Spring 2022

Blending Borders: Transboundary Protected Areas and their role in an intersectional future

Alexandra Rogalinski
Bard College

Blending Borders:
Transboundary Protected Areas and their role in an intersectional future

Senior Project Submitted to
The Division of Social Studies
of Bard College

by

Alexandra Rogalinski

Annandale-on-Hudson, New York
May 2022

Dedication

This paper is dedicated to my family, who believed in me exponentially more than I believed in myself, and without whom my education would not be possible. To my grandmother especially for being my motivation to push through the hardest days and always look for the good in people and situations.

Acknowledgements

I would like to thank my incredible advisor, Peter Klein, for putting up with questions at all hours and guiding me through this process with kindness and patience. Thank you also to my board members Laura Ford and Kris Feder; your knowledge has greatly influenced my learning, thinking, and writing and your support over the years means so much. I count myself very lucky to have been taught by you. Lastly I would like to thank Lisa and Melissa, who kept me sane and grounded my whole time here and who helped me grow from a scared freshman to a slightly less scared senior, ready for graduation. I couldn't have done this without any of you.

Table of Contents

Abstract

Protected areas serve the vital role of designating spaces worthy of protection from and for human use. Transboundary protected areas are especially useful in thinking about the interconnected nature of the relationship between human societies and ecological systems as the latter, despite not conforming to the former, are managed as though they did. By learning from frameworks developed specifically for the two in tandem, systems can adapt to different locales and communities world-wide and build resilience in place for the future in which resilience will most assuredly be needed.

Introduction

Between New York and Vermont, the Appalachian Mountain range spans the entire border. In fact, the mountain range stretches through over a dozen US states and into Canada. Mountain ecosystems such as this are home to unique species that live along it in its entirety, paying no attention to the invisible lines humans have drawn. Nevertheless, human management of ecosystems like this around the world are typically divided by those same invisible lines, creating confounding interests and management styles. This is especially true along the borders between countries. Instead of arbitrarily dividing up naturally occurring systems, transboundary protected area frameworks seek to blend the borders between society and ecosystems. In order to protect the resilience of both nature and ourselves, it is necessary to acknowledge that we live in an interconnected way with nature- one affects the other. We then need to learn to live in a way that benefits both halves of the whole. In a world of political borders which mean nothing to nature, this means effective stakeholder communication in order to manage adaptable protected areas that transcend boundaries.

The invasive nature of human influence has spread around the world, leaving virtually no corner of the planet untouched. Any action taken towards more sustainable treatment of Earth and its resources must take the human component into consideration. Socio-ecological systems (SESs) aim to do just that. Since the first major publication on socio-ecological systems by Folke and Berkes in 1998, the term has spread through many academic communities from the social sciences to the environmental sciences, leading to many different definitions ranging from simple to complex. This paper will use a simple definition that can be utilized in the different complex situations to which it will be applied: a socio-ecological system (SES) is a localized system in which human societies and non-human ecological networks are indivisibly linked.

Land is one of the easiest ways to picture the relationship between human and non-human communities since it is tangible and unavoidable. People use land to build their homes and businesses, as well as to cultivate foodstuffs, but some land holds value for people because it is (seemingly) untouched. Green spaces, whether they be cultivated plots of greenery in the midst of cityscapes or a naturally created national park that serves as a destination, these breaks from the markedly human-built parts of the world are held in high regard, if nothing else, for their aesthetic values. Land is, therefore, a hot commodity, thanks to its highly variable potential uses. Although our use of land does not mean a visible disappearance, as it does with other natural resources such as the ones we mine, to grant someone or a party of someones a right to a plot of land typically means that it then becomes unavailable for any other party to use.

Socio-ecological systems and land rights combine in formally recognized protected areas. Formal recognition, meaning by national and international governments and organizations (not necessarily by locals; more on this later), grants land rights to specific governments/ communities who then choose, with varying levels of collaboration from other stakeholders, how

to manage that land. This relationship is a prominent example of SESs: land and its non-human inhabitants are affected by decisions made by humans, who are then impacted by the quality of the land they create. As human populations rise in numbers and reach, not only does the need for protected areas of varying kinds rise, but the variety of people involved in these areas rises, too. It therefore becomes crucial that these managers understand how closely related their actions are to the quality of the land, the health of the ecosystems encompassed therein, and, ultimately, their own quality of life, now and in the future.

A transboundary protected area (TBPA) is an area given a designated protection status by some power, whether it be national or international, that crosses a border of some kind. Although this border can be of any magnitude, the most complex borders are those between nations. It is here that the differences between stakeholders involved in the protected area become more pronounced, as do the ensuing struggles for access rights. “Transboundary protected area” might appear to be a relatively simple term, there is a lot of depth to the concept. Transboundary (sometimes termed transfrontier or transborder) refers to the way in which the protected area spans more than one jurisdiction, whether it be state to state (as in the United States) or country to country. This paper will focus specifically on TBPAs that cross a border between countries. Because these protected areas have more than one rule-making body presiding over them, it makes governance that much more difficult. Not only do people in different areas have different belief systems and ways of engaging with the world around them (this is already the case even within the same country), but there can be significant barriers between countries as well, including language and different government styles.

There are many programs made up of experts from fields of all kinds that help formalize what constitutes a TBPA so that they can be officially recognized and given adequate

protections. Two of these programs are the United Nations Educational, Scientific, and Cultural Organization (UNESCO); and the International Union for Conservation of Nature (IUCN). As its name suggests, IUCN is more fully dedicated to conservation issues than UNESCO, which has a wider variety of programs. UNESCO's Man and Biosphere (MAB) program is the one on which this paper will focus since its programs are the most applicable.

There is a large quantity of research dedicated just to "protected areas" which, while certainly a rich topic worth exploring, is too broad for the current discussion of *transboundary* protection/ conservation areas. This specification necessarily limits the publishings from which further discussion will emerge. Despite this narrower focus, there is still a plethora of research to examine, especially since protected areas that cross boundaries go by many different names. "Transboundary" is among the more formal (i.e. as defined by IUCN or UNESCO) adaptations of the term, but other articles also utilize terminology like transborder and transfrontier to refer to the same concept. Scholars will often create a definition of the term that suits their needs for the specific research they are conducting.

Background: the Main Players

The International Union for Conservation of Nature (IUCN)

The IUCN might be best known among the public for its Red List, a list of known species from around the world and the extent to which they are endangered, but it does a lot more than generate lists. One of the IUCN's programs, the World Commission on Protected Areas (WPCA) has a designated Transboundary Conservation task force or, to use their terminology, "specialist group" (Vasilijević et al. 2015). The WCPA has designated three varieties of transboundary conservation areas: Transboundary Protected Areas, Transboundary Conservation Landscape/ Seascape, and Transboundary Migration Conservation Areas. Within any of these three categories, an area can earn the title of "Peace Park," which is a special designation granted to a conservation area that is specifically dedicated to the promotion of peace and cooperation between the nations that share responsibility for its upkeep.

As stated on their website, the IUCN's mission is to "influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and ensure that any use of natural resources is equitable and ecologically sustainable" (IUCN). It is an organization made up of member parties, which can be governments or "civil society organizations." Member organizations and experts from around the world come together in outlining what is needed to protect the natural (i.e. non-built) environment, as well as protecting and improving the well-being of the humans who live in these environments.

The United Nations is made up of a number of member states (193 at the time of this writing). Along with these members sit a collection of what are termed "permanent observers," which include nonmember states, organizations, and agencies. IUCN is one of these. Although it is not allowed a vote, as a permanent observer it has the right to attend meetings, make

statements, and submit documents (Sabel 2017). This gives it the ability to advocate advancements toward better TBPA management, for example, should it choose to do so.

Transboundary Conservation Areas (IUCN specific TBPAs)

The IUCN defines a protected area as "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Vasilijević 2015). Designation of a TBCA can happen in one of three ways. Top-down approaches begin with higher level institutions, especially governments, at the national and international level. These actors come together to create an agreement to set up a TBCA, but local-level stakeholders are often not involved in the designation decision (Vasilijević 2015, 70). Literature is most critical of top down approaches to designation (Petursson et al. 2013; Trillo-Santamaría 2016; Remis & Hardin 2008) for this reason, and, as with any body being governed by sanctions they did not agree to, locals are much less likely to be receptive to having a formal TBCA in their area.

Bottom-up approaches, on the other hand, involve efforts by local PA management or by local communities themselves to create a system of communication and cooperation across boundaries for the purpose of conservation. Small groups like this have less political power than do top-down entities, so if the proper support is not gained from higher-ups it can be challenging to maintain the long term effectiveness of the TBCA. Having said that, they do have the essential benefit of local support. Bottom-up approaches are the most common formation type recognized by the IUCN (Vasilijević 2015, 70).

The third type of conservation initiative comes from third party groups such as non-governmental organizations (NGOs) or an external donor. Third parties can be large or small in size of money or power, but because they are coming in from outside the situation, they need to gain the backing of both locals and government agencies in order to make long term sustainability feasible. Another snag for third parties is that their assistance and presence in an area usually come with an expiration date. NGOs typically function through donations and grants, so if the money runs out, or there is a need to spend it elsewhere, they cannot continue in the same area. It is therefore essential that a third party creates and communicates a clear exit strategy when they enter an area, so that the TBCA is not left high and dry at their exit (Vasilijević 2015, 72). This consideration is especially important for conservation and sustainability, which are definitionally long term. Once the area has been designated, there are six management categories that can be applied: Ia (strict nature reserve), Ib (wilderness area), II (national park), III (natural monument of feature), IV (habitat/ species management area), V (protected landscape or seascape), and VI (protected areas with sustainable use of natural resources).[1]

As a decades old institution, the IUCN has gone through many iterations of definitions, starting in 2001 with just Transboundary Protected Areas and Parks for Peace. In 2006 the term Transboundary Conservation Area became used, and Migratory Corridors were included in discussion and 2008 saw the previously stated new definition of "protected area" (Vasilijević 2015, 6). These developments brought IUCN terminology to the three current designations of TBCAs, all of which fall under the (too) general heading of Protected Area: Transboundary Protected Area; Transboundary Conservation Landscape and/or Seascape; and Transboundary

[1] The last of these is the most similar to how a UNESCO Biosphere Reserve is managed.

Migration Conservation Areas. Peace Parks serve as a special designation status that can be applied to any of these.

The United Nations Educational, Scientific, and Cultural Organization (UNESCO)

As a specialized agency of the United Nations (an independent legal entity that operates autonomously under the UN umbrella), UNESCO is also categorized as a permanent observer (Casey 2021). It was founded the same year (1945) as the UN itself. UNESCO's self-stated duty is to "reaffirm the humanist missions of education, science, and culture," and to promote peace founded on dialogue and moral solidarity (UNESCO b).

As previously mentioned, this is a vast mission statement, and not particularly related to the topic of transboundary protected areas, which is where the Man and Biosphere program comes in. At the Biosphere Conference in 1968, five entities (including the UN and IUCN) met to discuss global resource use and conservation. It was here that the term "biosphere" was first proposed in an international setting, and the stage was set for the emergence of the MAB coordinating council's first meeting in November of 1971 (UNESCO a). MAB aims to "establish a scientific basis for the *improvement of relationships between people and their environments*… to improve human livelihoods, and… to safeguard natural and managed ecosystems" (UNESCO 2017; emphasis added).

The other main program of focus, UNESCO's MAB program, designates another form of protected area: the Biosphere Reserve. Biosphere reserves are not necessarily transboundary, but a number of them are, and this review will focus specifically on Transboundary Biosphere Reserves, or TBRs. Biosphere Reserves have stricter guidelines for implementation and continuation than a more standard transboundary conservation area. If a nation has an area of

ecosystems that they wish to have designated a biosphere reserve, they will submit an application, which is then considered by the Advisory Committee of Biosphere Reserves. Once the committee reviews the application, they submit their decision to the International Coordinating Council of the MAB program, which has the final say in designation. Once an area has officially been designated a biosphere reserve, it needs to be organized into the standard BR elements. These elements are the core zone(s), buffer zones, and a transition zone.

In 1972, the general conference of UNESCO recommended the development of an intergovernmental committee, the purpose of which would be the protection of cultural and natural heritage (UNESCO 1972). This committee, aptly named the World Heritage Committee, was created from the merging desires for preservation of cultural sites as well as conservation of nature, and understanding the need to preserve the balance between these two goals while recognizing the ways people interact with nature (UNESCO c). Every year, the 21 member states from around the world gather at the UNESCO World Heritage Convention to consider natural or cultural sites for addition to the World Heritage List. The guiding principles in support of World Heritage, labeled the"Five C's" by the committee, are: Credibility (of the List); Conservation (of WH properties); Capacity-building (in order to generate better understanding of and provide assistance regarding the implementation process of sites); Communication (public awareness and support of the WH principles); and Communities (increasingly include communities at all stages of World Heritage processes) (ibid). Like UNESCO's Biosphere Reserves, World Heritage sites focus on encouraging human and non-human elements to exist simultaneously and cohesively.

Biosphere Reserves (UNESCO specific TBPAs)

As previously mentioned, the three zones involved in a biosphere reserve are the core zone(s), buffer zones, and a transition zone. The core zone (or zones) is the area designated for as pure conservation as possible, protected in order to preserve biodiversity. Low-impact usage such as education and research can be allowed here as well, but there should be as little human contact in these areas as possible in order to preserve the integrity of the system. The surrounding zones, called buffer zones, are made up of the land/ water surrounding or adjoining the core zone(s). The buffer zones are home to cooperative activities like recreation and ecotourism where the health of ecosystems are still very much prioritized, but human contact is incorporated in a mindful way that can benefit, or at least doesn't overtly harm, both parties. There can be many buffer zones, and although the boundaries should be clearly defined on the core zone side, it is not necessarily as crucial for outer borders. The final portion of the biosphere reserve area is that of the transition zone, which has the most fluid, flexible borders. Activities in the transition zone include agriculture and settlements, but the wellbeing of and sustainable usage of resources within the region are still paramount.

Biosphere reserves were initially created (in 1976) with the purpose of conservation and research. In the 1980s, however, additional emphasis was added: moving "toward sustainable use and cooperation with local people" (Taggart-Hodge & Schoon 2016). Stakeholders, such as local communities, management agencies, scientists, NGOs, cultural groups, and economic interests, work together to manage the area in accordance with these goals. Designated BRs also have the help of an MAB coordinating council to help them maintain and oversee functions of the area. This is especially helpful for transboundary biosphere reserves (of which there are currently 21 listed by UNESCO) because there are even more parties involved. Having input from an

"expert" source can help these groups work together more effectively. Proper involvement of stakeholders is arguably more important in planning of TBRs than traditional BRs because the dynamic is so much more complicated.

The European Union (EU)

Within individual nations, there are specific authorities to whom managers must look for guidance, and there are different levels to these authorities. One such authority specific to Europe is the European Union. A coalition of willingly participating states, the EU has its own agreed upon laws, regulations, and definitions, including those relating to protected areas. States who have elected to be a part of the EU must comply with said regulations or face repercussions.[2] Although countries that do not belong to the EU are free to make their own environmental blueprints, they could certainly base policies off EU blueprints should they choose. Political tension between the two groups makes it unlikely that non-EU states would look to EU policies for inspiration, however, so for the TBPAs comprising land from both EU and non-EU states it means even more unevenness between the stakeholders across border lines.

In order to understand this unevenness, it is important to understand the foundations provided by the EU, which has several laws that deal with the protection of biodiversity within EU borders. These include the Birds Directive, Habitats Directive, Regulation on Invasive Alien Species, Zoos Directive, Leghold Traps Regulation, Trade in Seal Products, and Seal Pups Directive (Europa a). In 2012, the European Commission (usually just called the commission: the EU's executive branch) initiated a Regulatory Fitness and Performance Programme (REFIT) with the purpose of performing fitness checks and evaluation of current policies, specifically of

[2] They are of course free to have their own, additional regulations, but must meet the EU base level.

the two main pieces of legislation, the Birds Directive and the Habitats Directive (including Natura 2000) (Europa b).

Natura 2000 came into existence through the creation of the Habitats Directive in 1992 (Europa c). It is a "coordinated network of protected areas" that stretches over 18% of land area belonging to EU states, 8% of the states' marine area, and encompasses part of all 27 EU countries. Land area comprises 62.9% (764,222 km²) of its total, the rest (450,752 km²) marine (Europa d).[3] Some of these areas are breeding and resting grounds for threatened species, and some are being protected in their own right, being rare natural habitats. (Natura 2000 places significant focus on rare and threatened species/ areas, which, while important, is not the only reason to protect environments.) Its reach across all EU countries, encompassing such a large area, is necessary to allow for less border loss as well as more area for species migration.

Management of Natura 2000 is constantly shifting and fluctuating over time as new sites continue to get added to the network (Europa e). Instead of working from a pre-approved management plan, management in each site is to be appropriate "to the ecological requirements of the natural habitat types and the species of Community interest." Member states in which a conservation site is located are able to create their own management plans, following guidelines from the EU and from other members. This built-in flexibility is crucial to the success of large scale implementation to ensure that a conservation model actually fits the area in which it is to be placed- a fit determined and designed by the people who know the area best.

There are, however, guidelines created by the commission (in cooperation with stakeholders and member states) to help in the creation of management plans, which will help with consistency across state lines. Guidelines on management are relatively broad so that they

[3] To put those numbers in perspective, the entire United States region of New England, plus New York State, together encompass only 327,746 km².

can be applied to a variety of situations, and are the bare bones kind of guidelines expected when it comes to protecting any part of the environment (Europa e). In summary, management stakeholders are to "take appropriate conservation measures" according to each specific habitat or species; avoid damaging or disturbing activities; and to assess any new project development appropriately to ensure integrity of the site (if public interest necessitates the project, and there are no options beyond one that would normally be disallowed, development may still be allowed while still ensuring "the overall coherence of the N2000 Network" is protected). Member states can find documents online that help them with questions they might have regarding conservation or the designation of a protected area; these documents are offered in every language spoken by EU member states.

It is ultimately the responsibility of the European Commission to ensure that EU law is followed by the member states. In 2008 the Commission adopted a Communication on Implementing European Community Environmental Law and, in 2012, a Communication improving the delivery of benefits from EU environment measures (Europa f). These communications along with the REFIT program and the guidelines for the nation states themselves strive toward the creation of transparency and understanding of EU law.

Having a system like Natura2000 in place for European countries puts in place directives similar to those associated with TBPAs, which helps with understanding and acceptance of protected areas. The more areas in which adaptability and cooperation are touted, the more institutional they can become. This helps smooth the way for future relationships between groups of stakeholders, especially in the field of environmental policy.

Reviewing Literature

To better understand the topic at hand, literature was examined in two parts: theory and cases. Because of the interconnected and oftentimes combative nature of stakeholder relationships in TBPA management, I turned to the topics of socio-ecological systems (SESs) and game theory. This road led me to Elinor Ostrom's Institutional Analysis and Development (IAD) framework, a framework that builds off of competitive game theory (specifically the prisoner's dilemma), the tragedy of the commons, and Mancur Olson's logic of collective action to create a new, adaptive model which fits perfectly in the world of TBPAs.

Literature on both IUCN designated conservation areas and Biosphere Reserves generally consists of case studies of a particular site and the issues within that area specifically, which may or may not be directly due to its being an officially designated TBR/ TBCA. Whether or not designation is explicitly analyzed in a given article, however, there are still themes that emerge from the literature regarding the difficulties and issues faced by these sites.

As might be expected from a topic with so many examples around the world, the literature related to transboundary protected areas is quite large. Much of this literature looks at case studies of a specific protected area, region, or species. Although there is great variability, there are themes that emerge regarding challenges common to TBPAs around the world: management of extractive resources, differing terminology, communication, and stakeholder engagement . Every area is different, as are its stakeholders, but identifying and understanding broad challenges in the context of appropriate theory is an important first step in helping maintain long term success of a specific TBPA.

Theory

Socio-ecological systems (SESs)

As previously mentioned, there are a number of paper-specific definitions of the term "socio-ecological system," ranging from simple, broad ones that can be applied to many situations and fields of study to more narrowly focused ones. Colding & Barthel (2019, 2-3) alone found and analyzed more than 1,500 publications that discuss these systems. Although the term was first raised in its infancy in 1970 by E.D. Ratzlaff, the work around which the bulk of SES scholarship revolves is the 1998 piece "Understanding Dynamics of Ecosystem-Institution Linkages for Building Resilience" by Carl Folke and Fikret Berkes. The authors place focus on the nested nature of both natural ecosystems and institutional management practices and analyze the dynamics that emerge from the linkages between them. Emphasis on the intersectional nature of systems that might previously have been considered separate fields of study is also considered (Folke & Berkes 1998, 9). Ultimately, the authors conclude that flexibility of a socio-ecological system allows it to adapt effectively to minor crises, building up durability over time in order to show resistance in the face of more major, existence-threatening events.

Transboundary protected areas are SESs put into action. Simply by being designated a "protected area," human societies become linked to ecological networks. This link becomes more apparent when locals live within the area and management choices have more visible outcomes. Much scholarly thinking has been done through the Western lens of nature as distinct from humans. This separation does a disservice to the actuality of the relationship, and creates nonfunctional management practices. Instead of focusing on one or the other, it is necessary for the integrity of the entire system for the two to be considered together; a decision regarding one necessarily impacts the other (Clark, Fluker and Risby 2008).

If this interconnected relationship between human and non-human elements sounds familiar, it is likely because this is how Indigenous communities view life on the planet. Despite their practices having allowed Indigenous people to survive on Earth for centuries before the influx of Western ideology on the rest of the world, it is only recently, at least in the United States, that governments have begun to realize the value of said practices. Take, for example, burning practices in the western United States. The US government has prioritized the suppression of fires for so long that undergrowth has built up in forests, making for devastating destruction when accidental fires do start. If, however, forest managers had taken the time to understand what Indigenous people already did, that setting seasonal, controlled fire to clear out undergrowth in certain areas would not only curb damage from wildfires but is also beneficial to species in the area, the problem would not have been built up to the level it was. Thankfully, managers are beginning to see what native land managers had seen all along, and are turning to Indgenous practices to better manage the land.

As thinking about nature has evolved over the decades from one of total isolation to one of separation, it has begun to come around to one of mutually reinforcing co-existence. Humans learn from and value the function and adaptability of nature, but the timelines do not match up, as humans exist on a much faster timeline (Mace 2014, 1559). Again, accurate adaptability is key; humans must think on ecological timescales when acting within their own. That is easier said than done, but the structure of transboundary protected areas provides a framework with which to begin finding solutions. This structure is being seen within TBCAs designated by IUCN and the EU's Natura2000 network, but can be seen especially within the UNESCO programs of the World Heritage Convention and Man and Biosphere's biosphere reserves. All of these programs specifically underline the importance of humans understanding that our societies and

natural ecosystems are inseparably related to each other and base their frameworks off this understanding.

Game Theory

In the world of mathematics and economics, game theory is a thought method used to solve problems of players within an interaction called a game. Games in this context are defined as interactions between players in which one's payoff is affected by the others' decisions (Game 2016). There are two main categories within game theory: competitive and cooperative. Competitive game theory applies to situations in which a game is being played where necessary winners and losers will emerge, and players therefore gain from disadvantaging each other. Likely the most well known example of competitive game theory, the prisoner's dilemma is a theoretical situation in which two prisoners must weigh the pros and cons, in relation to ensuing jail time, of pinning blame on each other. Cooperative games, on the other hand, deal with players working together toward a common goal, forming coalitions, and (often) dividing up the burden of a common issue (Game 2016).

Both of these game theory branches make sense in their specific contexts, but the hitch with applying game theory to TBPAs is that their complex nature means there is both cooperation and competition. At its core, however, the game involving land rights is a competitive one.[4] There is cooperation going on between some groups, but because of that cooperation, one such group, or coalition, can be thought of as a single stakeholder which is in competition with another coalition. Each individual stakeholder will have its own specific visions for the land, but these visions can be reduced down into 3 major coalitions: those who

[4] Remember that although land does not disappear after use in the same way other resources do, having rights to it usually disallows others from its use.

want the resource now, those who want the resource in the future, and those who want a sustainable usage of the resource across time. For land, that means: those who want rights to the land in order to use the specific resources it offers and maximize the returns they can get today (these will be short-term thinkers and those who treat resources as though they weren't finite like some loggers, miners, et cetera, or locals/ governments who benefit from the money generated by these companies); those who want to put land use on lockdown, preserving it and all its resources without allowing any human use (this group could be made up of agencies like conservation-focused NGOs or biodiversity agencies); and those who want rights to the land in order to manage resource use in a sustainable way that ensures availability for use well into the future (this group would be made up of local or indigenous populations, certain sustainability-focused NGOs, or any other stakeholder with similar aims).

Within each coalition there is obviously a large variety of potential uses for land. After a coalition wins out in the larger competitive game, there might then be another game between individual stakeholders to determine more specific usage (or non-usage, as the case may be), depending on how much they are willing or able to cooperate with each other. The coalition in which second level cooperation would be the most difficult would be the "sustainable usage" group for the simple reason that it encompasses the largest range of possible usage preferences.

Institutional Analysis and Development (IAD) framework

Despite being a political scientist, Elinor Ostrom won the Nobel Prize in Economic Sciences (the only woman to have done so) in 2009. Her work was hugely influential to many fields of study, two relevant ones of which include game theory and SES theories. Ostrom's research focused on common-pool resources (resources with both the subtractability of private

goods and the difficulty of exclusion that comes with public goods). Land is one such resource. In collaboration with academics and experts in the field, Ostrom developed her Institutional Analysis and Development (IAD) framework. This framework is a tool that can be used to analyze the processes through which choices occur at both the individual and collective level by looking at actors (stakeholders), their norms, and the institutionalized incentive structures with which they must live (Ostrom 2010). Although the mathematical and modeling aspects of this framework are beyond the scope of this paper, the ideas put forth by Ostrom in support of this framework are extremely helpful in the understanding of stakeholder engagement with each other and the land they care about in complex situations like those of TBPAs.

There are three mainstream models that Ostrom sought to adjust with her research: the prisoner's dilemma, the tragedy of the commons, and Olson's logic of collective action. Among the three, the Tragedy of the Commons is likely the most well known. (Hardin added the crucial adjective "unmanaged" to the word commons in a later publication (Hardin 1998).) Written by Garrett Hardin and published in 1968, this piece describes the inherent nature of man to take just one more, since his personal benefit so greatly outweighs his personal cost in a state of common resources (never mind societal costs). Cattle grazing, to use Hardin's example, is a classic instance of this phenomenon (Hardin 1968, 1244). When there is a pasture held in common among many farmers, each farmer will see the benefit of putting another cow out to graze, since there is seemingly so much grass to be consumed. When every farmer thinks like this, however, the land quickly becomes overcrowded, making the resource inaccessible to anyone. If the farmers had acted in the societal best interest of grazing only a small number of cattle each, thereby ensuring the availability of land and food for the cattle much further into the future, such a tragedy could have been avoided. Another example we hear about very often today is that of

overfishing. It is not hard to see how this situation is applicable to that of TBPAs which, by definition, hold land in common and must find a way to manage the shared resources in a healthy, sustainable way. As described by Ostrom, the problem with this way of thinking is that it assumed common-pool resources were owned by no one, and external forces, namely governments, therefore had to impose sanctions on such resources (2010, 649).

As previously mentioned, the Prisoner's Dilemma is an example of competitive game theory in which it is described that there are two criminals who are each being questioned separately by police without the ability to communicate with one another. There is enough evidence to find them both guilty enough to spend time X in jail. If, however, one prisoner confesses, they will be granted immunity, spending no more time in jail while their partner serves a much longer sentence of Z. If both prisoners confess, they will each be given Y years of jail time, a sentence between X and Z. Because neither player knows what their partner will do, the most logical thing for each of them to do is to confess and incriminate their partner because if they didn't, and their partner did, they would have to serve maximum jail time. Through cooperation they could have both decided to deny, in which case they would both have the smallest jail time possible, but because they cannot be sure of the other's actions, and because they would each have the most to gain by throwing each other under the bus, competitive game theory says the players will decide to take the mid tier jail time, Y. It is the outcome in which they benefit the most, *regardless* of the other player's decision.

Suspect A \ Suspect B	Remain silent	Blame
Remain silent	1, 1	0, 5
Blame	5, 0	3, 3

Figure 1: Source: https://corporatefinanceinstitute.com/resources/knowledge/other/prisoners-dilemma/

Similar to issues with models based on the tragedy of the commons framework, the prisoner's dilemma also models situations in which individuals in the given scenario are trapped within it, unable to change their circumstances for themselves (Ostrom 2010, 648). This is not going to be the case in every competitive situation, and is actually usually not the case as stakeholders do not live in a vacuum. To assume such opens the gate for the less sustainable option of intervention from the top down: outside stakeholders thinking local level stakeholders are too isolated to come to logical conclusions for themselves.

Lastly, Ostrom sought to challenge Mancur Olson's *Logic of Collective Action*. Originally published in 1965, Olson's influential book put forth the central idea that a collective of "rational, self-interested individuals will not act to achieve their common or group interests" unless the group is small enough or is coerced by some outside force (Moffatt 2019). An example of this phenomenon is that of perfect competition. Although all firms would benefit from collusion and the higher prices it would generate, they are also motivated to sell large quantities. The more one firm sells, the more profit potential is taken away from other firms, creating an antagonistic relationship wherein a firm is not motivated to restrict its own output for

the sake of a higher industry price (Moffatt 2019). Olson's book opened the door for a much larger discussion on collective action and the eventual creation of a family of collective action theories (of which one is Olson's original). These theories vary according to resource type, the current state of property rights in the area, how new rules are made, and payoff structures (Ostrom 2003).

Although Ostrom does not disregard any of these previous frameworks or the importance they have had on the fields of political science and economics, she makes clear that these theories alone do not allow for the full range of situations made possible by the complex nature of interactions involving common-pool resources. Individuals who deal with these situations are not as helpless as models like the prisoner's dilemma or tragedy of the commons suggest. There is the ability for collaboration and communication, unlike the isolation of individuals suggested by the prisoner's dilemma (Ostrom 2010, 648). Whether or not those in a situation are willing or able to take full advantage of outside information that exists will depend on the specific situation, but it should not be assumed that stakeholders exist in a vacuum and need outside forces to completely take over their situation. Using case studies, field experiments, and lab work, Ostrom was able to test her fledgling IAD framework against real life and simulated situations. The results supported the idea that by simply allowing for even the most basic communication between stakeholders more cooperation took place than expected, resulting in joint payoffs and the creation and enforcement of sanctions for violators (Ostrom 2010, 656). This contradicts Olson's assertion that such collaboration is not in the best interest of a rational individual.

Common Challenges

Extractive resource use

One of the most well known tensions between environmentalists and traditional economists is the time scale of resource use. Humans have developed an economy that functions using money and views the worth of resources based on their monetary value. This has created an acute tension between overuse of resources in order to be constantly circulating money and not using resources today to make sure that there will still be resources in the future. By prioritizing money today, there are increasingly fewer nonrenewable resources left for use in generations to come. This tension comes into play in a number of ways when it comes to transboundary protected areas. Regardless of the physical makeup of a given TBPA, each protected area is made up of land, a vitally important resource in and of itself. To understand the complexity of the relationship surrounding land (as well as other resources), it is beneficial to turn to game theory.

Central to stakeholder conflict in transboundary protected areas is the desire to have control over the land in question. Stakeholders that prioritize land for its own sake desire rights to land in order that no one takes from it. All other stakeholders desire some level of resource extraction from the land, whether immediate or over time, for monetary purposes or for survival. This battle of extraction timeline is typically one between those living on the land and government forces. Locals have to live by the law and justify any resource extraction they make, but the government is not held accountable by the people, meaning it rarely has to justify its extractive actions (Brosius, Tsing and Zerner 1998).

This distinctly uneven relationship has the potential to lead to illegal extraction such as poaching in order to avoid overbearing regulations (Ngouhouo Poufoun et al. 2016; Ali 2019; Hoffman 2014). In the Dzanga-Sangha Special Reserve of Central African Republic, for

example, illicit trading of meat, arms, and diamonds from within the area circulates into broader markets due to ineffective management (Remis & Hardin 2008). Tensions were also high enough in the area to warrant hunters holding researchers hostage, thinking they were park officials (ibid, 119). Because natural resources have the dual provisional nature in their own right as well as for the monetary value they can provide if sold, tensions regarding their allocation can run very high very quickly.

Definitions, terminology, and the importance of communication

As with any relationship, effective communication is crucial between the stakeholders of a transboundary protected area. Unfortunately it is also one of the most frequent obstacles for transboundary protected areas, especially those that cross international borders. At the most basic level, there are often language barriers that correspond with country borders. Some language barriers are more easily overcome than others, whether it be through generally similar dialects or through a common language between stakeholders. If there is not enough similar ground to stand on, however, having to use interpreters or simplified language is going to make communication in these already complex relationships even slower and more complicated.

Different stakeholders speaking different literal languages is far from the only communication challenge. Stakeholders come to the table from various backgrounds and with varying knowledge sets, so it is understandable that metaphorical language gaps will be present. This is especially the case when stakeholders within different countries or regions define terminology differently (Lamarque et al. 2011). To have a clear cut, strict definition of “protected area” or “national park” has both pros and cons. On one hand, it helps to create a concrete path

forward for any stakeholder wishing to designate an area and grant it definitive protections. Strict guidelines, when understood and enforced, ensure that the standards for these areas can actually be upheld, now and into the future. Another point of view, however, couples with the ineffectiveness of the unilateral application of outside norms on any situation without local input. By creating at a high level designations for formally recognized standards of a national park or protected area, bringing these standards down into localized practice is often not welcomed by those living in the areas, especially those living in rural settings (Perreault 1996).

A frequent cause for contention is when designation requests come from governments or external NGOs, as opposed to the people themselves, but regardless of who initiated the process if the designation requirements are too strict to allow the land's inhabitants to live off their own land it will create understandable tensions and pushback from locals. By allowing for flexibility within management strategies of given designations, stakeholders are better able to work together to maintain local rights as well as environmental integrity. It is at this intersection that the biosphere reserve framework has the ability to play a beneficial part (Hough 1988, 130; Fall 1999; Taggart-Hodge & Schoon 2016). Although biosphere reserves are another example of a top-down management strategy, they are definitionally more flexible due to their requirement of transition and buffer zones, easing the tensions between strict rules of use and rights for people to live off their own land. Even then, it is not an uncomplicated relationship.

Whether or not stakeholders share common terminology is not the most important part of the relationship; communication is. Open and thorough communication at every stage from TBPA creation to regular wellness checks is vital to the success of a structured protected area. Both education (Blicharska and Angelstam 2010; Western et al. 2019) and strong informal relationships (Niewiadomski 2011) are effective forms of communication that allow for better

equality between stakeholders with differing knowledge sets, especially those of scientists, governments, and local community members.

Stakeholder engagement

No matter who took the initial steps in the process of designating a piece of land as an internationally recognized protected area, the most important factor contributing to its long term success is participation and engagement of local stakeholders. If locals were part of the process of working towards recognition to begin with, engagement is not going to be as much of an issue. When the people's government, or even a foreign power, was the one to push for designation without conversation with or consent of locals, on the other hand, resentment is much more likely to form.

No matter where the TBPA is located, or what kinds of biogeographical features comprise it, local stakeholders are going to know its intricacies the best, and are therefore crucial for its survival. This theme can be seen in literature written about protected areas around the globe, from the Korean DMZ (Healy 2007) and the Congo Basin (Ngouhouo Poufoun 2016) to the US-Mexico borderlands (López-Hoffman et al. 2017) and the Bosque Protector Mindo y Nambillo in Ecuador (Perreault 1996). People who live in and on the land and use its resources to meet their daily needs might not always be the best managers of said resources though. Certainly they have knowledge regarding what works for them, but if they are focused solely on their specific location, the importance of global resource or biodiversity preservation might not come into play.

This is where outside forces such as NGOs, resource management experts, or governments can provide aid, conversing *with* local level stakeholders and not *at* them.

Coordination and conversation with, and potentially education of, locals is going to generate much more long term success than simply coming in and implementing broad “solutions” that have been “proven” simply because they happened to work in another location in some other part of the world.

Methods and Data

In order to better understand the theoretical frameworks, I researched transboundary protected areas from around the world. Focusing on those TBPAs that crossed international borders, I came away with two that had not only enough literature available but also sufficient complexities to make them worth analyzing through the lenses provided by the theories and challenges discussed above. As a student with limited resources, the data provided on each of these TBPAs is generated exclusively through second hand information from the physical locations themselves.

Białowieża Forest

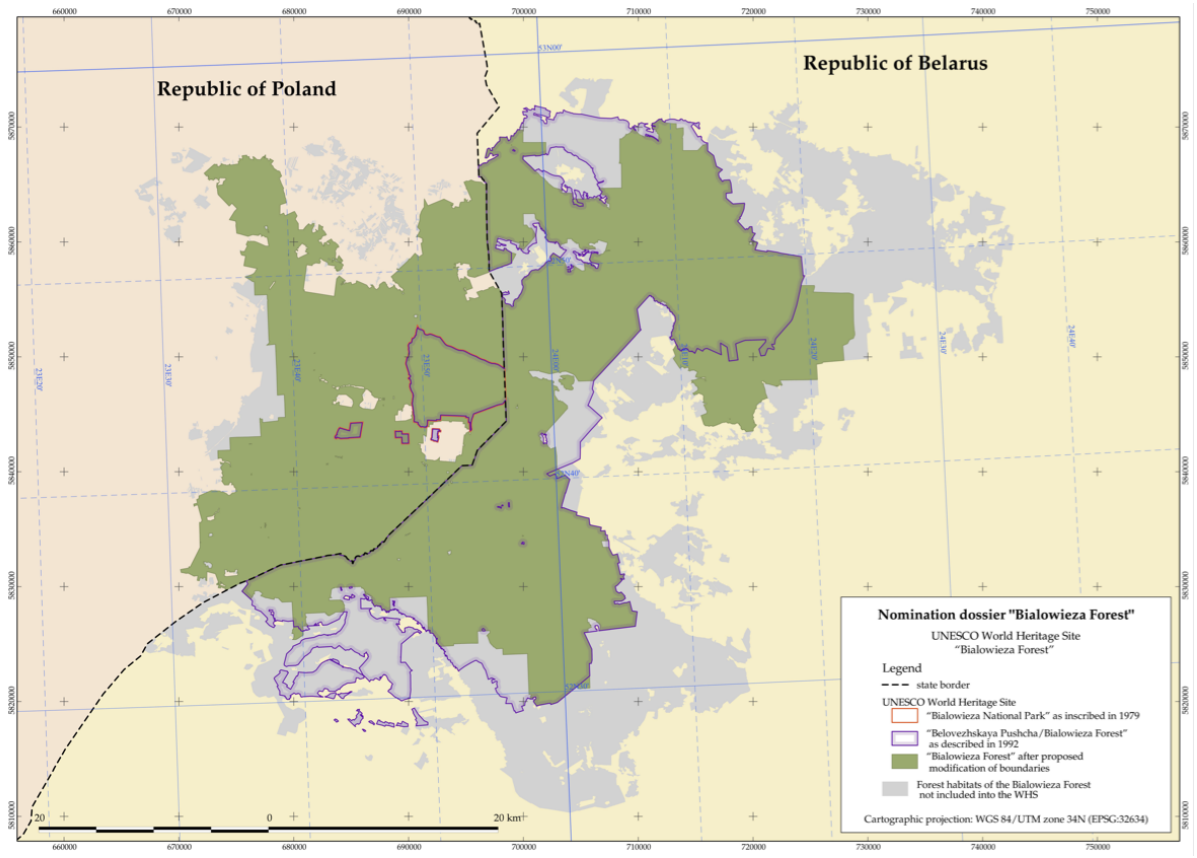

Figure 2: Source: https://whc.unesco.org/en/documents/132364

The conservation history of the Białowieża forest is understandably complex, as are most protected areas having to contend with Europe's fluctuating borders. Its origin, however, is comparatively unique. The reason it is still such a large area of relatively untouched primeval forest is that its protection originated in the *fourteenth century* as a royal hunting reserve. In the following century, rangers were used to aid in protection against illegal hunting and logging, and similar protections remained in place for the next 300 years (Blicharska 2010). It wasn't until the 1700s that "some grazing and game-breeding activities took place;" nevertheless, the area on both sides of the border remained almost entirely unmanaged (Blicharska 2010). In a world marked by constant exploitation of land throughout time, the nearly untouched state of this area is truly a marvel. During and after World War I, however, the near-pristine nature of the forest was brought to a close thanks to occupation by Germans and the later introduction of the European Century Timber Corporation (Perkowski 2018). Despite the devastation brought on by the 20th century, a section of the forest was able to survive, and the Białowieża Forest was designated protection status as a UNESCO World Heritage Site in 1979, increasing over time from 50 square km to today's 141,885 hectares (Perkowski 2018).[5] There is also a buffer zone of 166,708 hectares around the central protected area (Lethier 2016).

Located in Poland and Belarus, the Białowieża Forest is the oldest section of primeval forest remaining in Europe. Due to its combination of ecosystems (not only forests but also wetlands, meadows, and river valleys), rare and specialized species of every category, and natural processes that are unique to and that maintain old growth forest, its conservation is incredibly important to the rapidly diminishing biodiversity faced by this planet (Perkowski 2018; Blicharska 2010). Among the forest's species (59 mammal, over 250 bird, 13 amphibian, 7 reptile, and 12,000 invertebrate species) it is most known for its European Bison

[5] In comparison, the major United States city of Los Angeles, California covers only 121,500 hectares.

population(UNESCO d). The area is home to about 900 individual bison (nearly 25% of the total world's population), making it the largest population of free-roaming European Bison (ibid).

The two major conflicting resources in this area are the trees themselves and the European bison that live within the forest. Because they are a large species, the bison need large, uninterrupted habitats, something that is difficult to find on a human dominated planet (yet another reason why the preservation of forest like this one is so important). However, for some stakeholders, the bison are a hindrance, whether it be in the form of personal property damage, crop consumption, or damage to protected areas, especially trees. Reports of overabundance of bison include claims that their numbers are harming trees (Agrawal 2000). Harm to trees is something that concerns both loggers and organizations or citizens who desire to keep forests intact, two groups that would ordinarily be at odds. Despite these claims, there are a number of organizations dedicated to the preservation of the bison in the area, and it has become something of a symbol for the forest as a whole (Perkowski 2018).

On a basic level, there is cooperation between Poland and Belarus when it comes to the protection and management of the Białowieża forest. It does have the designation of an area to be protected, and is legally recognized as such in both member states. Authorities from the Białowieża National Park in Poland and the Belovezhskaya Pushcha National Park in Belarus (see Figure 2) as well as the Polish Forestry Administration have all entered into an agreement in order to create and implement a management plan for the area (UNESCO d). A transboundary steering group was also founded with the intent of better communication and coordination.

There are a number of complexities within the government system of both Poland and Belarus, and the general action taken by each regarding environmental protection is different from the other. For example, in Poland, cooperation between local governments is one of the

strongest in regards to environmental protection (Perkowski 2018). Another complication comes from the fact that Poland is a part of the EU, while Belarus is not, and does not show promising signs of heading in that direction. This means that not only does Poland have to answer to the EU restrictions when it comes to protected areas, but the two countries are not being held to the same standards. It is always possible for Belarus to adopt policies similar to those of the EU, but, as just mentioned, their alliance has shown trends pulling them away from EU nations, making it unlikely they will look to the EU for guidance of any kind.

Besides the government of the countries, there are a number of other stakeholders (residents, scientists, foresters, environmentalists) who butt heads, not allowing the forest to have consistency in regards to management. Because the two nations are independent, there has historically been a physical barrier on the border, blocking easy travel between the two, a problem both for forest managers and the species living within it (Agrawal 2000). That barrier has shown promising signs of being removed in the name of easier access within the forest (Perkowski 2018), but as tensions in Europe between differing alliances constantly flux, it is difficult to know how Białowieża will be affected.

East Carpathians Biosphere Reserve (ECBR)

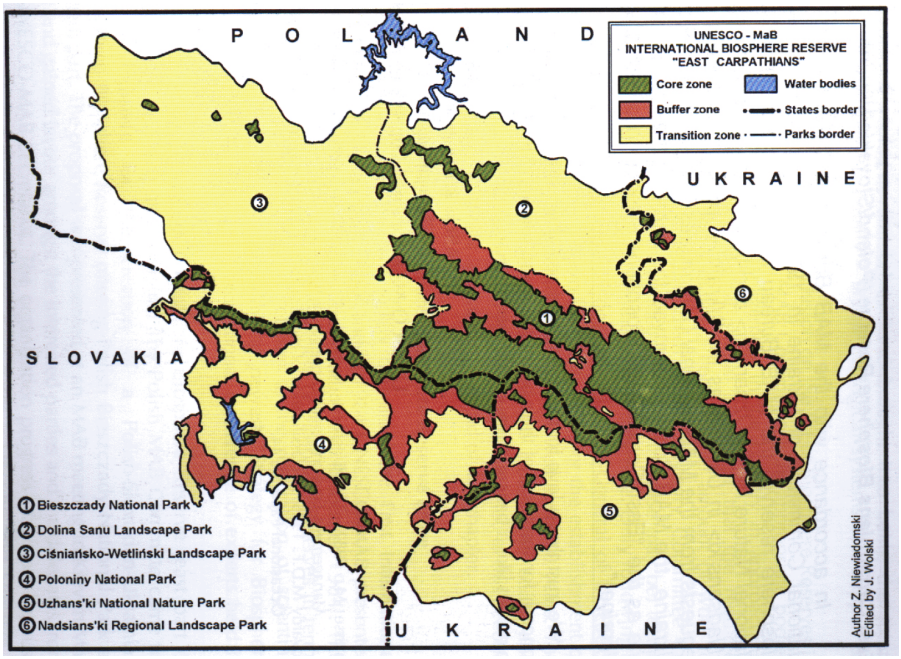

Figure 3: Source: Taggart-Hodge & Schoon 2016

The ECBR is a UNESCO designated biosphere reserve located in an area that crosses the borders of Poland, Ukraine, and Slovakia, of which Ukraine is the only non-EU member. Created in 1989, the ECBR was the first tri-lateral biosphere reserve, combining pre-existing Poland-Slovakia areas with a new section in Ukraine (Taggart-Hodge & Schoon 2016). Like many other transboundary protected areas, especially in Europe, the ECBR is composed of multiple distinct protected areas: Bieszczady National Park (29,200 ha), San River Valley Landscape Park (33,240 ha), and Cisna-Wetlina Landscape Park in Poland (51,165 ha); Poloniny National Park in Slovakia (29,805 ha); and Uzhansky National Nature Park (39,159 ha) and Nadsyansky Regional Landscape Park (19,428 ha) in Ukraine (Niewiadomski 2006; Niewiadomski 2011). The totality of these areas make up the formal ECBR. This totality is then divided into the three designated areas associated with biosphere reserves: a core area of 30,142 hectares, a buffer zone of 24,757 hectares, and a transition zone of 158,313 hectares, all of which

combine to encompass the total 213,212 hectares of the ECBR (Niewiadomski 2006; Taggart-Hodge & Schoon 2016).[6]

Understandably, governance of the ECBR has shifted quite a bit since 1989 as the area itself morphed into what it is today. In 1991 a trilateral protocol was signed and the Coordinative Council was formed. Later, in 2003, the Carpathian Convention was created as a governance mechanism for the whole of the "Carpathian area" and to facilitate cooperation between member states (Taggart-Hodge & Schoon, 5).

Land in this area has a long and very complicated history involving movement of both people and borders. During World War II, Poland sided with the Ukrainian push for independence. After the war, the movement was crushed, and people were forcibly removed from the area as punishment (Taggart-Hodge & Schoon 2016). Political movements and changes on the Slovakian side of the border forced relocation of citizens from their farmlands into urban centers to find work (Solár 2020). Because of the constant state of flux of inhabitants of the region throughout the past century, there has been less human influence than in more settled parts of Europe, a reclaiming of nature over previously overpopulated and managed land (Niewiadomski 2006). Accordingly, the ECBR is unique among temperate Europe for its ability to have maintained relatively healthy populations of plants, mammals, and birds (Taggart-Hodge & Schoon 2016). Like the Białowieża forest, the ECBR hosts primeval beech stands[7] and is home to large species like the European bison, red deer, and brown bear (Solár 2020; Niewiadomski 2006). In the region there are some distinct vegetation types: beech forest,

[6] It is difficult to draw hard lines between buffer and transition zones, so the exact numbers for these zones are subject to variability.
[7] A group of trees sharing one or more similar characteristics that set it apart from the rest of the forest (Snyder 2014).

beech-fir forest, dwarf-shrublands (with green alder), and subalpine meadows. There are also over 100 bird species in the area (UNESCO e).

Current human populations are decreasing in the area, especially among young people, so there is not a very large working population. Those who are in the workforce are typically involved in agriculture, forestry,or, especially on the Polish side, tourism. Agriculture in the area is made up of the raising and breeding of cattle or sheep as well as smaller scale organic farming. Tourism is based around the wealth of historical sites and buildings in the area which are worth visiting in and of themselves, but locals have also increased their participation in older traditional and cultural events that appeal to the tourist populations (UNESCO e, Taggart-Hodge & Schoon). Ecotourism is another more specific income opportunity for governments and locals within the region. As a rapidly expanding sector of the global tourism industry, there is a lot of income potential. Solár (2006, 1875) points to the possibility of growth in the ecotourism sector that allows for the realization of "recreational tourism values," while simultaneously ensuring the conservation of species and their habitats.

This area is one of consistent turmoil (as is being shown right now with the invasion of Ukraine), so the fact that there have been consistent efforts toward protection of these areas is, while due in no small part to the migration patterns caused by said turmoil, particularly impressive. Unfortunately, as the borders between countries have settled and development increases, conflicting viewpoints about land management are on the rise as well. To begin with, the initial establishment of the ECBR was one decided on mainly by state institutions, and not necessarily with inclusion of locals (Solár 2020). This means that locals are not invested in the successful conservation of the land, and are much more likely to desire land rights simply for the capital they can reap from its harvest, in one way or another. One of the more prevalent problems

is that of deforestation. As we learned from the Białowieża case study, primeval forest land has a high monetary value, and although it also has exceedingly high biodiversity value, we live in a society that prioritizes the former over the latter.

Funding of the ECBR is complicated, and is another point of change in the region. In 1995, the Foundation for the Eastern Carpathian Biodiversity Conservation (ECBC) was created. This foundation was an environmental trust fund established by and for the three countries with land in the ECBR. When Poland and Slovakia joined the EU, however, the foundation, which had been located in non-EU member Switzerland, needed to move in order to reduce costs and complications. During the transition, the foundation took on the entirety of the Carpathian mountain range as it extends through Poland and Ukraine. After the erasure of the ECBC from the Swiss register in 2011, the new foundation formally opened in 2012 in Slovakia with the new name Carpathian Biodiversity Conservation Foundation. Managing authorities of the foundation include each of the three ECBR countries and the World Bank (Nadácia). It is not yet clear whether or not this fund is entirely effective. Solár (2006, 1875) mentions that without assistance from external funds the balance between environmental considerations and continued pressure from economic drivers like forestry is increasingly more difficult to manage. This is likely in part because the fund now covers more land than just the ECBR itself, which thins out funds while increasing the number of entities involved, slowing down action and fund dispersal. In his 2011 paper, Niewiadomski speaks to the considerable benefits of the ECBC, not only for funding but also for outreach and collaboration for the ECBR. (Its dissolution was mentioned, but had not been completed at the time of Niewiadomski's writing.)

Discussion

Extractive Resources

In order for a TBPA to be successful, any and all groups involved in its management must compromise and come to one solution. The challenge of regulating extractive resource management is a particularly difficult one due to the finite nature of the resource(s). Both the Białowieża forest and the East Carpathians Biosphere Reserve have portions of primeval forest, the trees from which are in high demand. The ideal way to manage such trees, from a biodiversity perspective, would be to leave them be so that they can continue to be biodiversity hotspots and home to countless species reliant on that diversity for their survival. These trees are also highly prized for their wood however, and forestry services are active stakeholders in both sites.

Forestry is an industry that provides jobs to locals, as well as income to governments, so it is easy to see its appeal. In the ECBR, for example, forestry plays a different role in each of the three countries. In Ukraine, there are only a few regions where ski resort development is permitted; the East Carpathians is one. Development of the Ukrainian region of the park is therefore comparatively more dangerous for the ecosystem than in the other countries. As national firewood consumption increases, so too does pressure from the forestry industry. Many Ukrainian organizations support efforts to use more resources produced from forest biomass, which could represent double the consumption of wood for energy production by 2030 (Solár 2020). There is also a conflict between forestry and ecotourism. Cutting and logging is unsightly, which negatively impacts the ecotourism industry. This has resulted, in the ECBR, in the forestry industry suppressing the development of ecotourism (Solár 2020).

The Białowieża forest protected area is structured differently from the ECBR, though similar to a biosphere reserve. One section of the Białowieża National Park, an area measuring roughly 5,258 hectares, is a "strictly protected reserve with no management," meaning no use of resources is allowed here (Blicharska & Angelstam 2010). In the remaining parts of the protected area, management is conducted with varying degrees of conservation in mind, as well as maintenance and restoration. There is a strong division between local attitudes to maintain the status quo (including the forestry that is currently allowed) and outside desires to increase protection of this unique forestland. This conflict of desires falls easily in line with game theory, as one set of stakeholders wants to take the trees and profit from them now, while the other wants to stop harvesting in the current time frame, preserving them into the future so they can continue to expand the forest and shelter the rich biodiversity of the species that live there. This tension is especially seen on the Polish side of the border (Blicharska & Angelstam 2010). (It is also important to note that the inclusion of Poland in the European Union has made it easier for outsiders from EU nations and allies to come in and learn more about the area than it is on the Belarusian side.) According to these authors, the current situation, in which there is a mutual lack of trust on both sides of the border, will need to be addressed first if there is to be any chance of building a common management structure.

During the World Wars, logging efforts erased large quantities of the forest that had survived up to that point. After the end of World War II, citizens and NGOs both began raising concerns to the World Heritage Center about the levels of logging going on within the Białowieża protected area (UNESCO 2017b). Logging is currently allowed, and although the State Party of Poland has been urged to halt all logging and wood extraction, it is not a simple process. Forest managers must take cutting for reasons other than timber into consideration here,

reasons such as public safety and fire control measures, but one of the biggest threats to tree quantity and quality is the spruce bark beetle (Generalna & Państwowych 2017). Since 2012 spruce beetle populations have greatly reduced the presence of spruce trees; the dieback has affected 20,000 hectares of forest land, according to the Białowieża Forest website (ibid). Biodiversity reduction from this has detrimental impacts on the present and future forest health. In order to get ahead of the spread of beetle populations, it is, unfortunately, often necessary to cut down spruce trees in order to isolate an infected tree. Each stakeholder or group of stakeholders will have its own opinion about what should be done, so it is easy to see how complicated decision making is here. No matter the ideal outcome for any particular coalition, taking action in any given direction regarding resources such as this (those that are not renewable on a human life time scale) is incredibly difficult.

Stakeholder Engagement

In the case of the Białowieża forest, Blicharska and Angelstam (2010, 73) conclude that not only is ecological restoration of key importance, but "in aiming at biodiversity conservation in densely populated Europe, people should be the cent[er] of attention." In fact, one of the reasons for struggles within Białowieża is that "stakeholders advocating better protection of Białowieża Forest built their arguments on the strong scientific evidence about this ecosystems composition, structure and function, to a large extent neglecting the local people's situation and needs," leading to conflict that could have otherwise been avoided or minimized (ibid, 71).

Citizens are valuable for their ability to collect ground level information, especially about the implications of conservation-related management strategies (Agrawal 2000). Agrawal agrees with both Blicharska and Angelstam that better management does not mean implementation of prescribed approaches without inclusion of residents, and that people living within the protected

area can provide valuable data. Some positive steps have been taken towards more and better citizen engagement in the Białowieża forest area like the implementation of an agreement between local citizens/ counties of both Poland and Belarus, and emphasis has been placed on the importance of local authorities and governments when it comes to cross border cooperation and communication (Euroregion; Perkowski 2018).

Authors writing about the Eastern Carpathians Biosphere Reserve agree that "strengthening fruitful and positive cooperation between local communities would be extremely beneficial" (Solár 2020, 1875). To begin with, it was established predominantly without local level involvement or decision making and, since it incorporates land from three countries, there are even more locals that need to be involved. This lack of initial inclusion has resulted in "a general[ly] low acceptance of nature conservation by the local population" which needs to be overcome in order to more cohesively and successfully manage the BR (ibid, 1876).

It is also important to note, however, that local people will not automatically be willing to support conservation efforts, especially in situations where they are largely dependent on localized natural resources (Blicharska and Angelstam 2010, 72). In such instances, it becomes necessary to strengthen relationships between locals and "experts" using education and trust building.

Communication

The Białowieża Forest and the Eastern Carpathian Biosphere Reserve are two of the transboundary protected areas with at least one country that belongs to the European Union and at least one that does not. This means they both must contend with both national and international structures, on top of the many other stakeholder definitions and ideas.

Biosphere reserves have a precise definition and implementation process according to UNESCO, but by no means does that mean that they are treated the same way by all countries or stakeholders with which they may be involved. The three countries with land comprising the Eastern Carpathians Biosphere Reserve, for example, each react to its designation differently. It might make sense for Ukraine to have weaker protection/ designation status for protected areas of the three countries, since it does not have to follow guidelines similar to EU nations. This is not, however, the case. In Poland and Slovakia, biosphere reserves are not specifically associated with any protected area category, which means BRs have no legal context in either of these nations. Even though Ukraine has a distinct protected area category for BRs, the according legal equipment does not align with those of a UNESCO biosphere reserve and are instead perceived as strict nature reserves" (Taggart-Hodge & Schoon 2016, 2).

One of the central communication challenges within the Białowieża forest protected area is a skepticism between governments and an unwillingness of experts to fully communicate at risk of saying something potentially upsetting. Without the full participation of scientists and specialists, management cannot fully reach its potential (Perkowski 2018, 88). There has also been miscommunication centered around the expansion of the Białowieża National Park, with locals assuming it would lead to an increase in unemployment (Blicharska and Angelstam 2010, 70). Similar to other green infrastructure proposals, the expansion would generate different jobs, as opposed to fewer jobs; this fact was not effectively communicated and created unnecessary tension.

Conclusion

Thinking about the relationships between human and non-human environments has changed greatly since it was first considered in the environmental movements of the 1960s and ‘70s. Many people still consider humans distinct from natural environments, but research and literature is increasingly showing that this distinction is fiction. Humans are impacting the planet and are, in turn, impacted by the planet. As the quantity of “untouched” land decreases, we need to understand this interwoven relationship and learn to create and properly manage systems that take both necessary halves into consideration. Transboundary protected areas are the way to do that. It is crucial that managers of these systems understand how closely related their actions are to the quality of the land, the health of the ecosystems encompassed therein, and, ultimately, their own quality of life, now and in the future. By developing adaptable frameworks that can be applied to ecosystems and their human communities around the world, and actively working toward effective management of these sites in spite of the complex network of challenges associated with such interconnectivity, it can be possible to begin living less destructively and more hopefully.

Reference List

Agrawal, Arun. 2000. "Adaptive Management in Transboundary Protected Areas: The Bialowieza National Park and Biosphere Reserve as a Case Study." *Environmental Conservation* 27 (4): 326–33.

Ali, Saleem. 2019. "A Casualty of Peace? Lessons on De-Militarizing Conservation in the Cordillera Del Condor Corridor." In *Collateral Values: The Natural Capital Created by Lanscapes of War*, edited by Todd R. Lookingbill and Peter D. Smallwood, 1st ed., 177–88. Landscape Series. DOI:10.1007/978-3-030-18991-4_8.

Blicharska, Malgorzata, and Per Angelstam. 2010. "Conservation at Risk: Conflict Analysis in the Białowieża Forest, a European Biodiversity Hotspot." *International Journal of Biodiversity Science, Ecosystem Services & Management* 6 (1–2): 68–74. https://doi.org/10.1080/21513732.2010.520028.

Bouamrane, Meriem, Marja Spierenburg, Arun Agrawal, Amadou Boureima, Marie-Christine Cormier-Salem, Michel Etienne, Christophe Le Page, Harold Levrel, and Raphael Mathevet. 2016. "Stakeholder Engagement and Biodiversity Conservation Challenges in Social-Ecological Systems: Some Insights from Biosphere Reserves in Western Africa and France." *Ecology and Society* 21 (4). http://www.jstor.org/stable/26270009.

Brenner, Jacob C., and John G. Davis. 2012. "Transboundary Conservation across Scales: A World–Regional Inventory and a Local Case Study from the United States–Mexico Border." *Journal of the Southwest* 54 (3): 499–519.

Brosius, J. Peter, Anna Lowenhaupt Tsing, and Charles Zerner. 1998. "Representing Communities: Histories and Politics of Community‐based Natural Resource

Management." *Society & Natural Resources* 11 (2): 157–68. https://doi.org/10.1080/08941929809381069.

Burleson, Elizabeth, and Diana Pei Wu. 2010. "Non-State Actor Access and Influence in International Legal and Policy Negotiations." *Fordham Environmental Law Review* 21 (1): 193–208.

Caddy, J. F., and J. C. Seijo. 2005. "This Is More Difficult than We Thought! The Responsibility of Scientists, Managers and Stakeholders to Mitigate the Unsustainability of Marine Fisheries." *Philosophical Transactions: Biological Sciences* 360 (1453): 59–75. https://doi.org/10.1098/rstb.2004.1567.

Casey, Heather. 2021. "Guides: United Nations Research Guide: Specialized Agencies of the UN." March 18, 2021. https://guides.ll.georgetown.edu/c.php?g=365747&p=7141851.

Clark, Douglas A., Shaun Fluker, and Lee Risby. 2008. "Deconstructing Ecological Integrity Policy in Canadian National Parks." In *Transforming Parks and Protected Areas*, edited by Kevin S. Hanna, Douglas A. Clark, and D. Scott Slocombe, 154–80. Routledge.

Colding, Johan, and Stephan Barthel. 2019. "Exploring the Social-Ecological Systems Discourse 20 Years Later." *Ecology and Society* 24 (1): 10. https://doi.org/10.5751/ES-10598-240102.

Corson, Catherine, Rebecca Gruby, Rebecca Witter, Shannon Hagerman, Daniel Suarez, Shannon Greenberg, Maggie Bourque, Noella Grayh, and Lisa M. Campbell. 2014. "Everyone's Solution? Defining and Redefining Protected Areas at the Convention on Biological Diversity." *Conservation and Society* 12 (2): 190–202.

Danby, Ryan K., and D. Scott Slocombe. 2005. “Regional Ecology, Ecosystem Geography, and Transboundary Protected Areas in the St. Elias Mountains.” *Ecological Applications* 15 (2): 405–22.

Europa a. “Nature and Biodiversity Law.” Accessed March 20, 2022. http://www.euroregion-pb.pl/wordpress/umowa-zalozycielska/.

Europa b. “Fitness Check Mandate for Nature Legislation.” Accessed March 20, 2022. https://ec.europa.eu/environment/nature/legislation/fitness_check/docs/Mandate%20for%20Nature%20Legislation.pdf.

Europa c. “Natura 2000.” Accessed March 18, 2022. https://ec.europa.eu/environment/nature/natura2000/index_en.htm.

Europa d. “Natura 2000 Barometer.” Accessed April 25, 2022. https://www.eea.europa.eu/data-and-maps/dashboards/natura-2000-barometer.

Europa e. “Management of Natura 2000 Sites.” Accessed March 18, 2022. https://ec.europa.eu/environment/nature/natura2000/management/index_en.htm.

Europa f. “Legal Enforcement.” Accessed March 21, 2022. https://ec.europa.eu/environment/legal/law/index.htm.

Euroregion. “Stowarzyszenie Samorządów Euroregionu Puszcza Białowieska” [The Association of Local Governments of the Euroregion Białowieża Forest]. Accessed March 25, 2022. http://www.euroregion-pb.pl/wordpress/umowa-zalozycielska/.

Fall, Juliet J. 1999. “Transboundary Biosphere Reserves: A New Framework for Cooperation.” *Environmental Conservation* 26 (4): 252–55. http://www.jstor.org/stable/44519614.

Flores, David, and Gregory Russell. 2020.“Integrating Tribes and Culture into Public Land Management.” Northeastern California Plateaus Bioregion Science Synthesis. Fort

Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station https://www.fs.fed.us/rm/pubs_series/rmrs/gtr/rmrs_gtr409/rmrs_gtr409_177_185.pdf.

Folke, Carl, and Fikret Berkes. 1998.“Understanding Dynamics of Ecosystem-Institution Linkages for Building Resilience.” Beijer Discussion Paper No. 112. The Beijer Institute of Ecological Economics, Royal Academy of Sciences, Stockholm, Sweden.

“Game Theory: The Science of Decision-Making,” YouTube video, 9:49, posted by “SciShow,” September 29, 2016, https://www.youtube.com/watch?v=MHS-htjGgSY.

Generalna, Dyrekcja, and Lasów Państwowych, eds. “Position of the Białowieża Forest World Heritage.” Lasy Państwowe, July 29, 2017. https://www.lasy.gov.pl/en/information/all-about-bialowieza-forest/position-of-the-bialowieza-primeval-forest-world-heritage.

Hardin, Garrett. 1968. “The Tragedy of the Commons.” *Science* 162 (3859): 1243–48.

Hardin, Garrett. 1998. “Extensions of ‘The Tragedy of the Commons.’” *Science* 280 (5364): 682–83. https://doi.org/10.1126/science.280.5364.682.

Healy, Hall. 2007. “Korean Demilitarized Zone: Peace and Nature Park.” *International Journal on World Peace* 24 (4): 61–83.

Hoffman, David M. 2014. “Conch, Cooperatives, and Conflict: Conservation and Resistance in the Banco Chinchorro Biosphere Reserve.” *Conservation and Society* 12 (2): 120–32.

Humer-Gruber, Adelheid. 2016. “Farmers’ Perceptions of a Mountain Biosphere Reserve in Austria.” *Mountain Research and Development* 36 (2): 153–61. http://www.jstor.org/stable/mounresedeve.36.2.153.

IUCN. “About.” Accessed December 3, 2021. https://www.iucn.org/about-iucn.

Laird, Wendy, Joaquin Murrieta-Saldivar, and John Shepard. 1997. “Cooperation across Borders: A Brief History of Biosphere Reserves in the Sonoran Desert.” *Journal of the Southwest* 39 (3/4): 307–13. http://www.jstor.org/stable/40170056.

Lamarque, Pénélope, Ulrike Tappeiner, Catherine Turner, Melanie Steinbacher, Richard D. Bardgett, Ute Szukics, Markus Schermer, and Sandra Lavorel. 2011. “Stakeholder Perceptions of Grassland Ecosystem Services in Relation to Knowledge on Soil Fertility and Biodiversity.” *Regional Environmental Change* 11 (4): 791–804. https://doi.org/10.1007/s10113-011-0214-0.

Lejano, Raul P. 2006. “Theorizing Peace Parks: Two Models of Collective Action.” *Journal of Peace Research* 43 (5): 563–81.

Lethier, Hervé, Oliver Avramoski, and IUCN. “IUCN Advisory Mission to the World Heritage Property ‘Białowieża Forest.’” Mission Report. Krakow, Poland: UNESCO World Heritage, June 8, 2016. https://whc.unesco.org/en/documents/157756.

López-Hoffman, Laura, Charles C. Chester, Darius J. Semmens, Wayne E. Thogmartin, M. Sofia Rodríguez-McGoffin, Robert Merideth, and Jay E. Diffendorfer. 2017. “Ecosystem Services from Transborder Migratory Species: Implications for Conservation Governance.” *Annual Review of Environment and Resources* 42 (October): 509–39. https://doi.org/10.1146/annurev-environ-110615-090119.

Mace, Georgina M. 2014. “Whose Conservation?: Changes in the Perception and Goals of Nature Conservation Require a Solid Scientific Basis.” *Science* 345 (6204): 1558–60. https://doi.org/DOI: 10.1126/science.1254704.

Maskin, Eric. 2016. “How Can Cooperative Game Theory Be Made More Relevant to Economics? : An Open Problem.” In *Open Problems in Mathematics*, by John Forbes Nash and Michael Rassias, 347–50.

Moffatt, Mike. “The Logic of Collective Action: Special Interests and Economic Policy.” ThoughtCo, March 19, 2019. https://www.thoughtco.com/the-logic-of-collective-action-1146238.

Nadácia pre ochranu biodiverzity Karpát [Carpathian Biodiversity Foundation]. “About the Foundation.” Accessed March 31, 2022. https://www.cbdcf.org/en/

Nickelsburg, Stephen M. 1998. “Mere Volunteers? The Promise and Limits of Community-Based Environmental Protection.” *Virginia Law Review* 84 (7): 1372–1409.

Niewiadomski, Zbigniew. 2006. “The first trilateral UNESCO-MAB Biosphere Reserve ‘East Carpathians’ (Poland/Slovakia/Ukraine).” In *Proceedings of the 2004 International Conference and Expert Workshop of Transboundary Biosphere Reserves: Following-up on Seville+5*, edited by Roland Stein, Peter Heil, and Lenka Tucˇek, 26-35. Naturpark Pfälzerwald/Parc Régional des Vosges du Nord, Lambrecht/La Petite-Pierre.

Niewiadomski, Zbigniew. 2011. “The East Carpathians—the world’s first trilateral UNESCO biosphere reserve”. In *Crossing borders for nature: European examples of transboundary conservation*, edited by Maja Vasilijević and Tomasz Pezold, 26-30. Gland, Switzerland and Belgrade, Serbia: International Union for Conservation of Nature and Natural Resources (IUCN). https://onlinelibrary.wiley.com/doi/10.1111/j.1755-5825.1973.tb02107.x.

Ngouhouo Poufoun, Jonas, Jens Abildtrup, Dénis Jean Sonwa, and Philippe Delacote. 2016. “The Value of Endangered Forest Elephants to Local Communities in a Transboundary

Conservation Landscape." *Ecological Economics* 126 (June): 70–86. https://doi.org/10.1016/j.ecolecon.2016.04.004.

Ohnesorge, Bettina, Tobias Plieninger, and Patrick Hostert. 2013. "Management Effectiveness and Land Cover Change in Dynamic Cultural Landscapes- Assessing a Central European Biosphere Reserve." *Ecology and Society* 18 (4). http://www.jstor.org/stable/26269401.

Ostrom, Elinor. 2010. "Beyond Markets and States: Polycentric Governance of Complex Economic Systems." *American Economic Review* 100 (3): 641–72. https://doi.org/10.1257/aer.100.3.641.

Ostrom, Elinor. 2003 "How Types of Goods and Property Rights Jointly Affect Collective Action." *Journal of Theoretical Politics* 15 (3): 239–70. https://doi.org/10.1177/0951692803015003002.

Perkowski, Maciej, Wioleta Hryniewicka-Filipkowska, and Izabela Dabrowska. 2018. "Protection of the Bialowieza Forest as a Challenge to Cross-Border Cooperation." *International Community Law Review* 20 (1): 71–107.

Perreault, Thomas. 1996. "Nature Preserves and Community Conflict: A Case Study in Highland Ecuador." *Mountain Research and Development* 16 (2): 167–75. https://doi.org/10.2307/3674010.

Petursson, Jón Geir, Paul Vedeld, and Arild Vatn. 2013. "Going Transboundary? An Institutional Analysis of Transboundary Protected Area Management Challenges at Mt Elgon, East Africa." *Ecology and Society* 18 (4). https://www.jstor.org/stable/26269406.

Rao, K. S., Sunil Nautiyal, Rakesh K. Maikhuri, and Krishna Gopal Saxena. 2000. "Management Conflicts in the Nanda Devi Biosphere Reserve, India." *Mountain Research and Development* 20 (4): 320–23.

Reed, Maureen G., and Merle M. Massie. 2013. "Embracing Ecological Learning and Social Learning: UNESCO Biosphere Reserves as Exemplars of Changing Conservation Practices." *Conservation and Society* 11 (4): 391–405. http://www.jstor.org/stable/26393134.

Remis, Melissa J., and Rebecca Hardin. 2008. *Transforming Parks and Protected Areas: Policy and Governance in a Changing World*. Edited by Kevin S. Hanna, Douglas A. Clark, and D. Scott Slocombe. New York ; London: Routledge, Taylor & Francis Group.

Sabel, Robbie. 2017. "4.1.4 Participation of Non-State Entities." In *Rules of Procedure at the UN and at Inter-Governmental Conferences*, 3rd ed., 54–56. Cambridge University Press.

Snyder, Michael. "What Is a Forest Stand (and Why Do Foresters Seem so Stuck on Them)?" Northern Woodlands, July 2, 2014. https://northernwoodlands.org/articles/article/forest-stand.

Solár, Jaroslav, and Marián Janiga. 2020. "World Heritage Beech Forests and Regional Socio-Economic Policy at the Slovak-Ukrainian Border." *Polish Journal of Environmental Studies* 29 (2): 1869–78. https://doi.org/10.15244/pjoes/106027.

Stoll-Kleemann, S., A. C. De La Vega-Leinert, and L. Schultz. 2010 "The Role of Community Participation in the Effectiveness of UNESCO Biosphere Reserve Management: Evidence and Reflections from Two Parallel Global Surveys." *Environmental Conservation* 37 (3): 227–38. http://www.jstor.org/stable/44519977.

Taggart-Hodge, Tanya D., and Michael Schoon. 2016. "The Challenges and Opportunities of Transboundary Cooperation through the Lens of the East Carpathians Biosphere Reserve." *Ecology and Society* 21 (4). http://www.jstor.org/stable/26270039.

Trillo-Santamaría, Juan-Manuel, and Valerià Paül. 2016. "Transboundary Protected Areas as Ideal Tools? Analyzing the Gerês-Xurés Transboundary Biosphere Reserve." *Land Use Policy* 52 (March): 454–63. https://doi.org/10.1016/j.landusepol.2015.12.019.

UNESCO. 1972. "Convention Concerning the Protection of the World Cultural and Natural Heritage." 17. Paris, France: General Conference of the United Nations Educational, Scientific and Cultural Organization. https://whc.unesco.org/en/conventiontext/.

UNESCO. 1996. *Biosphere reserves: The Seville Strategy and the Statutory Framework of the World Network*. UNESCO, Paris.

UNESCO. 2017a. *A New Roadmap for the Man and the Biosphere (MAB) Programme and Its World Network of Biosphere Reserves*. Paris, France: The United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/in/documentViewer.xhtml?v=2.1.196&id=p::usmarcdef_0000247418&file=/in/rest/annotationSVC/DownloadWatermarkedAttachment/attach_import_a7071ba2-71cc-4ae5-93ee-bdd4be5b1a7a%3F_%3D247418eng.pdf&locale=en&multi=true&ark=/ark:/48223/pf0000247418/PDF/247418eng.pdf#1744_16_lima_int_E.indd%3A.6411%3A45.

UNESCO. 2017b. "State of Conservation of 'Białowieża Forest.'" UNESCO World Heritage Centre, July 20, 2017. https://whc.unesco.org/en/news/1695/.

UNESCO a. "History." Accessed December 8, 2021. https://en.unesco.org/mab/50years/history.

UNESCO b "UNESCO in Brief - Mission and Mandate | UNESCO." Accessed December 9, 2021. https://www.unesco.org/en/introducing-unesco.

UNESCO c. "The World Heritage Convention. Accessed March 22, 2022. http://whc.unesco.org/en/convention/.

UNESCO d. “Białowieża Forest.” Accessed March 20, 2022. https://whc.unesco.org/en/list/33/.

UNESCO e. “East Carpathians Transboundary Biosphere Reserve, Poland/Slovakia/Ukraine.” Accessed March 31, 2022. https://en.unesco.org/biosphere/eu-na/east-carpathians.

Vasilijević, Maja, Kevan Zunckel, Matthew McKinney, Boris Erg, Michael Schoon, and Tatjana Rosen Michel. 2015. *Transboundary Conservation: A Systematic and Integrated Approach*. Edited by Adrian Phillips. 23. Gland, Switzerland: International Union for Conservation of Nature. https://doi.org/10.2305/IUCN.CH.2015.PAG.23.en.

Western, Guy, David W. Macdonald, Andrew J. Loveridge, and Amy J. Dickman. 2019. “Creating Landscapes of Coexistence: Do Conservation Interventions Promote Tolerance of Lions in Human-Dominated Landscapes?” *Conservation & Society* 17 (2): 204–17.

Westing, Arthur H. 1998. “Establishment and Management of Transfrontier Reserves for Conflict Prevention and Confidence Building.” *Environmental Conservation* 25 (2): 91–94. http://www.jstor.org/stable/44519471.

Zbicz, Dorothy C. 2003. “Imposing Transboundary Conservation.” *Journal of Sustainable Forestry* 17 (1–2): 21–37. https://doi.org/10.1300/J091v17n01_03.