. 2010; Shandra et al. 2011; Pandolfelli et al. 2014).

Many of the correlations with protected areas are in the predicted direction, such as GDP per capita, democracy, and debt. However, Table 3 illustrates that the correlation

coefficient for secondary school enrollment and protected land areas is almost negligible. Similarly, I hypothesized that nations with higher numbers of fixed broadband Internet subscribers would have higher percentages of terrestrial protected areas, as access to Internet should increase information flows and inform populations of threats to the environment. However, the correlation coefficient between fixed broadband Internet and terrestrial protected areas is also very small.

The correlation coefficients displayed in Table 3 show that many of the predictor variables are highly correlated with each other and begin to suggest factors that are important in explaining cross-national variation in land conservaion. For example, GDP per capita and secondary school enrollment have a correlation coefficient of .686 and forest area percent and latitude have a correlation coefficient of -.403. Fixed broadband Internet and secondary school enrollment also have a high correlation coefficient of .546.

Table 4 displays the results of my OLS regression analysis used to predict the percent of terrestrial protected area across developing nations included in my study. I constructed my models carefully as many of the independent variables were highly correlated. I paid particular attention to VIFs in an attempt to stay within conventional standards of below 2.5. As my key variable of interest, IMF structural adjustment is included in every model. GDP per capita is also included in every model as a key developmental control, and together these variables serve as a baseline for all 6 models. In model 1, IMF structural adjustment is significant at the .01 level and has a coefficient of -6.89, suggesting that nations under structural adjustment loans have about 7% less terrestrial protected areas than nations not under structural adjustment loans of the nations included in my sample, when controlling for GDP per capita. The IMF structural

adjustment variable continues to be significant in all subsequent models. Together, IMF structural adjustment and GDP per capita explain almost 20% of land conservation rates across countries.

Model 2 adds the variables secondary school enrollment and fixed broadband Internet to the baseline. In this model, GDP per capita is significant at the .10 level, suggesting that a higher GDP per capita means more terrestrial protected areas in a given nation. This is the only model where GDP per capita is significant. Neither secondary school enrollment nor fixed broadband Internet are significant, when controlling for GDP per capita and IMF structural adjustment. Model 3 adds debt and gross capital formation to the baseline predictors. As predicted, external debt stocks is significant and has a negative relationship with percentages of terrestrial protected areas, net of other factors. However, gross capital formation is not a significant predictor of land conservation in developing nations. Together, the variables included in model 3 explain about 27% of variation in land conservation rates across developing countries.

Model 4 considers the influence of democracy, and the results illustrate that in addition to structural adjustment, the FH democracy score is a highly significant predictor of conservation rates, where nations with higher levels of democracy tend to have more land area protected.

Model 5 adds latitude and forest area percent to the baseline predictors. Latitude demonstrates a negative relationship to terrestrial protected areas, controlling for other factors. This finding indicates that for every 1 degree of latitude further from the equator, a nation has about .2% less land area conserved. Forest area percent has a positive relationship to terrestrial protected areas, net of the influence of latitude, structural

adjustment, and GDP per capita. This means that nations with larger forests tend to have more land area protected. Together, latitude, forest cover, structural adjustment and GDP per capita explain about 38% of land conservation rates across nations.

Model 6 represents a fully saturated model and includes all variables that were statistically significant in any prior model. Notably, IMF structural adjustment is still statistically significant in this final model. This finding indicates that when controlling for GDP per capita, external debt stocks, FH democracy score, latitude, and forest area percent, nations under IMF structural adjustment have about 4% less land conserved than nations not under IMF structural adjustment loans. Together, these indicators explain almost 50% of the variation in land conservation rates across developing countries.[3]

Discussion and Conclusion

Globally, conservation is the most popular strategy or environmental policy aimed to address issues of biodiversity loss and ecosystem decline. Despite the popularity of conservation efforts, to the best of my knowledge, this is the first study to attempt to understand what factors explain rates of land conservation across nations. As threats to biodiversity and conservation continue to increase, especially in poor nations most vulnerable to environmental degradation, it is critical that attention is paid to macro-level policies that influence land conservation rates in developing nations.

Based on the results of the regression analyses, I find substantial support for world-systems/dependency theory. My main variable of interest, IMF structural

[3] One variable of interest that was excluded from this study is the number of environmental NGOs in a given nation. This variable was excluded because there was insufficient data as when included, the total sample size for my study was reduced to N=20. However, this variable did approach statistical significance and was positively correlated with terrestrial protected areas, as expected. The implications of civil society efforts in protecting land areas should be studied in greater detail in future research as more data becomes available.

adjustment, is significant in every model in my study. Additionally, external debt stocks (% of GNI) is a significant predictor in some of the models, providing support for world-systems/dependency theory perspectives that are critical of debt and conditionality reforms. In the past, the "debt regime" implemented by agencies such as the IMF caused nations to divert funds from important social services like food subsidies and clean water (McMichael 2012; Shandra et al. 2011). Countless examples cite that the effects of servicing debt fall on those least able to cope with them. For example, in Mexico in the 1980s, prioritizing replaying debts resulted in the elimination of food subsidies. This ultimately led to 17 million people living in extreme poverty by the year 1990 (McMichael 2012). Additionally, in 1983, Zambia, Sudan, and Tanzania used over 100 percent of their export earnings to pay back debt (McMichael 2012). My findings are consistent with the existing literature on debt servicing and the detrimental effects it has on poor nations.

Given the existing literature on structural adjustment loans and other neoliberal strategies for debt management, it is clear that steps need to be taken to prevent future social and environmental injustices. The most important strategy that macro-level institutions can take to prevent further environmental and social damage is to forgive the debt of the Third World. The debt crisis and debt management have dominated the economies of developing countries since the 1980s and many of these nations, given the existence and prevalence of structural adjustment loans, still struggle to pay back debt. Some of the debt of developing countries dates back to colonial times, where profits of colonialism were invested into the economies of colonizers and left Third World nations impoverished (Isbister 1991). Debt owed to macro-level institutions and core nations

continues to plague developing countries and hinder the development that these countries so desperately need. Alleviating debt or promoting more socially and environmentally friendly strategies to debt repayment is a necessary step for development and the prioritization of the environment and conserving biodiversity. Additionally, neoliberal ideologies that promote privatization and deregulation of state economies cripple the abilities of developing nations to protect social and environmental conditions, ultimately disadvantaging the poorest and most vulnerable people and species. Stronger states that have control over their economies and the power to invest funds into social and environmental services can drastically improve social conditions.

Another strategy to promote conservation in less-developed nations is to implement debt-for-nature swaps. In the late 1980s, it became apparent that many of the countries with the richest natural resources and ecosystems were also the most in debt (Dobson 1996). Debt-for-nature swaps occur when, "…a conservation organization acquires the debt at a discount and asks the debtor country to redeem the debt by supplying land for reserves and salaries for people to manage, monitor, and protect those reserves" (Dobson 1996:249). In practice, debt-for-nature swaps have helped many less-developed nations alleviate debt and increase conservation, as in the case of Costa Rica (The Nature Conservancy 2015b). In this instance, the Costa Rican government and the U.S. Treasury agreed upon a debt-for-nature swap to alleviate debt and pour funds into marine and terrestrial protected areas (The Nature Conservancy 2015b). Debt-for-nature swaps are excellent initiatives for resolving issues of debt for Third World nations and promoting conservation. Ultimately, however, debt relief needs to be a serious priority to

curb the environmental degradation fueled by increased demands for debt payback (Dobson 1996).

My findings suggest that structural adjustment loans continue to perpetuate global inequality. Structural adjustment loans hamper development and as long as developing countries continue to service debt, there can be no real economic or social gains. As noted by the Critical Ecosystem Partnership Fund, the most important biodiversity hotspots in the world are also the most threatened (Critical Ecosystem Partnership Fund 2014). Nations included in my analysis like Mozambique, Tanzania, Colombia, Ecuador, Bolivia, and Peru, among others, are those designated as "hotspots" by the Critical Ecosystem Partnership Fund (CEPF 2014). These "hotspot" regions of the world face severe threats to biodiversity and need conservation efforts the most, yet these regions continue to be held back by debt and structural adjustment loans (CEPF 2014).

While historically structural adjustment loans have perpetuated global inequality, it is important to note that the current president of the World Bank is prioritizing ending extreme poverty and focusing on financial strategies in local contexts. Jim Yong Kim, a physician and anthropologist, believes in finding solutions based on specific contexts and that "…there's no one-size fits all" (Lowrey 2012). With Kim in a leadership position at one of the top financial institutions in the world, hopefully the conditions of debt servicing and the treatment of the environment will see positive change.

Because debt service and foreign direct investment have historically been associated with negative effects in less-developed countries, I hypothesized that gross capital formation would have a positive effect on terrestrial protected land areas and conservation efforts. If nations are in control of their funds instead of foreign institutions,

money is more likely to be locally invested to improve social and environmental conditions (Jorgenson et al. 2007; Kentor and Boswell 2003). In my study, however, gross capital formation did not have a statistically significant impact on terrestrial protected areas. I believe that this variable and the effects of domestic investment/gross capital formation have not yet been studied widely enough in sociological research and that this topic warrants further research.

Based on the results of the regression analyses, I find limited support for modernization theory. While this theory argues that economic development and liberalization will lead to more beneficial social and environmental outcomes for societies, I found little evidence of these trends given the results of my analyses. The secondary schooling variable used to measure education was not significant in my models. This contradicts my hypothesis that more access to education would have a positive effect and encourage and increase conservation rates. Similarly, I expected my variable for fixed broadband Internet to have a positive effect on conservation rates. I hypothesized that access to information would make populations aware of environmental issues, or perhaps be used to mobilize efforts. The non-significant relationship between fixed broadband Internet subscribers and terrestrial protected areas was thus also surprising, as I hypothesized that it would have a positive and significant impact on conservation rates.

Additionally, GDP per capita was not a significant predictor of conservation in any model. Modernization theory places heavy emphasis on economic development and the EKC argues that an increase in economic status should positively impact the social and environmental sectors (Ehrhardt-Martinez et al. 2002). A modernization argument

that economic development will increase conservation rates does not hold true in this study. One variable linked to modernization theory that was highly significant in all models, however, was the Freedom House democracy score. This suggests that the more democratic a nation is, the greater the percentage of terrestrial protected areas. This finding is consistent with prior literature linking more democratic nations to increased accountability and action from governments to protect people and environments (Payne 1995).

I uncover a unique set of findings for the variables latitude and forest area percentage, as both latitude and forest area percentage are positively associated with percentages of terrestrial protected areas across developing nations. I hypothesize that this finding speaks to the fact that many tropical, forested nations represent biodiversity hotspots (CEPF 2014), and therefore have received extra attention to conservation efforts. Increases in terrestrial protected areas among topical, forested nations may be also driven by an emphasis on ecotourism. As an example, the two nations with the highest percentages of terrestrial protected areas in this study are Tanzania and Belize, which also have extensive ecotourism programs (Sood 2012; The International Ecotourism Society 2014). These nations dedicate a significant percentage of their land to conservation as ecotourism has significant economic benefits (Sood 2012). However, even nations rich in biodiversity that benefit from ecotourism note that "…poverty, governance issues, lack of financial resources, and development pressures" place great strains on conservation efforts (The International Ecotourism Society 2014). Studying ecotourism and the benefits it may have for conservation rates, retaining biodiversity, and economic growth is a potentially important area for future research.

One of the limitations to this study is the availability of data. For some measures, data was only available for some nations, limiting my sample size. Also, by performing a cross-national secondary data analysis, I am limited by the type of data that is publicly available. It is therefore impossible to gather data on other measures that may have been relevant to this study, such as level of enforcement in conservation areas, or amount of spending on conservation. Also, I would have liked to include a measure of environmental organizations/environmental NGOs, but the data was too thin to be utilized here, as it dramatically reduced my sample size. This variable should be further explored in the future to investigate the effects that NGOs or civil society groups can have on promoting conservation.

At a time when species are being extinguished at unprecedented rates, we must take into consideration any and all factors that may adversely affect our ability to conserve biodiversity. Chief among these is the negative impact of structural adjustment. It is past time that humans take accountability for the damage we have done to the planet and the "Sixth Extinction" we are responsible for causing (Kolbert 2014). If we are to be truly concerned with our future and the future of millions of other species on our planet, we need to acknowledge the macro-level forces that influence conservation efforts. If we do not recognize the damage we are causing to biodiversity and make drastic efforts to stop it, humans too will be forced to suffer the consequences.

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BIOGRAPHY

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