WAR AND WILDLIFE: THE DELETERIOUS EFFECTS OF ARMED CONFLICTS IN BIODIVERSIY HOTSPOTS AND THE MERITS OF ENVIRONMENTAL PEACEKEEPING

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Abstract

In the 1970s, ecologist Norman Myers first coined the term "biodiversity hotspot" in order to define locations that possess exceptional species endemism and habitat diversity. The survivability of these unique ecosystems relies heavily on human action and the ability of world governments to work collaboratively on shared environmental management goals. Unfortunately, there exists an alarming geographic overlap between armed conflicts and biodiversity hotspots, creating a barrier to effective environmental conservation in areas concentrated in politically volatile regions. This thesis seeks to examine the viability of environmental conservation in the future with regards to the frequency of armed conflicts that have transpired within biodiversity hotspots. Chapter One will use data that I have collected to examine the incidences of global conflict years in 1946-2018 that have occurred within biodiversity hotspots. Chapter Two will provide case studies exemplifying the variety of consequences associated with ecological niches located in areas of conflict. I will discuss the transnational wars in the Democratic Republic of Congo (1996-2003), the current international war in Afghanistan (2001-present), and the Columbian Civil War (1964-2016). Chapter Three will discuss the merits of environmental peacekeeping through human rights and collaborative approaches. The Conclusion will stress the importance of immediate action against the destructive forces of war, serving as a global call to action to conserve biodiversity hotspots and reduce the frequency of armed conflict.

ACKNOWLEDGMENTS

I am continuously inspired by nature and the chaotic energy that connects us as human beings. I enjoy surrounding myself with lush landscapes and wildlife, as well as strong female figures who not only are passionate about their respective fields, but also who pave the way for the success of future women in science and political science. My thesis would not have been as great of an achievement without the help of the following women:

I would like to thank Dr. Donata Henry, my primary reader, for her unconditional support of my thesis project. She was the person who initially encouraged me to explore my passions further in the form of an honors thesis, and she has been committed to my overall success from its inception. I would also like to thank Dr. Jelagat Cheruiyot, my second reader, for helping me to narrow my focus and think critically about my data and results. Her personal narrative gave me insight into the complex balance between conflict and nature. Finally, I would like to thank Dr. Christina Kiel, my third reader, for lending her political science expertise to my thesis. Working with her strengthened my perspective that collaboration with a variety of disciplines is necessary to produce viable and well-rounded policy.

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FOREWORD

Dr. Wangari Maathai, winner of the 2004 Nobel Peace Prize, once said, "In a few decades, the relationship between the environment, resources and conflict may seem almost as obvious as the connection we see today between human rights, democracy and peace." There exists a nexus between environmental conservation and conflict resolution that has become an important concept of study among peace activists, conservationists, and national security scholars. Emerging literature has proposed that in theory, protecting and restoring the environment can contribute to a more peaceful future by establishing institutions that preserve human rights via the equitable distribution of natural resources. The increasing importance of unifying natural resource management with conflict resolution has inspired me to challenge people's preconceived notions about the future of effective environmental conservation.

We are currently living through the Anthropocene, or the geological age in which human activity is the dominant influence of climatic and environmental changes. The present environmental crisis is a global problem that requires global collaboration as well as local implementation in order to conserve ecosystem services for future generations. Unfortunately, armed conflicts act as a barrier to global collaboration as governments become preoccupied with addressing citizens' grievances to eliminate outbreaks of violence and war. I am interested in uncovering the consequences of human conflicts that have taken place in biologically important regions because the future prospect of effective climate change mitigation will rely heavily on warfare and post-conflict mediation becoming environmentally friendly.

While ‘environmentally friendly warfare’ sounds contradictory, this does not negate the importance of conflicting groups to be more environmentally conscious in the pursuit of their political and social goals. In instances where it is impossible to preserve nature present within a warzone, environmental policies implemented post-conflict should be used to ensure these ecosystems are properly managed and restored. This thesis seeks to explore the deleterious overlap between armed conflicts and biodiversity hotspots by presenting a novel interpretation of wildlife conservation through a geopolitical lens. The goal of this thesis is not simply to condemn conflict for its detrimental effects on nature, but rather to promote a more ecologically conscious future by endorsing sustainable peacekeeping strategies.

My honors thesis is guided by several research questions: (1) With regards to the frequency of modern armed conflicts, which biodiversity hotspots are the most at risk of experiencing critical damage? (2) How can environmental conservation be used to encourage conflict resolution, and vice versa? (3) What needs can environmental peacekeeping fulfill in order to promote environmentally conscious warfare? I will take a hybrid approach in order to holistically address these research questions, applying my international relations background to my knowledge and focus in environmental biology.

I believe environmental conservation can be used as a peace conduit in order to encourage conflict resolution. Conflict resolution can be used to leave societies in a more unified state, allowing governments and international organizations to focus public policy and resources on new environmental protections. Environmentally conscious warfare can more readily be promoted when societies feel that their security needs are met. Only then can conservation efforts exist in harmony with societal cohesion.

CHAPTER ONE: QUANTITATIVE ANALYSIS

Introduction

The term 'armed conflict' is broadly understood as an act of war generated by two or more governmental groups, non-governmental groups, or international states that generally involves a combination of direct and indirect active military actions (Lawrence, et al., 2015). The majority of contemporary wars have involved conflicts among political factions or ethnic groups within countries rather than international military confrontations between different nation-states (Dudley, et al., 2002). As a consequence, there exists an alarming geographic overlap between armed conflicts and vulnerable ecosystems concentrated within politically volatile regions. Climate change, deforestation, overexploitation of natural resources, and pollution are commonly cited anthropogenic threats to wildlife communities around the world. Rarely considered by citizens and policymakers alike is the theory that international and civil wars play a significant role in dramatically reducing animal and plant populations within biodiversity hotspots.

Ecological degradation and environmental changes associated with armed conflict not only threaten the stability and security of national governments in many regions of the developing world, but also destroy the structure and functioning of ecosystems (Dudley, et al., 2002). It is estimated that over 42% of terrestrial vertebrate species and 50% of known plant species live concentrated in only 2.3% of Earth's land surface (Hanson, et al., 2009). In the 1970s, ecologist Norman Myers first coined the term "biodiversity hotspot" in order to define such locations that possess exceptional species endemism and habitat diversity. In addition, he stressed the importance of allocating considerable financial and political resources to biologically important regions that are

highly sensitive to human disturbances in order to preserve their integrity for the benefit of future generations (Hanson, et al., 2009).

Today, the Critical Ecosystem Partnership Fund recognizes the existence of 36 biodiversity hotspots globally (CEPF, 2020). Previous research conducted in 2009 by Hanson et al. for a scientific paper titled "Warfare in Biodiversity Hotspots" discovered that an estimated 90% of major armed conflicts between 1950 and 2000 occurred within countries containing biodiversity hotspots. This study examined conflicts in only 34 biodiversity hotspots identified by Conservation International, a nonprofit organization. It also uncovered that more than 80% of wars took place directly within hotspots, and a majority of these biologically diverse areas suffered repeated episodes of violence (Hanson, et al., 2009). I am interested in expanding upon this research by including armed conflicts that have occurred, and new biodiversity hotspots that have been identified, since this previous study was published. It is important to me to supplement Hanson's research with my own study in order to provide more comprehensive data that encompasses contemporary warfare of the twentieth and twenty-first centuries.

The most intractable problem facing environmental conservation today is the pervasiveness of armed conflicts within biodiversity hotspots because eliminating anthropocentric grievances often take precedent over minimizing anthropogenic activities (Redpath, et al., 2013). As a consequence, ecosystem health and integrity are neglected casualties of conventional warfare as environmental concerns recede, and security concerns force the suspension of environmentalist activities (Lawrence, et al., 2015). The weakening or collapse of sociopolitical institutions during wartime can lead to habitat destruction and the erosion of conservation policies with little responsibility from

involved parties to contribute to reconstruction and rehabilitation efforts post-conflict (Hanson, et al., 2009).

I hypothesize armed conflicts occur at a different frequency inside than outside of biodiversity hotspots due to the high concentration of biodiversity hotspots in geopolitically volatile regions. I predict the Eastern Afromontane, the Indo-Burma, and the Mediterranean Basin biodiversity hotspots are the most at risk of experiencing critical damage due to their large ranges that overlap countries with a history of violent conflicts. This has serious implications to the survival of a variety of wildlife, as well as may exacerbate armed conflicts over the distribution of natural resources in the future.

Methods

My first goal while designing this study was to clearly define my study space by setting strict guidelines for which biodiversity hotspots exist and where they are found. I identified the eight biogeographic realms on a map—Afrotropical, Antarctic, Australasia, Indo-Malay, Nearctic, Neotropical, Oceania, and Palearctic—which were originally acknowledged by British naturalist Alfred Russel Wallace in 1876 (Figure 1). I chose to define the world by geographic realms rather than by continents because many islands that have experienced conflict are more easily defined by their biogeographic realm. Next, I obtained a list of the 36 internationally recognized biodiversity hotspots from the Critical Ecosystem Partnership Fund (CEPF). The CEPF is an umbrella organization with a biodiversity conservation initiative. They utilize the resources of several international organizations, including the European Union, to advocate for the protection of Earth's rarest plant and animal species. I compared the map of highlighted hotspots on their

website with a map of Wallace's biogeographic realms, and then I compiled my own list of hotspots categorized by their biogeographic realm.

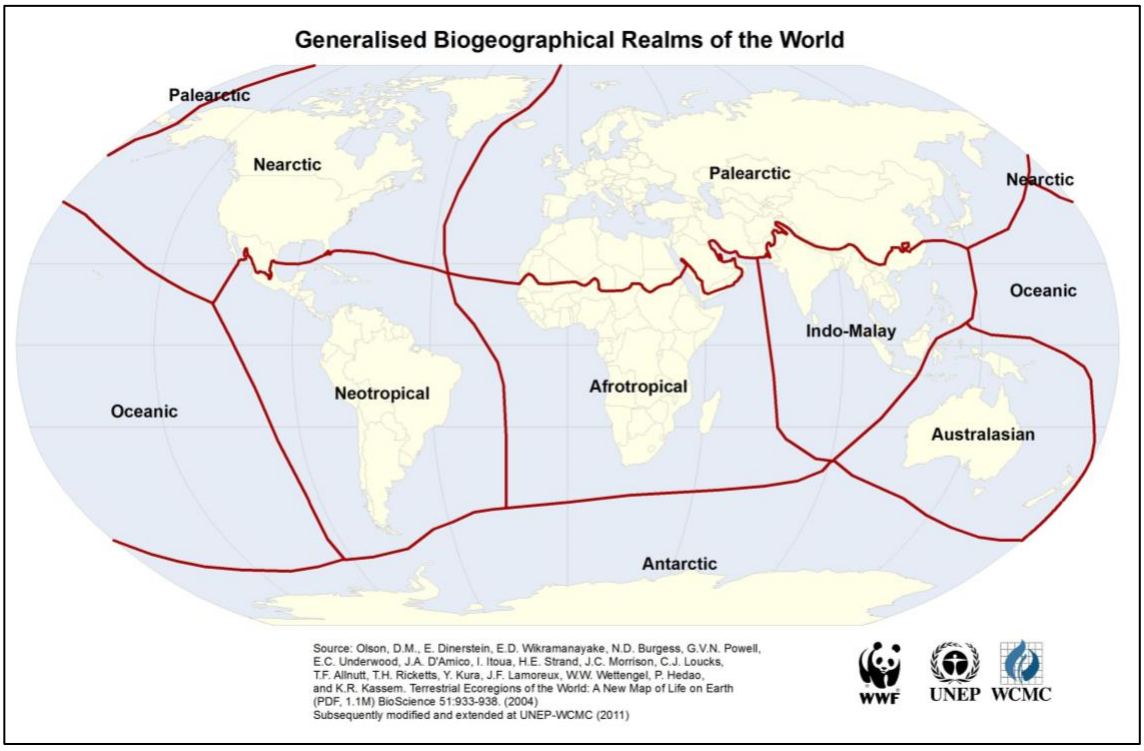

Figure 1. Wallace's Biogeographic Realms

My second goal while designing this study was to organize a list of armed conflicts in terms of their biogeographic realm as well as their potential overlap with a biodiversity hotspot. I created an Excel document with the following columns: location, biogeographic realm, hotspot (Y/N), and hotspot name (if applicable). Then I downloaded the "UCDP/PRIO Armed Conflict Dataset version 19.1" from the Uppsala Conflict Data Program's website. Uppsala University is a Swedish institution that collects, organizes, and disseminates data on armed conflict events around the world. They maintain the oldest ongoing data collection program on organized violence and are trusted in the field of international relations to define how conflicts are categorized. The document I downloaded had a conflict-year unit of analysis that covered the time period

of 1945 to 2018. Each armed conflict listed by its start year followed strict parameters set by UCDP. At least one actor must have been the government of a state, and at least 25 battle-related deaths must have occurred within the first year of fighting.

From the Uppsala dataset, I first copied the location column over to my own data table. According to their codebook, UCDP defines 'location' as the name of the country or countries whose government is the primary actor. They did provide the disclaimer that where multiple countries were listed, not every location recorded corresponded to a precise geographic location of conflict. I corrected for this discrepancy in my own data table by noting the start year (and in some cases the name of the territory over which the conflict was fought) provided in the UCDP dataset. I then conducted a quick internet search of the conflict and included the correct location in my Excel document.

I completed the rest of my data table by first looking up the exact location of a conflict in Google Maps, especially when I was unsure of a country's exact location. Next, I found the same country on a map depicting Wallace's biogeographic realms and recorded the name of the realm in the corresponding column. Then, I found the country in question on the interactive map of biodiversity hotspots provided by the Critical Ecosystem Partnership Fund's website (Figure 2). I recorded a "0" for locations outside of a hotspot and a "1" for locations within a hotspot in the corresponding column. For conflict-year locations that overlapped with a biodiversity hotspot, I also wrote down the specific name of the hotspot in which the conflict was fought. I repeated these steps for a total of 2,385 armed conflict-years provided by the Uppsala dataset.

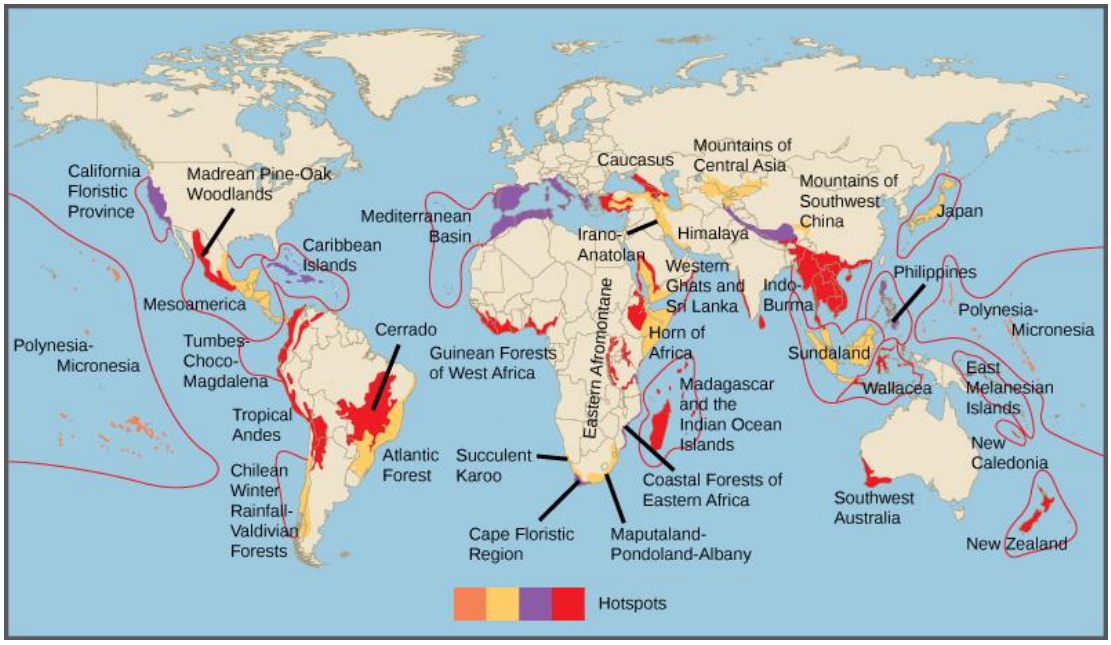

Figure 2. World map with highlighted biodiversity hotspots similar to the interactive map found on the CEPF website (https://www.cepf.net/our-work/biodiversity-hotspots)

My final goal while designing this study was to complete a chi-squared test ($p<0.05$). I made my observed frequency table by first reorganizing my data alphabetically by name of biogeographic realm. Beginning with the first realm, I counted the number of "1" (representing wars that occurred inside hotspots) and "0" (representing wars that occurred outside of hotspots). I repeated this methodology for each biogeographic realm. I omitted the Antarctic and Oceania biogeographic realms because these regions have not experienced any armed conflicts in the course of contemporary history as reported by Uppsala University. During my analysis process, I also omitted the Australasia, Nearctic, and Neotropical biogeographic realms as outliers because they experienced less than 300 armed conflict-years during the time period of 1945 to 2018.

Results

In the three most volatile biogeographic realms, the incidences of armed conflict-years occurred at a higher frequency inside biodiversity hotspots than outside of

biodiversity hotspots (chi-squared= 56.12, df= 2, p-value<0.001). According to Figure 3, the Indo-Malay, Afrotropical, and Palearctic biogeographic realms experienced the highest number of armed conflict-years during the time period of 1945 to 2018. The Indo-Malay biogeographic realm experienced 862 armed conflict-years, while the Afrotropical realm experienced 659 armed conflict-years and the Palearctic realm experienced 633 armed conflict-years.

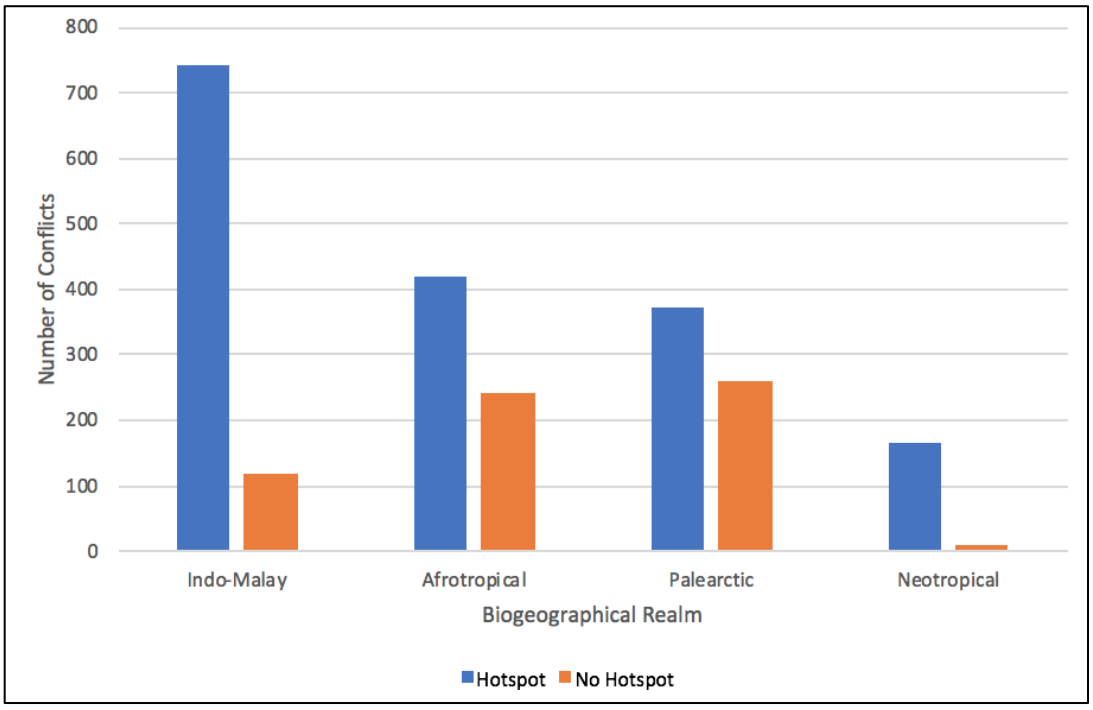

Figure 3. Frequency of armed conflict-years that occurred inside/outside biodiversity hotspots from 1945 to 2018

According to Figure 4, the biodiversity hotspots most impacted were the Indo-Burma (with 492 armed conflict-years), the Eastern Afromontane (with 257 armed conflict-years), the Mediterranean Basin (with 275 armed conflict-years), and the Philippines (with 107 armed conflict-years). Out of the 2,154 total conflict-years analyzed, over 71% of the conflict-years occurred directly inside of biodiversity hotspots.

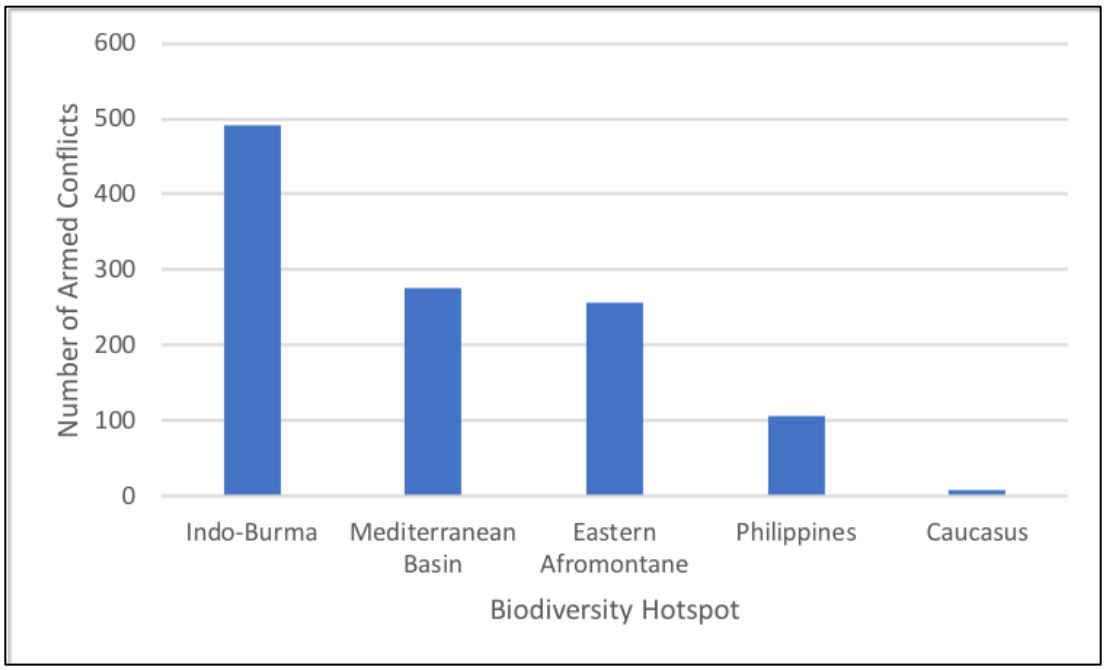

Figure 4. Number of armed conflict-years in the most impacted biodiversity hotspots from 1945 to 2018

Discussion

There exists a greater need for global consideration of the environmental consequences of warfare due to the high frequency of armed conflict-years that occur within biodiversity hotspots. Anthropogenic influences over the health of biological hotspots depends on the nature of the disturbances, the sensitivity of the biological system at risk, and the duration of the negative impacts (Lawrence, et al., 2015). Nevertheless, the causal links between environmental degradation and armed conflicts create positive feedback loops that amplify interactions between ecosystem vulnerability, resource availability, and civil disobedience (Dudley, et al., 2002).

The overharvesting of wildlife and vegetation in conflict zones aggravates existing restrictions on access to natural resources. This threatens the health of ecosystems as well as the livelihoods of local communities dependent on resources for sustenance (Dudley, et al., 2002). Biodiversity will continue to be adversely affected by

the complex geopolitical landscape unless conservation can be integrated into post-conflict reconstruction strategies (Hanson, et al., 2009). Unfortunately, the restoration of peace does not necessarily result in improved environmental conditions. The newly established culture of lawlessness prompted by protracted periods of war may spillover into peace time. Looting of natural resources gone unrestrained during armed conflicts can persist and may even increase if not promptly addressed (Dudley, et al., 2002).

The Indo-Malay biogeographic realm extends across most of South and Southeast Asia, including the islands of the Philippines, home to a biodiversity hotspot of the same name. This realm also encompasses countries such as Cambodia and Myanmar, which have a history of ethnic conflict and violent genocide that overlaps with the Indo-Burma biodiversity hotspot. In addition, China, Pakistan, and India not only are engaged in their own triadic conflict over territorial rights and the procurement of nuclear weapons, but also are confronted with their own internal civilian insurgencies. Ongoing conflicts across these three countries puts at risk the Mountains of Southwest China, Himalaya, and Indo-Burma biodiversity hotspots.

The Afrotropical biogeographic realm encompasses all countries within the continent of Africa below the Sahara Desert. Africa is known for being particularly volatile due to its rich history of rebellions against colonialism, guerilla wars against morally corrupt governments, and being the refuge for several active extremist organizations. Much of inner Africa is void of biodiversity hotspots, however several ecologically important areas can be found in countries that compose the edges of the continent. The Eastern Afromontane biological hotspot provides tens of millions of people with fresh drinking water, and it passes through several unstable countries, such as

Burundi, Djibouti, and the Democratic Republic of Congo. This densely forested area rich in natural resources is often overexploited by impoverished citizens and armed insurgencies looking for safe haven and an easy source of income.

The Palearctic is the largest biogeographic realm, containing part of the Sahel and Maghreb regions of Africa, as well as all of Europe, Russia, and the Middle East. The Irano-Anatolian and Mediterranean Basin are the two most widespread biodiversity hotspots in the region. Syria, Jordan, Lebanon, and Israel all exist within the Mediterranean Basin and have been engaged in a series of protracted armed conflicts against each other since Israel's independence in 1948. In addition, these countries are a hotbed for terrorist and rebel organizations that also act as proxies for other countries in the Greater Middle East. The ethnic conflicts resulting in genocide, wars of independence, and insurgencies fought in the former Yugoslavia during the 1990s also occurred within the Mediterranean Basin biodiversity hotspot.

I was confronted with several sources of error during this study due to the unit of analysis of this Uppsala University dataset. The original dataset was organized by location and conflict start year based on the number of casualties experienced within one calendar year. Firstly, the absence of temporal considerations meant that two or more conflict episodes over the same incompatibility may have been listed several times or only once regardless of the time separating them. This results in an error because some conflicts last longer than others, and the same country can experience several simultaneous conflicts. Moreover, some conflicts involved multiple insurgency groups that may be fighting the same government over the same incompatibility but at different times throughout the same conflict. This creates a confusing situation where

overestimations may exist in the dataset. Secondly, if an armed conflict did not exceed the "25 battle-related deaths in the first year" threshold established by UCDP, then it was omitted from the dataset. This results in an error because, in reality, this dataset is not a comprehensive list. Small conflicts might not have been included in the list, while certain observations might have been based on a single catastrophic event which exceeded the minimum threshold for armed conflicts.

Another possible source of error comes from making comparisons without any adjustment for spatial area or population density. This is due to the reality that despite their ecological and economic importance, many of these biodiverse regions remain under monitored, even in the absence of war. The analyses I conducted for this study uncovered that the most impacted biodiversity hotspots also encompass large geographic areas. Future studies would benefit from standardizing the data for area since some hotspots have much larger terrestrial areas than others.

Human biases are not absent from this study. According to the UCDP/PRIO Armed Conflict Dataset codebook, the dataset only included information when the researchers were confident that the compiled data was correct. This methodology created a bias against the inclusion of conflicts from earlier decades and/or conflicts that have occurred in less-developed countries due to the lower abundance of reliable information. In addition, my own biases were present while collecting my own data. While comparing the location of a conflict to the biodiversity hotspot interactive map, I had to deduce whether or not the conflict actually took place within a hotspot, and if so, which one. In countries containing more than one hotspot in close proximity, I had a bias towards recording the larger hotspot that might have had a higher chance of experiencing armed

conflict. Future quantitative studies may benefit from comparing multiple datasets from different organizations in order to fill gaps in the information presented.

With regards to the frequency of modern armed conflicts by conflict-year, the Indo-Burma, the Eastern Afromontane, the Mediterranean Basin and the Philippines biodiversity hotspots are the most at risk of experiencing critical damage. This conclusion is significant because reduced ecosystem health may contribute to future resource-related civil unrest and violent wars (Hanson, et al., 2009). Civil society needs to understand that wildlife conservation is not a politically neutral activity, but rather something that should be seen in the context of the conflicts in which the damage is taking place.

CHAPTER TWO: CASE STUDIES

Introduction

In a world at odds with the dire costs of climate change, environmental mediation and conflict resolution can be used to align conservationist goals with national security priorities. I decided to take a hybrid approach while conducting this thesis to provide a holistic view of the subject matter. The purpose of the quantitative analysis presented in the previous chapter was to establish statistically significant evidence that a pattern exists between the frequency of armed conflicts and their presence in biodiversity hotspots. The purpose of the following case studies is to offer a less abstract narrative and to demonstrate the importance of taking immediate action to mitigate further environmental damage due to armed conflicts.

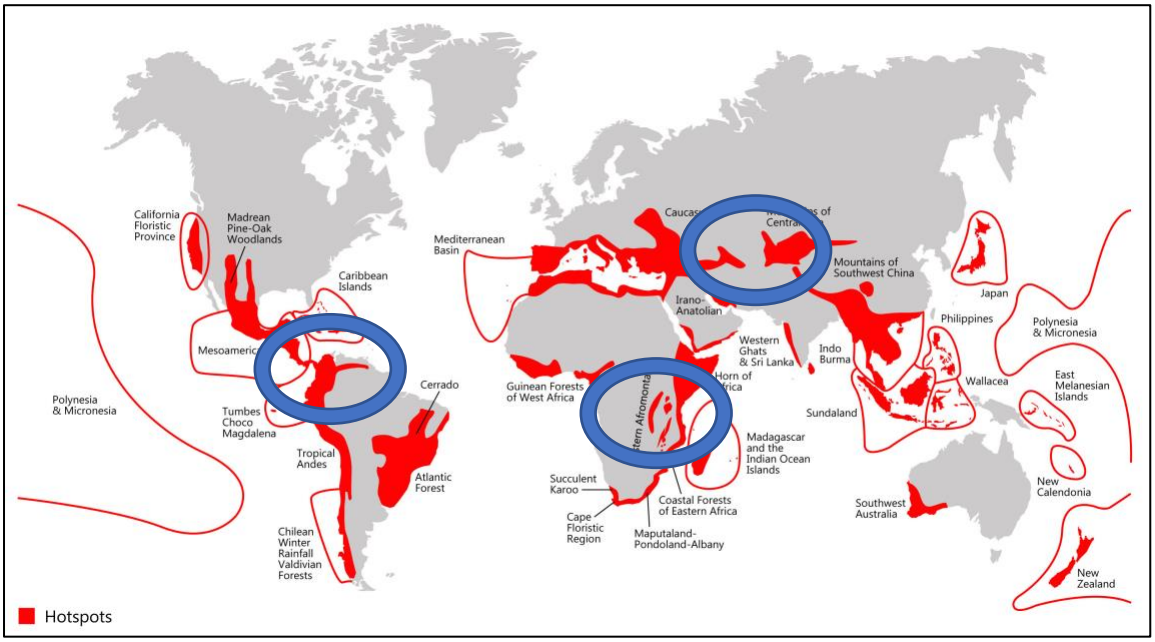

Figure 5. Range map of identified biodiversity hotspots around the world [blue ovals around volatile regions analyzed in the following case studies]

I chose to analyze the armed conflicts in the Democratic Republic of Congo (1996-2003), the current war in Afghanistan (2001-present), and the Columbian Civil

War (1964-2016). These specific conflicts each coincide with a unique biodiversity hotspot—Eastern Afromontane, Mountains of Central Asia, and Tropical Andes/Tumbes-Choco-Magdalena respectively—as well as employ different warfare strategies.

The DRC contains Virunga National Park, a mountainous and densely forested habitat home to a population of critically endangered mountain gorillas (Zielinski, 2014). The wars in the DRC represent transnational and guerilla warfare, as well as exemplify how habitats can suffer from the actions of neighboring countries. Afghanistan contains the Kol-e-Hashmat Khan wetlands, an important source of water for local Afghani and migrating bird populations (Chaon, 2017). The protracted war in Afghanistan represents international warfare and the consequences of superpowers utilizing weapons of mass destruction that survive in the environment for long periods of time. Columbia contains lush tropical rainforests and a complicated relationship with deforestation (Dale, 2018). The Columbian Civil War represents internal warfare and the uncertain future of the environment during post-conflict reconstruction.

The DRC, Virunga National Park, and Human Encroachment

Most high-quality habitats exist only within federally protected areas, making them highly sensitive to the negative impacts of armed conflict (Hanson, et al., 2009). Armed conflicts put wildlife at risk because animals can get caught in the crossfire or poached to feed armies and forgotten civilians. Natural resources can also be easily exploited to raise revenue to fund rebel operations as parks departments crumble and enforcement efforts wane due to a lack of funding and law-and-order (Marijnen & Duffy, 2018). National parks and wildlife reserves are increasingly subject to human occupation by guerrilla fighters, military forces, internally displaced persons, and refugees during

and subsequently after periods of war and civil unrest (Dudley, et al., 2002). More than 70% of Africa's national parks have been affected by war in the past decade, including Virunga National Park in the Democratic Republic of Congo (Marijnen & Duffy, 2018).

War and civil unrest have plagued the Democratic Republic of Congo (DRC) since its independence from Belgium in 1960. Fighting has included two civil wars, one from 1996 to 1997 and another from 1998 to 2003 (Zielinski, 2014). The Alliance of Democratic Forces for the Liberation of Congo (AFDL) insurgent group emerged in 1996, demanding a change in government from corrupt dictator Mobutu Sese Seko to the more moderate Laurent-Désiré Kabila (BBC News , 2014). The AFDL was partially funded by a coalition of African countries spearheaded by Rwanda in protest of the Congolese government's role in interfering with the movement of Hutu genocidaires following the Rwandan Genocide (BBC News , 2014). Today, rebel forces continue to plague the country, fighting the Congolese government over political ideology and the presence of profitable natural resources (Zielinski, 2014). There are more than 30 armed militias in eastern DRC, making a living from extracting minerals, poaching animals, and trafficking goods and people throughout the region (BBC News , 2014).

Refugee migrations caused by civil unrest in one country can affect the political stability of neighboring countries, resulting in complex patterns of simultaneous cross-border wars and civil wars within affected regions (Dudley, et al., 2002). The Rwandan Genocide is said to have triggered regional destabilization within the eastern portions of the Democratic Republic of Congo (BBC News , 2014). In July 1994, the purposeful crash of Rwandan President Juvenal Habyarimana's plane preluded 90 days of fighting between ethnic Tutsi minorities and combatants from the Hutu majority (Al Jazeera,

2014). Targeted Tutsi's fled for their lives over the border into the DRC in search of refuge from Hutu violence, while Hutu genocidaires followed in order to escape ridicule from the Rwandan government (BBC News , 2014).

Currently, over 200,000 Rwandan refugees remain in the Democratic Republic of Congo, most of which are living in camps based in and around Virunga National Park (Al Jazeera, 2014). Refugee camps are often associated with environmental degradation as displaced human populations undergoing food and fuel shortages in lawless landscapes exact heavy tolls on the health of natural resources (Dudley, et al., 2002). Slash-and-burn agriculture and overharvesting of vegetation for fuel and construction materials results in widespread erosion, deforestation, and habitat loss (Dudley, et al., 2002). In addition, the looting of livestock and crops by combatants and refugees leave local inhabitants with little to no alternatives to subsistence other than overharvesting bushmeat and wild edible plants from adjacent ecosystems (Dudley, et al., 2002). Delays in the repatriation of refugees can last for several years and decades, perpetuating the environmental impacts of armed conflict even after the war is declared over (Hanson, et al., 2009).

Conservation initiatives are not just passive victims of armed conflict, but rather are an inherent part of the volatile landscape to which they are situated. Many national parks were created during periods of colonialization by the global north. This creates feelings of disdain among rebel groups looking to legitimize their own identities. Ecocide is a term used to describe deliberate tactical assaults on the biological fabric of a country with the intention to deprive the enemy of shelter, sustenance, and cultural influence (Hanson, et al., 2009). Virunga National Park was established during Belgian rule, and upon decolonization, new park management formed a partnership with the Congolese

army. Some rebel groups regard the occupation of national reserve spaces as a form of resistance or a way to exercise and demonstrate sovereignty over territory that otherwise holds nationalistic symbolism (Marijnen & Duffy, 2018). The everchanging nature of rebel territories makes protected habitat ranges inaccessible to scientists and wildlife officers who are unaware of which sites are safe to enter (Dudley, et al., 2002). This often results in deadly battles between rebels and park guards burdened with the responsibility of protecting Virunga's unique biodiversity amidst war (Marijnen & Duffy, 2018). Furthermore, biological monitoring becomes impossible in addition to conducting conservation or restoration projects.

Civil wars often occur in remote areas where armed groups seek cover afforded by deep forests, mountains, and other rugged terrain. Military, paramilitary, and guerrilla forces lacking established or secure lines of supply often subsist partly or entirely on wild animals and plants, likely contributing to overharvesting of wildlife within occupied territories. In addition, opportunistic, accidental, and random shootings of large mammals and birds by combatants is the primary cause of mortality among wildlife populations during periods of armed conflict (Dudley, et al., 2002). War often leads to abuses of wildlife and natural areas by soldiers and civilians alike. Military expenditures can come at the expense of other governmental programs, usually led by cuts to natural resource management. Protected areas can be left without paid staff, equipment, or infrastructure for the duration of a war, making them more easily exploitable (Hanson, et al., 2009).

Virunga National Park is an example of how countries can mitigate some of the deleterious effects of inadequate park management through the creation of public-private partnerships. It is possible for governments to transfer management of a protected area

under threat to an international non-governmental organization (NGO). New park directors are typically from outside the country, which allows them to be presented as neutral actors merely enforcing the law in a volatile landscape. Virunga National Park fell under new management in 2005 and is currently run by a British NGO called The Virunga Foundation (Marijnen & Duffy, 2018). It is believed that well-governed natural spaces have a positive trickle-down effect on political and economic outcomes in the wider area due to providing a positive example of how to effectively govern a dynamic territory (Marijnen & Duffy, 2018).

Disassociating the park from the Congolese government's control looks to deter rebel activities by utilizing the deterrent capabilities of legitimate world actors. Nevertheless, the mass migration of internally displaced persons fleeing indiscriminate violence has caused widespread deforestation and resource exploitation events in Virunga National Park, which continues to reduce population numbers of local plant and animal species (Zielinski, 2014).

Afghanistan, The Kol-e-Hashmat Khan Wetlands, and Ground Warfare

The Kol-e-Hashmat Khan wetlands outside the capital city of Kabul, Afghanistan provide sanctuary for thousands of storks, egrets, pelicans, and flamingos heading north every spring from southern India. Nearly 400 species of migratory birds pass through these wetlands every spring season, some staying for short periods of time to find food and to rest (Chaon, 2017). In 2002, the UN Environment Programme (UNEP) designated Afghanistan's wetlands as historic, known for being sustainably managed by the Afghan government as royal hunting grounds and as the main water supply of water-scarce Kabul (Chaon, 2017). Wetlands are highly sensitive habitats that provide unrivalled ecosystem

services to humans as well as wildlife. This unique habitat continues to be threatened by the growth of new homes, irrigation systems for agriculture, insufficient waste management, global warming, and warfare that each play a role in gradually degrading the local environment (Chaon, 2017).

On October 7, 2001, less than a month after the terrorist attacks of September 11, President of the United States George W. Bush launched operation "Enduring Freedom" in Afghanistan. His decision was in response to the Taliban, who refused to hand over al-Qaeda leader Osama bin Laden who was responsible for the 9/11 attacks. For the past 19 years, the U.S. and Afghani governments have engaged in war against the Taliban and other terrorist-supporting rebel groups, plunging the region further into chaos. The U.S.-led 'war on terror' has exacerbated the destruction of biodiversity hotspots across Afghanistan (Al Jazeera, 2017). Afghanistan's massive refugee crisis, lack of governmental stability, and extreme poverty, coupled with polluted water supplies, drought, land mines, and excessive bombings, all contribute to the country's severe humanitarian and environmental dilemma (Frank, 2010).

Land mines and other weapons of mass destruction commonly used by the U.S. military threaten Afghanistan's natural landscape and unique biodiversity (Frank, 2010). The exact location and extent of minefields in combat zones are often poorly documented. Although landmines may limit human encroachment to some degree, they do not differentiate between humans and non-target wildlife species when triggered. In addition, habitat alteration and defoliation associated with chemical weapons and herbicides are responsible for declines in local wildlife populations, creating opportunity for invasive species to proliferate (Dudley, et al., 2002). Many chemical warfare agents

have highly toxic and damaging properties intended for human targets, however chemicals that can harm humans are also toxic to other innocent vertebrate species (Lawrence, et al., 2015).

Ground warfare takes place in sensitive and remote locations around the globe. Soldiers and guerilla fighters are often positioned for on-the-ground battle within critical habitats of endemic and endangered species, becoming a potential threat to the survival of these organisms (Lawrence, et al., 2015). The variation in size and severity of military operations leads to a broad spectrum of anthropogenic impacts on the local ecosystem. Explosive technologies have left a legacy on landscapes across the globe by creating large craters, shrapnel, and contamination behind. Landmines and chemical weapons remain a major threat to biodiversity, even decades after being deployed (Lawrence, et al., 2015). Migratory birds passing through Afghanistan are often killed or de-routed due to bomb blasts and poisoned wetlands overlapping with migration corridors (Frank, 2010). Leftover artillery shells or metal fragments following combative clashes can result in accidental ingestion by many animal species. Small particles may be consumed accidentally, causing direct, physical reactions, including choking, severe illness, and ultimately premature death (Lawrence, et al., 2015).

People internally displaced due to armed conflict also pose a risk to biodiversity hotspots in Afghanistan because their preoccupation by their own survival means they do not have the means to properly care for the environment (Frank, 2010). Land grabbing is common in the chaos of war as people take advantage of the lack of law-and-order. As a result, the Kol-e-Hashmat Khan wetlands are dotted with hastily constructed mud and brick structures, erected for refugees and internally displaced persons to use as shelter

during escalations of violence (Chaon, 2017). Throughout the duration of modern warfare, Afghanistan has faced nearly 40 years of unregulated resource exploitation as forests and wetlands are plundered to provide short-term energy and building materials for refugees (Frank, 2010). Conservationists forced to vacate projects in the wetlands due to security risks make them vulnerable to overexploitation. As a result, refugees more regularly participate in grazing livestock, cutting reeds for construction, and dumping waste into waterways without knowing the biological value of the landscape (Chaon, 2017). Following decades of protracted conflict between the central government and the Taliban, Afghanistan's National Environmental Protection Agency (NEPA) has listed 80 unique animal species on its endangered list, and the numbers are steadily growing as instability continues (Frank, 2010).

Columbia, Tropical Rainforests, and Post-Conflict Exploitation

Columbia is a richly biodiverse country, and conservationists often find themselves working in some of the most isolated regions in the world (Dale, 2018). Starting in the 1960s and ending with a peace agreement in 2016, wildlife populations have been threatened by the civil war in Columbia that lasted nearly half a century. The main insurgent group, known as the Revolutionary Armed Forces of Colombia (FARC), launched a guerilla-style campaign inspired by Fidel Castro in 1966 in order to force their communist ideology onto the government. The FARC was known for using indiscriminate violence, high-profile kidnappings, and drug trafficking to raise funds and advance their goals. They also believed in commercializing the use of natural resources, promoting illegal resource extraction and gold mining in some of the world's most biologically diverse tropical rainforests (Felter & Renwick, 2017). Rebels enjoyed the

remote and inaccessible character of the periphery, a necessary attribute for successful guerilla warfare. As a result, most biodiversity hotspots in Columbia became overlapped by conflict zones (Dale, 2018). The final peace agreement in December 2016 ensured the demobilization, disarmament, and reintegration of former FARC members into greater Columbian society, as well as strengthened the control of Columbia's government over the weakened region. However, environmental damage continues due to economic and social pressures (Felter & Renwick, 2017).

War can relieve pressures on biodiversity through altered human settlement patterns, the creation of de facto buffer zones, and reductions in resource-based economic activity (Hanson, et al., 2009). Limitations on human expansion and development imposed by the civil war in Columbia greatly slowed the rate of deforestation possible in tropical rainforests (Dale, 2018). This altered human activity in conflict areas sometimes creates tangible conservation opportunities. The movement of people is an opportunity for conservation organizations to expand their education networks and find alternatives for locals to take on projects that are environmentally sustainable (Hanson, et al., 2009). Unfortunately, Columbians who fled to rural areas resorted to the bushmeat trade in order to prevent starvation when alternative sources of food were not provided by the government. As people who were displaced by the civil war returned home, new challenges arose, including finding ways to satisfy the need for new sources of income and sustenance as a means of survival (Dale, 2018).

Reduced economic activity in resource-based economies can make wartime a recovery period for certain overexploited resources. However, post-conflict damages to the environment may reemerge even more severely (Hanson, et al., 2009). The

unsustainable harvest of timber was controlled by rebels during the years of civil war in Columbia. While the Columbian government focused its efforts on the reintegration of combatants, land restitution, and developing previously neglected rural areas, the health of tropical rainforests was ignored. People are driven by a need for natural resources and income. With the civil war in Columbia over and a peace agreement signed, illegal rebel activities were replaced by an influx of opportunistic international miners and loggers looking to make a relatively easy profit. Without any governance or law enforcement, deforestation rose by 40% in 2016, and rivers, forests, and mangroves were increasingly being destroyed due to illegal mining activities for precious minerals (Dale, 2018).

The peace deal brokered between the Columbian government and the FARC rebels has brought many uncertainties for post-war conservation. Prior to the peace deal, the government of Columbia failed to properly manage the natural resources located in many of the conflict zones. This made it easier for armed combatants to take control of these areas, institutionalizing exploitative economic activities (Dale, 2018). Governments are weakened by civil disobedience, forcing them to prioritize regaining national stability and authority over reversing environmental wrongdoings. Modernization after war is associated with rapid industrialization and large-scale government-funded infrastructure projects. Political leadership often has no vested interest in the mitigation of environmental and social effects of unrestrained exploitation of natural resources due to civilian pressures to pursue economic stability. As a result, resource-based economies exploit natural resources at an increased rate in order to inject wealth back into the country. Consequentially, wildlife populations lose significant portions of their habitat ranges to economic growth and re-stabilization. Today, Columbia continues to pursue a

natural resource-based economy, perpetuating increases in deforestation and environmental degradation as a result (Dudley, et al., 2002).

Despite Columbia's below average commitment to addressing environmental issues, the success of peace agreements may empower citizens to act positively under specific conditions (Lawrence, et al., 2015). With post-conflict rehabilitation and de-escalation at the forefront of societal concern, locals have become the most powerful allies of the Columbian government, telling conservationists and military forces which habitats are free of rebel forces. As a reward for their cooperation, some local leaders are then given new sustainable sources of income through governmentally subsidized conservation projects. For example, organic rice production in Columbia did not exist prior to the civil war, however this industry became a new priority for the government shortly after their transition towards peace. The Alas de Arroz ("Rice Wings") project is a certification system developed for rice producers that uses the presence of threatened bird species as indicators for ecosystem health. When farmers reduce their use of pesticides, they can be granted organic certifications. These certifications not only help communities sell their products at more competitive prices, but also directly benefit some endangered migratory bird species (Dale, 2018).

Final Thoughts

There is no such thing as environmentally friendly warfare. As climate change progresses, the frequency and severity of civil conflicts will increase. Examining the recent conflicts in the Democratic Republic of Congo, Afghanistan, and Columbia showcase the negative consequences of armed conflicts in biodiversity hotspots. Overall lawlessness and the displacement of people provides opportunity for habitat destruction,

decreasing the level of ecosystem health. The presence of war may also encourage international intervention in the name of conflict resolution, renewing the need for immediate conservation action in conflict zones. As seen in the Democratic Republic of Congo and Afghanistan, the internationalization of civil conflicts increased the use of deadly weapons and the number of actors present in one territory at a time, amplifying the extent and duration of environmental damage possible. As seen in Columbia, the conclusion of war with a peace agreement does not necessarily mean an end to environmental exploitation.

While each of the case studies were purposefully chosen for their differences in biodiversity hotspot and war dynamics experienced, I discovered many important similarities while conducting my research. Depicted in Figure 6, both governments representing the DRC and Columbia participated in guerrilla-style combat against insurgency groups over diverging political ideologies. As discussed in the case studies, civil wars tend to bring the destructive forces of war directly into biodiversity hotspots due to their value in providing sustenance, refuge, and monetary gain to rebel groups. Within the Democratic Republic of Congo, AFDL guerrilla fighters repurposed the sanctuary provided by Virunga National Park to aid in their campaign. The AFDL took advantage of the valuable timber, minerals, and exotic animals to fund their rebel activities, prolonging the conflict. Similarly, the FARC in Columbia relied on the biodiversity-rich expanses of tropical rainforest habitat for protection and to sustain themselves. This is important in better understanding the results of my quantitative analysis in Chapter One because the high frequency of armed conflicts occurring inside

of biodiversity hotspots may be correlated with the frequency of civil wars that employ guerrilla-style tactics.

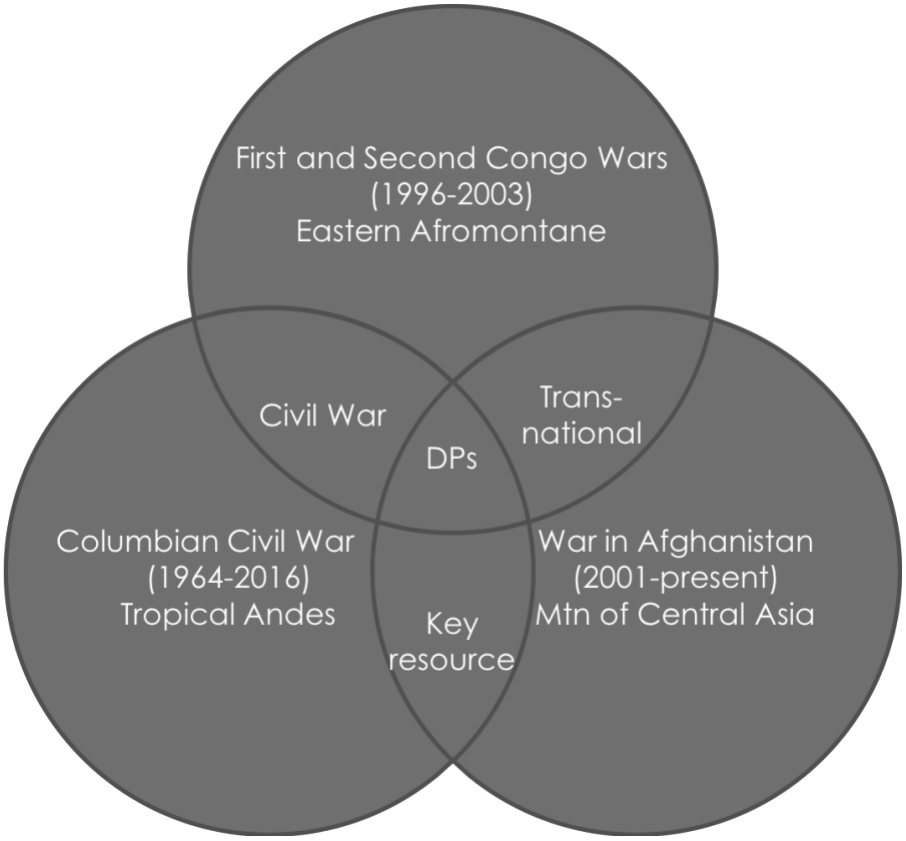

Figure 6. Venn Diagram illustrating commonalities between the three case studies

Another important similarity exists between the wars in the DRC and the war in Afghanistan. Both armed conflicts had a transnational component that not only increased the duration of conflict, but also the extent of damage inflicted on their respective biodiversity hotspots. One element I discussed with regards to the wars in the Democratic Republic of Congo was the role the Rwandan Genocide played in causing regional destabilization. The influx of Hutu and Tutsi refugees into Virunga National Park not only caused the overexploitation of natural resources, but also encouraged international intervention in the DRC on behalf of the Rwandan government. With regards to the war in Afghanistan, the war on terror initiated by the United States exerted political instability

and environmental damage in Afghanistan. The United States is an international superpower, possessing one of the most funded and technologically advanced militaries in the world. The use of landmines and chemical weapons by the United States projects devastating consequences on biodiversity hotspots that overlap with battlefields. With a high frequency of armed conflicts occurring in biodiversity hotspots as demonstrated by Chapter One, international intervention is one element of armed conflict that increases the probability of destroying large areas of habitat in a short period of time due to the pressure to end wars and restore global stability.

In addition, the war in Afghanistan and the Columbian Civil War share a lack of conservationist policy surrounding their key resources pre-, during, and post-conflict. Unlike Virunga National Park, which is under the protection of the Congolese government and the British NGO the Virunga Foundation, the tropical rainforests that run through Columbia are regularly exploited for economic gain. Although deforestation declined during the Columbian Civil War, being a resource-based economy allowed the Columbian people to pressure their government to increase deforestation efforts in order to reestablish financial security post-conflict. In the context of the war in Afghanistan, the Kol-e-Hashmat Khan wetlands used to be a highly regarded royal hunting ground for the Afghan government pre-conflict. However, following the outbreak of war, these wetlands were severely exploited and polluted by Afghani refugees displaced by the destructive path of violence. A lack of conservation provisions that protect key resources sets a damaging precedent for unstable countries. By reinforcing Chapter One, this puts biodiversity hotspots at a greater risk in exceedingly volatile regions that experience a high frequency of armed conflicts.

Finally, a common theme throughout my research and the case studies presented here is that plant and animal populations that lack plasticity when it comes to habitat destruction are exponentially threatened by conventional warfare. All three of the case studies I analyzed in this chapter not only share this inevitability of environmental damage, but also the consequence of displaced persons (DPs). Whether internally displaced persons or foreign refugees, the mass migration of humans causes political instability as well as the exploitation of natural resources regardless of armed conflict type. The governments of the Democratic Republic of Congo, Afghanistan, and Columbia all failed to address the concerns of displaced persons while preoccupied with war. As a result, the stress put on biodiversity hotspots was exacerbated further by civilians trying to fend for themselves. While the high frequency of armed conflicts in biodiversity hotspots is important to recognize, it is also necessary to acknowledge the collateral damage caused by a lack of law and order during the chaos of war.

Biodiversity is defenseless against the extremely destructive behavior of war. The strategies chosen to participate in armed conflict, the existence or absence of policy surrounding key resources, and the movement of displaced persons with no regard for their safety or the fragility of habitats are the environmental aspects from each conflict that should elicit concern or awareness from the international community. Public policy provides a unique opportunity for nations to create new social norms with regards to the environmental consciousness of future wars. While it is impossible to plead with insurgency groups and governments to consider the environmental impacts of their military strategies, this highlights the importance of establishing adaptive post-conflict conservation frameworks that address current as well as future biodiversity threats.

Wildlife conservation can, and should, be used as a peace conduit that strengthens human relationships intersocietally to benefit the health of the planet for future generations. Conservation efforts must be a continual effort in conflict zones that overlap biodiversity hotspots due to the unique and sensitive nature of these areas. Environmentally conscious reconstruction efforts following the conclusion of an armed conflict seek to restore trust between conflicting parties, as well as rebuild habitats that were destroyed. In a reality where climate change alters how humans interact with each other and the environment, wildlife conservation can be used to inspire conflict resolution and restore the ecological composition of warzones.

CHAPTER THREE: THE MERITS OF ENVIRONMENTAL PEACEKEEPING

Introduction

In addition to war's obvious negative impacts on human populations, armed conflicts have been documented as having significant deleterious influences on the environment across a range of ecological scales (Lawrence, et al., 2015). Wildlife exploitation lies at the intersection of economics, politics, and human welfare as human populations continue to increase in density (Dudley, et al., 2002). Fortunately, conflict management often bisects wildlife conservation, as both require parties to recognize problems as shared ones. Engaging with clear goals, a transparent evidence base, and an awareness to trade-offs increases the potential for successful and sustainable conflict resolution outcomes (Redpath, et al., 2013). This is made even more possible by the existence of grassroots advocacy organizations and peacekeeping programs looking to restore and preserve stability within the international community.

Humans have a responsibility to conserve nature in order for vital environmental services to continue to sustain societies into future generations. Conflict and environmental management policies should be integrated in order to prevent potential disagreements from developing into damaging conflicts that undermine reconciliation objectives (Redpath, et al., 2013). I define "environmental peacekeeping" as the use of shared natural resources as a tool to encourage cooperation and to enforce pre-existing peace or ceasefire agreements. It is important to discuss the human rights approach and collaborative approach to environmental peacekeeping in order to better comprehend the versatility of this conflict resolution strategy. The goal of this chapter is not only to promote environmental peacekeeping as an effective solution to relieving pressures

caused by the environment-conflict nexus, but also to hold the world accountable for its self-destructive conflict behaviors.

The Human Rights Approach to Environmental Peacekeeping

The global consumption of natural resources increases exponentially with economic and population growth (UNIFTPA, 2012). Coupled with unsustainable consumption, climate change threatens to escalate competition over land and water resources, becoming a significant component of international peace and security policies (UN-DPA, 2015). Countries most at risk are members of the global south that have an abundance of natural resources that are subject to overexploitation by insurgency groups as well as resource-based economies. As a result, many developing countries may face shortages of vital natural resources, including freshwater, cropland, rangeland, forests, fisheries, wildlife, and other ecosystem services. When natural resources are poorly managed or inequitably distributed, this can escalate into or exacerbate pre-existing armed conflicts (UN-DPA, 2015). However, policies and institutions governing the access, use, ownership, and management of biodiversity hotspots can be used to determine whether or not critical drivers of environmental degradation are allowed to persist in an area (UNIFTPA, 2012).

Framing the environment as a human rights issue establishes human agency and redefines our relationship with nature. In 2009, the Office of the High Commissioner on Human Rights released the statement that despite not explicitly connecting environmental health with human rights, "the United Nations human rights treaty bodies all recognize the intrinsic link between the environment and the realization of a range of human rights, such as the right to life, to health, to food, to water, and to housing," (Hulme, 2017).

Environmental damage has direct and indirect impacts on the enjoyment of a wide range of human rights. Since human rights have been internationally recognized as universal, a healthy environment is necessary to lay the foundation for universal justice, peace, and equality (Hulme, 2017). People are more likely to support environmental reforms if it is clear that these policy changes and project investments have a direct benefit to their well-being. Therefore, a key aspect of conflict prevention, particularly in the era of unpredictable climate change, must be supporting environmental human rights.

There is space for civil society in post-conflict reconstruction and diplomacy via grassroots peace and environmental movements. Using the necessity to fulfill human rights as a framework, these foundational groups can influence political leaders to enact public policy that is also ecofriendly. Traditional peacekeeping roles include protecting civilians without the use of armed force, actively preventing conflict by reducing violence, strengthening security, and empowering national authorities to assume their pre-conflict responsibilities (UN, 2015). In addition to these roles, environmental peacekeeping puts a special emphasis on the universal importance of natural resources, utilizing the inherent obligation of governments to provide civilians with various ecosystem services. By acknowledging the environmental damage caused by conflict, environmental depletion can be halted, and post-conflict justice mechanisms can be used to remedy environmental damage and compensate for any historical grievances that societies may face (Hulme, 2017).

The Collaborative Approach to Environmental Peacekeeping

Well-managed conflict can be an essential component of social change, however local and international institutions often lack the capacity to resolve disputes responsible

for the degradation and depletion of natural resources on their own (UNIFTPA, 2012). The success of environmental peacekeeping efforts does not rely solely on the institutions of the international community, but rather on the establishment of competent domestic conservation and peacekeeping forces. New attention is required by grassroots and international communities to develop integrated mechanisms for mitigating and resolving armed conflicts that threaten biodiversity hotspots.

Developing a collaborative approach to environmental conservation is essential to ensure that the international community can adequately address the growing number of ecological threats to biodiversity hotspots. Conservation projects designed to accomplish environmental peacekeeping goals should take into consideration the needs of conflicting parties as well as the dynamic attributes within the context of an overarching conflict. This may include focusing on eliminating sources of revenue for armed insurgent groups, as well as assisting the government of a conflict-torn state to regain control over its natural resources. Collaborative environmental peacekeeping efforts rely on the ability of international organizations and local community members to utilize an integrated framework. Peace should be promoted across all society members effected by conflict, not just between the government and insurgency groups involved, via the restoration of damaged habitats. Successful environmental peacekeeping projects should enforce the reduction of environmental destruction as well as the reduction of armed conflict, setting the foundation for future sustainable development.

Environmental peacekeeping efforts should seek individual behavior changes while acknowledging that mitigation requires policy solutions and holding conflict parties accountable. One such strategy that fosters collaboration is environmental mediation.

Mediation is defined by the United Nations Department of Political Affairs as a "non-adversarial and collaborative process through which an impartial third party helps parties in a dispute reach a resolution through interest-based negotiations," (UN-DPA, 2015). Mediation is voluntary and consensus-based, which makes it more prone to producing prolonged and sustainable solutions compared to traditionally arbitrated or imposed outcomes (UN-DPA, 2015). Conflict mediation efforts can become more complete when environmentalists are invited to the negotiation table because even though a peace agreement was reached, an environment destroyed by war left to deteriorate may reignite tensions. Environmental mediation focusses on the shared use of natural resources, encouraging reconciliation on other sources of tension while collaborating on the allocation and restoration of biodiversity hotspots.

Final Thoughts

An increasing number of political scientists view climate change and the destruction of ecosystems as a security threat that aggravates existing tensions between different societal groups, making it harder to sustain peace. Environmental degradation in biodiversity hotspots is commonly overshadowed by armed conflict when it overlaps with other factors, such as ethnic polarization, high levels of inequity, poverty, injustice, and poor governance (UNIFTPA, 2012). However, any comprehensive attempt at conflict resolution should consider the political context of the armed conflict along with its ecological dimensions. This requires an equal and impartial approach to environmental peacekeeping, as well as integrated access to scientific and technical information about the ecological processes within the biodiversity hotspots at risk (UN-DPA, 2015).

The shared economic and social benefits of natural resources often cross tribal, societal, and national boundaries that are vulnerable to ideological, ethnic, or political conflicts (UN-DPA, 2015). Finding consensus and building alliances over the sustainable use and protection of natural resources in biodiversity hotspots can be repurposed to aid in the peaceful resolution of other areas of grievance (UN-DPA, 2015). In the heat of a conflict, participants are preoccupied with preserving economic viability, political vitality, and existential survival. Warfare is inherently not an environmentally friendly activity. Nevertheless, environmental peacekeeping can be used post-conflict to encourage participants at every level of society to reconcile their differences sustainably.

Armed conflict disrupts state institutions and social relationships between natural resource users. In addition, the environment and associated infrastructure can become a target of conflict due to asymmetries in power, capabilities, and interests between conflicting parties. As discussed in Chapter Two, the Democratic Republic of Congo suffered from internal fighting that caused insurgency groups, internally displaced persons, and Rwandan refugees to cause destruction to Virunga National Park. In the case of insurgency groups, Virunga National Park was purposefully targeted due to its nationalist symbolism. In addition, the war in Afghanistan was detrimental to the Kol-e-Hashmat Khan wetlands as they became a target for exploitation by internally displaced persons and highly polluting weapons by the United States. Unfortunately, peacekeeping is only useful after a peace agreement has been reached. With several new armed conflicts persisting in the DRC, and the war in Afghanistan not fully resolved, environmental peacekeeping cannot be used. However, peace activists and

conservationists should spend the time developing an effective and efficient environmental peacekeeping agenda to be used post-conflict.

Peacekeeping efforts may not be able to stop a war when combatants are determined to continue fighting. Instead, well-timed efforts can seize an opportunity to stabilize a fragile peace when combatants have exhausted all of their strategies. As analyzed in Chapter Two, Columbia experienced a protracted conflict that lasted over fifty years. While large-scale deforestation projects were halted by the civil war, guerrilla fighting made it difficult for conservationists to conduct research within the tropical rainforests. At the local level, some individual citizens became powerful allies of the Columbian government following the peace agreement in 2016. Many community leaders told military forces and conservationists conducting damage assessments which habitats were free of FARC insurgency forces. This encouraged the government to subsidize organic farming, decreasing the environmental impact of conventional agriculture in some areas. This is a form of environmental peacekeeping because the Columbian government was able to reduce violence and identify rouge rebels by using the economic importance of organic farming to encourage collaboration between civilians and the military.

The future of environmental peacekeeping relies on the ability of conservationists and peace activists to take an intersectional approach to conflict resolution. There are multiple pathways in which the environment can be leveraged to promote peace. However, all environmental peacekeeping strategies require preventative action, mitigation, and adaptation components to prevent further conflict and subsequent environmental damage. While environmental peacekeeping is most effective after a peace

agreement is signed, this conflict resolution strategy can be strengthened by peacebuilding activities that use nonviolent means to resolve systemic injustices.

Community members affected by the destruction of biodiversity hotspots should feel empowered to have a voice in the decision-making process and be allowed to participate in workshops and public forums to transform the cultural conditions that prompted the conflict. In addition, conservationist leaders as well as conflict mediation specialists should be invited to the negotiation table in order to foster sustainable development and reinforce peace. By focusing on the co-benefits of environmental conservation and conflict resolution, such as the impacts on public health and economic success, public perception on these key issues can transform the political will of governments in support of environmentally conscious conflict resolution.

CONCLUSION

The impacts of armed conflicts on biodiversity hotspots are overwhelmingly deleterious due to the consequences on ecosystem functioning. Modern trends in the scale, intensity, and technologies associated with contemporary armed conflicts exert both immediate and residual effects on wildlife and their habitats (Dudley, et al., 2002). Guerilla warfare, weapons of mass destruction, human migration, and other anthropogenic factors severely deplete the structure and health of ecosystems, causing them to underprovide vital services. These include food, clean drinking water, natural resources, and cultural value among other amenities (Lawrence, et al., 2015). As climate change progresses, human populations will become more vulnerable to grievances over unequitable distributions of natural resources. As a result, the frequency and severity of civil conflicts are projected to increase as pre-existing incompatibilities become exacerbated by new origins of stress. Armed conflicts undermine effective conservation management, as well as prevent economic development, social equality, and resource sustainability (Redpath, et al., 2013). Consequentially, war has the potential to adversely alter the environment for future generations.

The purpose of this thesis was to explore several questions: (1) With regards to the frequency of modern armed conflicts, which biodiversity hotspots are the most at risk of experiencing critical damage? (2) How can environmental conservation be used to encourage conflict resolution, and vice versa? (3) What needs can environmental peacekeeping fulfill in order to promote environmentally conscious warfare?

I hypothesized that armed conflicts occur at a different frequency inside than outside of biodiversity hotspots due to the high concentration of biodiversity hotspots in

geopolitically volatile regions. After completing a chi-squared test, I found statistically significant evidence suggesting that the Indo-Malay, Afrotropical, and Palearctic biogeographic realms experienced the highest number of armed conflict-years during the time period of 1945 to 2018. In these three volatile biogeographic realms, the incidences of armed conflict-years occurred at a higher frequency inside biodiversity hotspots than outside of biodiversity hotspots. The most at risk biodiversity hotspots included the Indo-Burma, the Eastern Afromontane, the Mediterranean Basin, and the Philippines biodiversity hotspots. This conclusion is important to humanity's overall understanding of the environment-conflict nexus because it not only stresses the present dangers that biodiversity hotspots face, but also the value of integrating environmental policy into the management of armed conflicts.

The armed conflicts in the Democratic Republic of Congo (1996-2003), the current war in Afghanistan (2001-present), and the Columbian Civil War (1964-2016) all exemplify lessons to be learned from for the sake of preserving ecosystem services for the survivability of future generations. Participating in armed conflicts result in the disruption of government services and normal social behaviors, leading to the destruction of natural resources and infrastructure, the depletion of human and economic capital, and the diversion of public expenditures to support military operations (Dudley, et al., 2002). These repercussions of armed conflicts can be felt in areas long distances away from the origin of war as well as over prolonged periods of time, even after a disagreement has been resolved (Austin & Bruch, 2000). Since nature has the tendency to disregard borders, international institutions and grassroots organizations will become vital in

establishing a more environmentally conscious discourse compatible with current global security concerns.

The extent to which biodiversity is maintained for future generations depends on the ability of the conservation community to meet challenges associated with warfare in biodiversity hotspots (Hanson, et al., 2009). Many nations of the global north have adopted policies that require strict environmental management and scientific inquiry on home soil. However, it should be noted that while engaging in war outside of their respective countries, these policies are not necessarily followed (Lawrence, et al., 2015). Unfortunately, most contemporary wars occur in developing countries that tend to have unstable governmental structures. This creates a situation where there is limited capacity for developing environmental policy or addressing environmental issues that present themselves following conflict (Lawrence, et al., 2015).

Environmental peacekeeping can act as a catalyst for fostering dialogue, building confidence, trust, and capitalizing on shared resource management. Human rights and collaborative approaches to environmental peacekeeping would find success in the Democratic Republic of Congo, Afghanistan, and Columbia. All three of these case studies experienced protracted conflict over political grievances that impacted all levels of civilian life. Peacekeeping efforts by international organizations have often proved effective at keeping wars from reigniting. Environmental peacekeeping should be used in situations in which a long history of conflict makes it difficult to find commonalities between conflicting parties.

Local conservationists, field staff, and NGOs must maintain continuity of presence during periods of political instability. This includes establishing lines of

communication with local government officials and military administrators in rapidly shifting political landscapes, as well as providing much-needed materials and moral support to nature reserve personnel in biodiversity hotspots (Dudley, et al., 2002). The complex interconnectedness of the environment and armed conflicts can no longer sustain the same frameworks currently used in stable countries. Peacekeeping strategies, such as environmental mediation, should be promoted by conservationists and peace activists alike to help conflicting parties identify ways to maximize and share benefits, rather than fall victim to zero-sum positions. International organizations must also develop conservation programs specifically to be used in war-torn regions if they are to be effective in protecting global biodiversity (Hanson, et al., 2009). As of yet, no feasible universal model or framework has been established in order to achieve these goals, highlighting the need for immediate research on the subject.

While nations have the sovereign right, in accordance with the Charter of the United Nations and international law, to exploit their own natural resources, they also have the responsibility to ensure their activities do not prevent future generations from developing sustainably. Intergenerational equity should be placed at the epicenter of how sustainable development is defined because under unmaintainable circumstances, present generations will be unable to compensate future generations (Stefanik, 2017). Uncertainty about the future cannot be an excuse for inaction today. The future generations principle ensures intergenerational equity by balancing present needs with the responsibility to pass on the planet to subsequent generation in a healthy or better condition as it was received from prior generations (Stefanik, 2017). This requires governments to consider the short- and long-term consequences that armed conflicts inflict not only on the health

of the environment, but also on the ability of future generations to fulfill cultural norms and survive (Stefanik, 2017).

Conservation efforts are only as sustainable as the social and political context within which they take place. Targeting the planet's most biologically diverse regions first provides a greater return on the investment of limited conservation dollars. It also gives hope that a significant portion of global biodiversity can be preserved in the face of not just human-human conflict, but also human-wildlife conflicts in the form of unsustainable development, population growth, and climate change. The rehabilitation of post-war countries should be coupled with the rehabilitation of destroyed ecosystems in order to fulfill universal human rights and to ensure the extant of biodiversity hotspots. The environment can be used as a peace conduit, empowering and uniting people over a shared reliance on nature.

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